

Initial Environmental Examination

November 2013

Viet Nam: Renewable Energy Development and Network Expansion and Rehabilitation for Remote Communes Sector Project

Nam Nghe Hydropower Project

Prepared by Northern Power Company for the Asian Development Bank.

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NAM NGHE HYDROPOWER PROJECT

DRAFT INITIAL ENVIRONMENTAL EXAMINATION

**LOAN 2517-VIE: RENEWABLE ENERGY DEVELOPMENT AND NETWORK EXPANSION AND
REHABILITATION FOR REMOTE COMMUNES SECTOR PROJECT**

NORTHERN POWER COMPANY

JULY 5, 2012

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CURRENCY EQUIVALENTS

Exchange Rate

(as of 05 July 2012)

Currency Unit : Vietnamese Dong

US\$1.00 = 20,774 VND

1 VND = 0.000048 US\$

ABBREVIATIONS

ADB	Asian Development Bank
CEP	Commitment to Environmental Protection
NPC	Northern Power Corporation
EA	Executing Agency
ESDC	Environmental and Social Development Cell
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
DONRE	Department of Natural Resources and Environment
HH	Household
IEE	Initial Environmental Examination
MARD	Ministry of Rural Development
DARD	Department of Rural Development
MOIT	Ministry of Industry and Trade
NO _x	Oxides of Nitrogen
O&M	Operation and Maintenance
RP	Resettlement Plan
RoW	Right of Way
PDPMB	Power Development Project Management Board
PMU	Project Management Unit
SEA	Strategic Environmental Assessment
SC	Supervision Consultant
SONRE	Section on Natural Resources and Environment
SOX	Oxides of Sulphur
TA	Technical Assistance
TCVN	Vietnam Standards
QCVN	Vietnam parameter

WEIGHTS AND MEASURES

ha	hectare
km	kilometre
km ²	square kilometres
m	metre
m ³	cubic metre
m ²	square metre
s	seconds

EXECUTIVE SUMMARY

Objectives and Approach

As part of the Loan 2517-VIE: Renewable Energy Development, Network Expansion and Rehabilitation for Remote Communes Sector Project, ADB will provide funding for specific Mini-Hydropower projects for rural electrification in mountainous provinces of Vietnam. The Northern Power Corporation (NPC) is the Executing Agency (EA) for the project. The planning for individual hydropower projects is carried out in two stages. The first of these stages consists of identification of projects and development of feasibility studies, and the second involves the construction of these projects. Nam Nghe hydropower project has been identified for consideration under the programme and further feasibility studies are underway. This environmental assessment study is also part of this process.

Nam Nghe Hydropower Plant (Nam Nghe HPP) is among the sub-projects identified under the “Renewable Energy Development and Expansion, Rehabilitation of Power Grid in Remote Areas Sector Project”. The project aims to develop the hydropower potential in Nam Nghe River that would aid the electrification of the whole area of Muong Te town and other communes surrounding the town, as well as adding significant energy to regional power system of Lai Chau province.

Nam Nghe hydropower plant is located in Nam Nghe stream in Hua Bum commune, Muong Te district, Lai Chau province. The project will not directly affect any households in the project site. The plant is designed with an installed capacity of 7.5MW and an annual output of $E_{tb} = 36.43$ million kWh. The construction of the power plant is expected to be three years and the plant will start providing electricity in the year 2015.

The Commitment of Environmental Protection (CEP) report required under Vietnamese regulations was sent by NPC to Muong Te District People's Committee for consideration in April 2010.

Environmental concerns and impacts

No removal of houses will be required but the project construction will take and cause impact to 14.23 ha of forest area, in which 90% is mixed forest consisting of bamboo and shrubs, and about 10% of this area is farmland consisting of mainly rice and other crops.

There are no rare or precious plants found in the project area, therefore, major impact on plant life will be limited.

Negative impacts on wildlife in the area are unavoidable, however, the number of species in the project area is insignificant. No large animals are found within the project area. Although, there are small wild animals such as porcupines, squirrels, wild pigs, some rodent species and reptiles.

The project will be constructed on some steep and hilly slopes, which could cause landscape scarring and loss of trees, particularly at the headrace canal, penstock and access roads, which are located on steep land. There is potential for landslides and sediment invasion onto existing land in the lower slopes, resulting in siltation to downstream rivers such as Nam Nghe and Nam Bun, and to agriculture land such as the Chang Chao Pa, Pa Cheo, Pa Mu and Nam Nghe villages. The

discharge from the powerhouse will be into the Nam Bum River, which is immediately upstream of the existing confluence of the Nam Nghe and Nam Bum rivers.

A 3.5 km section of the Nam Bum River between the dam and the powerhouse will have no water flow for approximately eight months of the year. Reducing water flow in the river will have impact on fish and aquatic life.

Environmental Mitigation

The main environmental mitigation measures included in the EMP are as indicated below:

Table 1: Summary of Mitigation

No	Potential Impact	Mitigation
1	Construction impacts with destruction and scarring of land in steep mountain landscape.	Implementation of detailed EMP attached to the IEE to include provision of catchments/cut-off drains, silt traps, stone retaining structures, spoils planning, planting of grass and revegetation of disturbed areas.
2	Use of borrowed materials	Borrow materials only from permitted and existing quarries in the area.
3	Loss of agricultural and forest land	The Resettlement Plan to be implemented and compensated accordingly for loss of land & trees.
4	Reduced water flow in the 3.5 km section of the Nam Nghe stream.	100l/s will be retained in the river system downstream of the dam to protect fish and other aquatic life in the dry season. In addition, at about 300 meters downstream of the dam, there is a tributary which could add 167 l/s of water to Nam Nghe river. Therefore, the flow downstream of the dam will ensure the provision of environmental flow for aquatic species development.
5	Tree planting program	5 ha of tree planting at penstock area, roads, and fill cleared land areas cost 40,000,000 million VND per ha.
6	Erosion and cleaning in riverbed from tailrace discharge	Repair and/or extend the reinforcement of the downstream riverbed and provide a stilling basin.

Aside from compensation for the loss of land and for the temporary use of land during the 3-year construction period, funding is also incorporated in the budget for an Environmental and Social Cell to strengthen the capacity the Power Development Project Management Board (PDPMB), which is the body that will implement the project on behalf of NPC.

Conclusions

This project will have some negative impacts on the people and environment in Hua Bun commune. A resettlement plan will be prepared to compensate for effected land and forest in the project area. The proposed Environmental Management Plan (EMP) attached to this IEE will mitigate the impacts of construction activities. The planned retention of 100l/s environmental flow in the river system will also help reduce impact of the project to the ecosystem.

It is important that NPC as the EA maximizes its ability to implement and monitor the measures set out in the EMP. This is required to set up an Environmental Monitoring Unit including environmentalist & specialists on compensation, who will coordinate with the contractor's environmental staff and the Commune People's Committee during both construction and operation phases.

The main impacts identified in this environmental examination are the result of construction activity and the potential long-term removal of water flow from the 3.5 km stretch of the Nam Nghe River for more than half of the year and the potential impacts on aquatic species.

There is a need to ensure the mitigation of impacts resulting from the construction activities, particularly in the construction of 0.5 km road to the construction site.

I. INTRODUCTION

Purpose and Scope of Environmental Report.

1. The Government of Vietnam has requested ADB for a loan to develop a project that can provide a reliable and affordable supply of electricity to remote mountainous and poor communes. The project will also allow the replacement of thermal power generation with renewable energy.

Under the ADB Loan 2517-VIE: Renewable Energy Development and Network Expansion and Rehabilitation for Remote Communes Sector Project, various sub-projects have been identified and these subprojects consist of two components:

- Component 1 are subprojects that involve the development of small hydroelectric plants and associated facilities,
- Component 2 are subprojects that involve the extension or improvement of rural electricity networks for remote and poor communities.

Under Component 1, the Project will finance the development of between 5 and 10 small hydropower plants, each with a capacity of less than 7.5 MW in the northern and central provinces of Vietnam. The Project is expected to contribute over 30 MW additional volume to the national power system, while Component 2 will help extend the medium voltage power network in Vietnam by approximately 800 - 1,000 km. Low voltage transformers will be installed and the low voltage network will be extended by about 2,500 - 3,000 km. Component 2 will be implemented in the Northern, Central and Southern Provinces of the country.

2. Nam Nghe Hydropower Project is one of the sub-projects identified in Component 1 of the Project. The project will be constructed in Hua Bum commune, Muong Te District, Lai Chau Province.

The overall study of the Nam Nghe Hydropower Project focuses on the technical feasibility of the project. This environment examination is undertaken as part of project feasibility along with a Resettlement Plan and Ethnic Minorities Plan. According to ADB's Safeguard Policy Statement (SPS) June 2009, the sub-project is considered as an Environment Category B project, requiring an Initial Environmental Examination (IEE). This project categorization is based on anticipated environmental impacts of the proposed sub-project.

3. The EA for the project is the Northern Power Company and this report will be submitted to the District Office for Environment and Water Resources for assistance in monitoring the project.

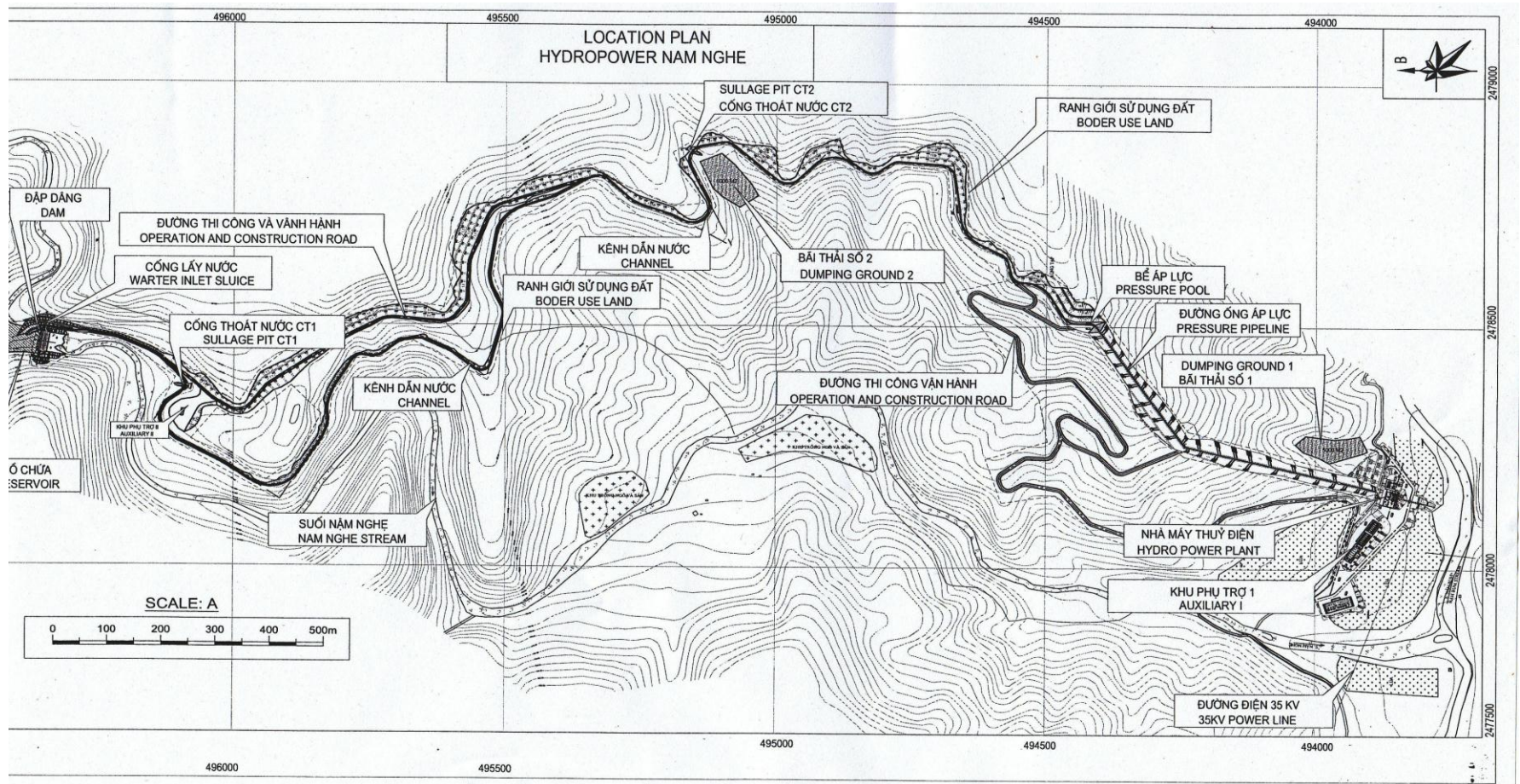
4. The project will change water flow characteristics in the Nam Nghe stream and has the potential to cause adverse environmental impacts to the watershed of this stream system, particularly in the section where water will be diverted away from the natural river to feed the proposed powerhouse. This study reviews the potential impacts of construction and operation of the project on the Nam Nghe stream and its watershed.

5. The construction of the 0.2km long transmission lines, which will link the project to the national grid at substation No. 121, are part of the project and this environmental assessment.

Map 1: Project Location in relation to region



Map 2: Master plan of Nam Nghe hydropower project



II. DESCRIPTION OF THE PROJECT

A. Type of Project and Legal Requirements

1. ADB Categorization

The 7.5 MW Nam Nghe hydropower plant is a relatively small project. Using ADB's Rapid Environmental Assessment Checklist for hydropower (Annex 2), the project is classified as Category "B", in accordance with ADB Environment Safeguards Policy Statement July 2009. An IEE is required to determine if there are significant impacts and if a more detailed impact assessment is necessary.

2. Vietnamese Environmental Assessment Requirements and Regulations

1. The relevant laws and decrees in Vietnam are as follows:
 - a. The Law on Environmental Protection (LEP) No 52/2006/QH11, dated November 29, 2005;
 - b. The Law on Cultural Heritage, June 29, 2011;
 - c. Government's Decree No. 80/2009/ND-CP, dated August 09, 2006 detailing and guiding the implementation of the number of LEP's articles;
 - d. Government's Decree No. 21/2008/ND-CP, dated February 08, 2008, amending and supplementing a number of articles of Government's Decree No. 80/2009/ND-CP, dated August 09, 2006 detailing and guiding the implementation of the number of LEP's articles
 - e. MONRE's Circular No. 05/2008/TT-BTNMT, dated December 08, 2008 guiding the preparation of SEA, EIA and Commitments on Environmental Protection.
 - f. Government's Decree No. 24/2008/ND-CP, dated July 31, 2000 providing detailed regulations in executing the Law on Foreign Investment in Vietnam specifically Article 82 concerning environmental protection;
 - g. The Vietnam's standard and National Technical Regulations on environment currently in effect;
 - h. Government's Decree No. 106/2005/ND-CP, dated August 17, 2005 detailing and guiding the implementation of some articles of the Electricity Law regarding the safety and security of high-voltage power grids;
 - i. MOI's Circular 06/2006/TT-BCN, dated September 26, 2006 guiding the implementation of several provisions of Government's Decree No. 106/2005/ND-CP, dated August 17, 2005, detailing and guiding the implementation of some articles of the Electricity Law regarding the safety and security of high-voltage power grids; and
 - j. National Technical Regulations on electrical safety (QCVN 01: 2008/BCT) according to Decision No 12/2008/QD-BCT, dated July 17, 2008.

Environmental Impact Assessment. The requirements for environmental assessment in Vietnam are set in Article 18 of the Law on Environmental Protection, which states when an Environmental

Impact Assessment must be prepared. Projects that are likely to impose risks or have adverse impacts to national reserves, national parks, historical-cultural relics, natural heritage and on water resources of river basins, coastal areas and protected ecosystems areas are subject to environmental assessment. A Circular issued by the Ministry of Natural Resources and Environment (MONRE) entitled “Guiding Strategic Environmental Assessment, Environmental Impact Assessment and Environmental Protection Commitment”¹ gives detailed guidelines for Strategic Environmental Assessment (SEA), Environmental Impact Assessment (EIA) and Commitment to Environmental Protection (CEP), including SEA, EIA and CEP report preparation, review and appraisal, monitoring, and confirmation of implementation of the mitigation measures.

Regulations² published in 2008 categorise which type of projects are required to undertake an EIA. With respect to the requirements for environmental assessment of hydropower projects, an EIA report is required for hydropower plants having reservoir capacity of 300,000 m³ or above and for high voltage transmission lines with a length of over 100 km. Power generation projects such as mini-hydropower plants and low and medium voltage transmission and distribution lines need only to submit a written CEP to the People’s Committee of the affected district. Since 2008, detailed environmental assessments have not been submitted for small hydropower projects. The CEP report was sent by NPC to Muong Te District People's Committee for consideration in April 2010 and approval is still pending.

Nam Nghe hydropower project has the capacity of 7.5MW. The reservoir volume is very small with a gross storage capacity of 34,490 m³, and a transmission line of 0.2 km. According to Vietnamese Laws, the project requires a CEP.

3. Other Vietnamese Approval Requirements and Regulations

The Section on Natural Resources and Environment (SONRE) at District level is responsible for environmental management in the district/town territory. District People’s Committees (DPCs) are responsible for approving CEPs³ and provincial level environment protection agencies are responsible for certification of registration⁴. SONRE is also responsible for conducting environmental monitoring during project implementation. However, given the current limited capacity of district level SONREs to undertake evaluation of environmental assessment reports, MOIT shall coordinate with the Provincial People’s Committee (PPC) to ensure that the respective SONREs are assisted by provincial DONREs during the review and approval of written CEPs. EIA reports shall be submitted to the district PCs for approval.

Utilization of Water Resources. The project must obtain approval on water resource use. Article 24 of The Law on Water Resources⁵ entitled “Issuing permits for exploitation and use of water

¹ GOV’s Circular No.05/2008/TT-BTNMT dated 08 December 2008

³ Article 26 of the LEP

⁴ Article 17c of Decree 21-2008

⁵ Law on Water Resources No. 8/1998/QH10 May 20, 1998

resources” requires organizations and individuals that exploit and use water resources to obtain permission from the competent State agencies.

Article 64 of the Act on “the Management of the river basin planning” specifies that the agency managing the planning of river basins is the Ministry of Agriculture and Rural Development (MARD).

Decree No 149/2004⁶, Article 4 defines permit issuance principles. Permits are granted initially for 20 years (Article 7). Permits for smaller projects are usually granted at Provincial People’s Committee level (Article 14). The permitting authority will also manage the permit and the dossiers of required information for the project.

Permit owners, among other requirements, are obliged to pay fees, take measures for safety, keep data and information on water resources and make reports to the People’s Committee (Article 18).

Article 21 “Order and procedures for issuance of surface water exploitation and use permits” defines what is required for a permit application i.e. what should be in the dossier accompanying the permit application. Details of scheme are required and certain other information including an analysis of quality of water sources according to State’s regulations. Also papers must be attached regarding land use rights and there must be a written agreement on land use between the organization or individual exploiting the water, and the organization or individual having the land use right. The competent People’s Committee must certify the agreement.

Environmental Flow. Decree No 112/2008⁷ prescribes the scope of environmental management protection requirements for integrated exploitation of hydropower and irrigation reservoirs (Article 1). It establishes the need for a minimum flow which is defined as “the lowest level of flow required for maintaining a river or a river section to ensure the aquatic ecosystem’s normal development and the minimum level for the exploitation and use of water resources by water users according to the priority level set in the river basin planning.”

According to Ministry of Natural Resources and Environment (MONRE) based on Article 12.2 is to assume responsibility for the coordination with the concerned ministries, branches and localities in specifying minimum flow requirements for reservoirs.

Land use permit for the project will be applied to the District People’s Committee and water use permit will be applied to Lai Chau province Department of Natural Resource and Environment later when financing is approved for the project.

Cultural and Archaeological Resources. In Vietnam, there are procedures set down relating to chance discoveries of an archaeological nature. The relevant laws and regulations are as follows:

1. Cultural Heritage Law Jun 2001,

⁶ Decree no 149/2004/ND-CP of Jul 27 2004 on the Issuance of Permits for Water Resource Exploration, Exploitation and use, or for discharge of Wastewater into Water Sources.

⁷ Decree No 112/2008/ND-CP of Oct 20, 2008 on Management, Protection and Integrated Exploitation of Resources and Environment of Hydropower and Irrigation Reservoirs.

2. Decree No. 92/2002/ND-CP November 11, 2002 relating to the implementation of some articles of the Law on Cultural Heritage,
3. Regulation on exploration of archaeological excavations Decision No. 86/2008/QĐ-BVHTTDL December 30, 2008 of the Ministry of Culture, Sports and Tourism.

Chapter II of the 2008 Regulations (Responsibilities of Organizations and Individuals when detecting archaeological sites) states that if organizations and Individuals find archaeological sites and/or artifacts, they have the responsibility to protect, maintain the location and promptly notify and hand in the archaeological relics to the closest office of the Department Culture, Sports and Tourism or the Department of Culture and Information.

B. Location and General Description

Nam Nghe hydropower plant (HPP) consists of a reservoir, a dam, an intake, a headrace canal, a spillway at the end of canal, a powerhouse and a tailrace channel. The project will be constructed on Nam Nghe river, a tributary of Nam Bum river which is a left bank tributary of Da river. The damsite is located at coordinates 102°57'00" East longitude and 22°25'10" North latitude.. The powerhouse site is located on Nam Bum river at coordinates 102°56'45" East longitude and 22°23'40" North latitude. The headrace canal is on the left bank of the Nam Nghe River and all the project components are on the right bank of the Nam Bum River (see Map 2). The water flow from the powerhouse is discharged to the Nam Bum River directly upstream of the confluence of the Nam Nghe with the Nam Bum.

The structure for the headworks is a gravity concrete dam founded on rock, with maximum height $H_{max} = 16.5\text{m}$ accounting to crest of non-overflow dam. The intake culvert is located on left dam abutment to convey water to a closed reinforced concrete headrace canal on the left bank of the river. The channel's length is about 3.15 km, almost located in the sandstone and rock sediment formation of Nam Cuoi. At the end of channel is a forebay and penstock intake. Water is transferred in the penstock connecting to the powerhouse located on Nam Bum River bank at elevation 552.0m. The powerhouse is located immediately upstream of the confluence of the Nam Nghe with the main Nam Bum River and the water from the powerhouse is discharged into the Nam Bum River.

The main components of the subproject are as follows: (i) dam with maximum height of 16.5 meters and reservoir with volume $34,490\text{ m}^3$; (ii) a 3,146 meter reinforced concrete channel (iii) penstock of 779.5 meters in length and 1.2 meter diameter divided in 3 sections having different wall thickness, depending on pressure level increase from intake location; (iv) power plant with vertical Pelton turbines; (v) outdoor electricity distribution station; (vi) high potential line 35KV to transfer electricity to the meeting point with the network; and (vii) management building (see Maps 2).

To connect the Nam Nghe hydropower plant to the national electricity system, a proposed 35kV connection line from the powerplant will be made to connect to the single line 35kV Muong Te – Hua Bum connection line at existing substation No. 121.

The sand and gravel quarry sites are located about 10km away from the project site. The materials will be transferred to two temporary storage sites; one located at the powerhouse site (5000m^2) and

the other is in the middle of the channel with capacity of 6,000 m². Soil and rock from burrow pits will be transferred to these locations. (See map 2)

The water delivery system has a volume of 329.65 m, which is designed to deliver a maximum of 2.63 m³/s to two turbines to generate 7.5 MW of power. As a result of the project, in the dry season, the Nam Nghe stream will experience loss of water flow for approximately eight to nine months over the 3.3 km of the river between dam and powerhouse.

During low flow season when flow is less than 0.535 m³/s, the plant will operate for only a few hours per day to provide electricity for peak hour. The water regime will change immediately downstream of the dam.

There are 4 villages in the project area: Chang Chao Pa, Pa Cheo, Pa Mu and Nam Nghe. However, they are located far enough from the project facilities that they are not directly affected. Chang Chao Pa and Pa Cheo villages are located about 4 km from the powerhouse to the Southeast. Nam Nghe village is 1.5km away from the dam and reservoir location to the Northwest. Pa Mu village is located 2 km from the powerhouse to the Southwest. Access to project area is only through the road from Muong Te District to Hua Bum Commune. This road is still under construction, which makes it difficult to transport materials. (See Photo No. 1)

The hydropower project is located far from the residential area and road construction. The plant operation is independent of the regular route therefore it will not affect the movement of local people in the Hua Bum commune. Hua Bun and Muong Te' s internal road is 100 meters away from the power plant.

For the construction of the dam, spillway and channel, access roads from the powerhouse to the dam need to be created. An access road needs to be created in order to construct the spillway and channel of the dam.

The following 5.0 km roads are required for the project (see Map 2):

- The road connection from Hua Bum - Muong Te to the forebay has a length of about 2133m. This section includes a branch into anchor position 2 for construction of penstock.
- This section covers the shunts in the anchor position 2 for construction of penstock.
- The road from the forebay to the overflow dam and reservoir has a length of about 2,650m. After the canal construction is completed, the surface canal will be part of the route.
- For the powerhouse, upgrading of an existing 215m track is needed in order to provide permanent access to the plant.

More detailed information on the project is indicated in the table below and the locations of various components are shown in Map 2.

Table 2: Project salient features

No	Parameters	Designation	Unit	Nam Nghe
I	Reservoir			
1	Catchment area	Flv	Km ²	28
2	Mean annual discharge	Qo	m ³ /s	2.37
3	Reservoir area 885 m	Fmh	m ²	6101
4	Full Supply Level	FSL	m	890
5	Minimum Operating Level	MOL	m	886
6	Gross storage	Wtb	10 ³ m ³	34.49
7	Active storage	Whi	10 ³ m ³	20.37
8	Dead storage	Wc	10 ³ m ³	14.12
II	Project features			
9	Design flood discharge	P _{1%}	m ³ /s	473
10	Check flood discharge	P _{0,2%}	m ³ /s	561
11	Firm capacity	Nđb	MW	1.55
12	Installed capacity	Nlm	MW	7.5
13	Mean annual energy	E	10 ⁶ Kwh	36.43
14	Powerhouse			Hở
15	Number of unit	n	unit	2
16	Turbine type			Pelton
17	Calculated head	Htt	m	329.65
18	Maximum powerhouse discharge	Qmax	m ³ /s	2.63
19	Overflow dam			Concrete
20	Max. height of dam (Hmax)	Hđ	m	16.5
21	Dan crest length	Lđđ	m	70
22	Structure of box culvert, reinforced concrete	bxH	mxm	1,35 x H
23	Length of channel		m	3143
24	Intake			
25	Trash-rack width	BxH	m	1.8x3.5

No	Parameters	Designation	Unit	Nam Nghe
26	Width of operational gate	BxH	m	1,8x1,8
27	Length of steel penstock	Lh	m	779.5
III	Social power supply in local			
28	Single line 35kV distribution line		Km	20.647
29	35 kV sub-station		station	6
30	Low voltage 0.4kV distribution line		Km	24
31	Access road		Km	5
IV	Compensation			
32	Compensation to forest		Ha	11.56
33	Compensation to paddy		Ha	1.47
34	Compensation to river, stream, wild land		ha	1.2
V	Investment capital + economic/financial indicators			
	Total investment capital		10⁹VND	268.846
	Net investment capital		10⁹VND	232.964
-	Cost of civil work and installation		10 ⁹ VND	127.549
-	Cost of equipment		10 ⁹ VND	61.711
-	Other costs		10 ⁹ VND	3.460
-	Contingency		10 ⁹ VND	25.020
-	Compensation to crop		10 ⁹ VND	0.669
-	Project management cost		10 ⁹ VND	2,875
-	Cost of engineering consulting service		10 ⁹ VND	11,679
-	VAT		10 ⁹ VND	22.866
-	Interest of preferential loan		10 ⁹ VND	13.016
34	Economic indicators			
-	B/C			1.07
-	EIRR		%	10.84
	NPV		10 ⁹ VND	14.30

No	Parameters	Designation	Unit	Nam Nghe
36	Financial indicators (4.26cent):			
-	B/C			1.13
-	FIRR		%	11.39
-	NPV		10 ⁹ VND	31.73
-	Payback period		year	18

Source: Investment project data- March 2011

Table 3: Bill quantity of project

No.	Work items	Unit	Total	Overflow dam	Headrace channel	Forebay + intake penstock	PH+ switchyard	Management house	Diversion work
I	Soil/rock excavation								
1	Sand exc., aQ+apQ _{IV}	m ³	0.0	-	-	-	-	-	-
2	Soil exc Edq+IA1	m ³	260,397.7	2,097.3	125,376.6	78,826.8	54,096.9	-	-
3	Soil/rock exc IA2	m ³	89,274.0	4,194.6	75,226.0	9,853.4	-	-	-
4	Exc, weathered rock IB	m ³	72,587.9	12,583.9	50,150.7	9,853.4	-	-	-
5	Exc, hard rock IIA	m ³	11,314.4	2,097.3	-	-	9,217.1	-	-
II	Soil/rock embankment								
1	Earthfill K=0.95	m ³	2,280.5	-	-	-	2,280.5	-	-
2	Rockfill	m ³	1,122.9	43.8	-	-	-	-	1,079.1
3	Embank. mixed rock/soil	m ³	1,617.5	-	-	-	-	-	1,617.5
			73,951.4	-	46,260.7	5,235.0	16,006.0	3,095.2	3,354.5
III	Concrete								
1	Concrete M150	m ³	5,751.4	3,883.2	1,393.2	-	475.0	-	-
2	Concrete M200	m ³	17,269.4	4,959.1	6,913.7	646.6	4,750.0	-	-
3	Concrete M10	m ³	32.3	-	-	7.3	25.0	-	-
IV	Reinforcement for concrete								
1	Reinforcement for concrete	ton	764.3	148.8	345.7	32.3	237.5	-	-
V	Grouting								
1	Consolidation grouting to	md	247.5	247.5	-	-	-	-	-

No.	Work items	Unit	Total	Overflow dam	Headrace channel	Forebay + intake penstock	PH+ switchyard	Management house	Diversion work
	foundation								
2	Grouting for support anchor	md	3,098.6	1,800.5	1,298.1	-	-	-	-
3	Anchor steel	md	34.4	20.0	14.4	-	-	-	-
4	Shotcrete		4,835.8	2,135.8	2,700.0	-	-	-	-
						443			
VI	Other works								
1	Masonry M75	m3	2,018.2		943.8	-	850.0	-	224.4
2	Grassing to protect slopes	m2	595.0	-	-	-	-	-	595.0
3	Constructing brick M75	m3	8,900.0	-	-	5,500.0	3,400.0	-	-
4	PVC waterstop	md	140.0	-	-	-	140.0	-	-
5	Glass-aluminum framed door	m2	3,859.5		3,859.5				
6	Corrugated iron roof	m2	220.0	-	-	-	220.0	-	-
VI	Equipment								
1	Hydro-mechanical equip.	ton	568.9	18.7	5.0	497.2	48.1	-	-
2	Hydraulic-mechanical equip.	ton	715.0	-	-		715.0	-	-
3	Electro - mechanical equip.	MW	7.5	-	-	-	7.5	-	-

Source: Investment project data- March 2011

Table 4: List of demand on material and main equipment

No	Material	Unit	Qty	Standby
I	Equipment, vehicle			
1	Excavator V= 0.5 ÷1.6m ³	pc	5	1
2	Bulldozer 110 Cv	pc	4	1
3	Vibrating roller 16T	pc	4	1
4	Drilling machine (Φ42-76)	pc	2	Chapter 18:
5	Air compressor 20m ³ /minute	pc	3	1
6	Crane 15 ton	pc	1	Chapter 19:
7	Crane 25 ton	pc	1	1
8	Dumping truck	pc	13	Chapter 20:
9	Batching station 60m ³ /h	pc	1	Chapter 21:
10	Concrete mixer 500l	pc	3	Chapter 22:
11	Mixing truck	pc	6	Chapter 23:
II	Material			
1	Cement	Ton	7,320	Chapter 24:
2	Steel	Ton	770	Chapter 25:
3	Timber, wood	10 ³ m ³	0.21	Chapter 26:
4	Aggregate	10 ³ m ³	25,730	Chapter 27:
5	Rock	10 ³ m ³	2,026	Chapter 28:
6	Sand	10 ³ m ³	15,055	Chapter 29:
7	Explosive	Ton	18	Chapter 30:
8	Metal structures	Ton	563.5	Chapter 31:

Source: Investment project data- March 2011

Table 5: List of labor force demand

Construction year	Year 1	Year 2	Year 3
Number of people	100	250	250

Source: Investment project data - March 2011

During the construction phase, there will be about 100 – 250 people that will be employed by the project. Workers or helpers during construction will be sourced from the local people. When the project is operational, 20 staff will be needed to run the power plant.

Two (2) campsites will be set up at powerhouse and spillway site for the plan construction.

C. Construction Schedule

The development of the project will last for 3 years, including 0.5 year for project preparation and 2.5-year for project construction. Assuming that the project starts from June 2012 and finishes at May 2015, the project schedule is as indicated below. The components to be constructed during the dry season are the headrace culvert and overflow dam.

The project milestones are:

Preparation (06/2012 – 10/2012). From the period of June to October 2012, the following activities will be implemented:

- Complete local government's requirements.
- Clear the ground.
- Construct road from power plant to pressure tank.
- Construct support project site and camps.

Dry season (From 11/2012 to 5/2013). From the period November 2012 to May 2013, the following will be implemented:

- *Channel alignment:*
 - Clear and bulldoze the ground from forebay into the dam line; consolidate the main locations, and complete concrete guard-wall and drill anchor. It is estimated that the access road leading to dam site will be finished by April 2013.
 - Arrange the support area and camps at elevation of 900m that is next to channel line.
- Construction of the power supplies line for residents.

Flood period (from 05/2013 to 10/2013). From the period May to October 2013, the following activities will be implemented:

Flood flow is directed through the natural river. This also includes preparing for construction work of dam overflow for the dry season in 2013 and 2014.

Period (From 11/2013 to 6/2014). The following will be undertaken from November 2013 to June 2014:

- Dam alignment:
 - Left bank embankment dams site:
 - Starting construction of waterway, excavation of the abutment and concrete reinforcement in the left bank of the dam.
 - February 2014 start of concrete work to complete the dam's left bank.
 - At the foundation, build right bank of the dam which is expected to be completed by the end of June 2014.

- Route channels:

- Concrete work on canal from km 1 + km0 to 170m

- Pipeline.

- Training pit powerhouse, forebay, water pipes

- Pour concrete plants, anchors, pressure tank, inlet

- Laying concrete, installation of mechanical equipment, hydraulic water for the plant

- Installation of equipment inlet valve, penstock

- Execution discharge channel, reinforced stone roof

- Construction of power lines for regional welfare

Flood Season (From 5/2014 to 10/2014):

Flood flow is directed through the narrow river and the construction work will have to stop.

- Pour concrete plant, installation of mechanical equipment, hydraulic water for the plant.

- Construction of power lines for regional welfare

Period (From 11/2014 to 5/ 2015):

Peak flow in dry season diversion designed for $Q = 13.8\text{m}^3/\text{s}$ (based on 10-year return period) is led through the sand outlet.

Construction of temporary road to right bank of dam is to stop for spring break.

Lay concrete for the overflow dam right shoulder. At the end of December, intake valve and drain scour will be installed.

- Route channels:

- Concrete work for the remaining sections of the canal which will be completed on March 2015.

- Pipeline, power plant

- Completion of concreting, installation of marine equipment, hydraulic equipment, electrical equipment.

- Completion of power supply line connecting the local school.

- 4 / 2015 to commission unit 1

- 5/2015 to commission unit 2 and to complete the project.

III. DESCRIPTION OF ENVIRONMENT

A. Provincial and District Context

Lai Chau is the provincial capital of Lai Chau and has 6 Districts of which Muong Te is one. Hua Bum commune is located in Muong Te district and is one of 94 communes in the Province.

Table 6: Population and Land Area

	Population 1000's	Area Km²	Density Persons per Sq Km
Vietnam	8,6024.6	331,051.4	260
Lai Chau Province	37	9,070.19	41
Muong Te District	5.2	3,618.76	14
Hua Bum commune	1,387	260	5.3

Note: Figures for Vietnam and province come from the 2009 Census. District figures are from 2009 District Statistics Book

The total natural land area of the province is 9,070.19km², mainly consisting of reddish soil, light yellow soil developed on sandy rock, argillite and limestone, and hard structure. The agricultural land area is about 64,299.9ha, including 13,781.44ha of paddy land and cropland; 10,993 ha of garden land, 5,978ha of animal farmland/grazing land and 409ha of aquatic cultivation land. The forestry land area covers 283.667ha, of which 31.3% is protected forest (natural forest is 274,651ha and plantation forest is more than 9,015ha). Special use land covers about 4,489.61ha, including 2,982.52ha of access roads, 377.26ha construction land and 1,918.443ha residential land. Bare hill land area with the potential of use is relatively large, which is about 525,862ha, including 1,743.69ha of unused flat land and some 524,118.87ha of hilly land.

Total area in 2010 of the Muong Te district is 376,535.41ha, which includes:

- + Agriculture land: 20,268.3ha.
- + Forest land: 182,647.35 ha.
- + Non-agriculture: 5,042.33 ha
- + Vacant land: 168,577.43ha.

There are no nature reserve areas in Lai Chau Province. There is a protection forest about 70km to the West from the project site, at the upstream of Da River.

In the neighbouring province of Dien Bien, there is the Muong Nhe Nature Reserve, which is located in Muong Nhe District. The reserve is about 700 km to the Northwest of Hanoi. The Muong Nhe Nature Reserve has a total area of about 310,262ha, border with 10 communes. There is 118,000ha of natural forest cover rate or 43% of the land area in Muong Nhe Nature Reserve area, of which there are many primitive forests consisting of lowland evergreen forest, lower mountain evergreen forest, evergreen forest on high mountains and bamboo forests. It is also the habitat of

many rare animals. With rich ecosystems like forests and parks, the Muong Nhe Nature Reserve is considered as a protected area with high biological diversity types in Vietnam. The Muong Nhe Nature Reserve is 80kms away from Nam Nghe; therefore Nam Nghe project is neither inside a protected area or the buffer zone of a protected area.

B. Physical Resources

1. Topographic characteristics

Topographical conditions in Lai Chau are characterized with many high mountain ranges and highland. To the East of this region is Hoang Lien Son mountain range; in the West is Song Ma mountain range (1,800m high). Between these two ranges is low land, a large mountain and the Da River catchment with many limestone plateaus (400km long, 1-25km wide, high 600-1,000m). More than 60% of the land area is higher than 1,000m, and more than 90% of the land area has slopes higher than 25° divided by long mountain ranges running in NW-SE direction, between valleys where topography is rather flat such as in Muong So, Tam Duong, Binh Lu, Than Uyen. There are high mountains such as Phan Xi Pang at elevation 3,143m and Pu Sam Cap at 1,700. Hills are high and sloping and characterized with many narrow and deep valleys, rivers, streams, waterfalls, high discharge flow, all of which creating high hydropower potential.

2. Geological condition

Geological structures: The project site located in the Northwest of Vietnam-China border. The Da fault is located about 10 km from the Nam Nghe dam. The reported earthquake intensity from this fault system is $I = 4$. Even though, the fault is outside of the dam's basin, it is necessary to include it in the engineering design stage to prevent the possibility of any problems occurring in the future.

The Nam Nghe reservoir area is located in a narrow valley, originating from an altitude of 2100m in Muong Te district, Lai Chau province. Average rolling terrain is from 25° to 40°. The rock walls in the basin are mainly carbonates. The lime walls are in the northwestern portion and carbonate deposits in the eastern.

The project area is in the narrowing position of the valley where topographical and geological conditions for constructing the dam is favourable.

Minerals. Minerals such as coal and gold have not been found in the reservoir area.

Earthquake: The Nam Bum basin, including the Nam Nghe, is in the strong seismic region of the northwestern area having events occur such as the 7 Richter scale earthquakes (1914), Dien Bien earthquake (1920), and Son La earthquake (1962). The Nam Nghe area is located in 8 Richter-scale generation and propagation region.

3. Climatic condition

Muong Te, in particular, and Lai Chau province, in general, has a typical climate regime for tropical region with hot days and cold nights, but less impacted by typhoons. The climate during the year is divided into two transparent seasons: the dry season and rainy season. Rainy season in Lai Chau normally lasts from May to September. During this time rain is plenty and temperature and humidity is high. During the early rainy season, hail normally occurs. Rainfall intensity is high and occurs in

the middle of June, July, and August, comprising about 80% of rainfall for the whole year. During this period, total average rainfall is about 2,500 – 2,700mm. The average temperature in the rainy season is normally between 25°C – 35°C. The dry/cold season starts from November to March, when the climate is cold and humidity created by rainfall is relatively low. There are months during this season when rainfall is only 5 to 20mm. In many places, the coldest average temperature is as low as 4 – 5°C, characterized with cold, thick fog, northeasterly wind, hail, and snow in high mountainous area, particularly in Dao San – Phong Tho. There is also hail and winds occurring early in the rainy season with a frequency of 1.3 – 1.5 day/year. April and November are transitional periods between the two seasons. During this period, temperature differences between day and night is high, sometimes temperature at midday is up to 38°C but goes down to 18 – 20°C at night. The mean annual air temperature is 22 – 25°C.

❖ *Rainfall regime*

Rainy season starts in April and finishes in October, which is the same time as the Southeast monsoon. At the high mountains, the rainfall reaches 3000mm/year. At the average mountains (400 – 800m), rainfall fluctuates from 2000 to 2500mm. At the low mountains (below 400m) and valley, it is from 1500 to 1800mm.

The climatological stations are near the centre of the basin, therefore, the rainfall of the station can represent the rainfall of the whole basin. Rainy season in the region lasts for 7 months from April to October, highest rainfall is usually in three months from June to August, and the rainfall in dry season is accounted for about 15% of annual rainfall. Lowest rainfall is in December and January; the rainfall is from 22.9 - 29.3mm. Monthly rainfall distributions at the stations are given in Table 7.

Table 7: Average monthly rainfall by month, year, measured at 3 stations in the area

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
Sin Ho	43.2	43.8	73.7	181	317	506	595	464	237	146	80.7	41.1	2729
Muong Te	27.2	30.2	48.1	128	280	471	617	453	180	107	63.4	29.3	2434
Na Hu	29.3	32.9	56.5	135	292	478	604	435	194	119	69.0	22.9	2468

Source: Investment project data- March 2011

4. Hydrographic conditions

❖ *Regional characteristic*

In the territory of Muong Te district, there are rivers such as: Da, Nam Ma, Nam Cun, Nam Nhe which belong to the Red River system and the Mekong River system.

Average elevation on whole catchment area of Da River is 1130m, and is about 900m in Vietnamese territory.

In China, Da River has an average slope of 25.4% and crosses Vietnam-China border where the riverbed elevation is about 313.18 m. The water level in the dry season recorded on March 20, 1997 was 319.68 m.

Nam Bum River, a tributary on left bank of Da River, originates from the high mountains at Vietnam-China border, in Hua Bum commune, Muong Te district of Lai Chau province. Elevation at river originates at about 2100m. The main course of Nam Bum River flows in the E-W direction and joins into Da River at Po Lech.

Typical characteristics of the channel and catchment at the project dam site are listed in following table.

Table 8: Characteristics of basin and rivers Nam Nghe Project

Sites	River	Basin area (km ²)	River length (km)	River slope (%)	Basin width (km)
Nam Nghe damsite	Nam Nghe	28	8.0	107.5	3.50
Nam Nghe powerhouse site	Nam Bum	63	12.5	101.3	5.04

Source: Investment project data- March 2011

❖ *Flow characteristics:*

The catchment of Nam Nghe Hydropower plant had no surveyed water flow data prior to Aug 2010 and annual flow has been interpolated from flow and rainfall data from the Na Hu station which is located 10 km from the site.

Charts 1: Average monthly flow at the Nam Nghe Dam

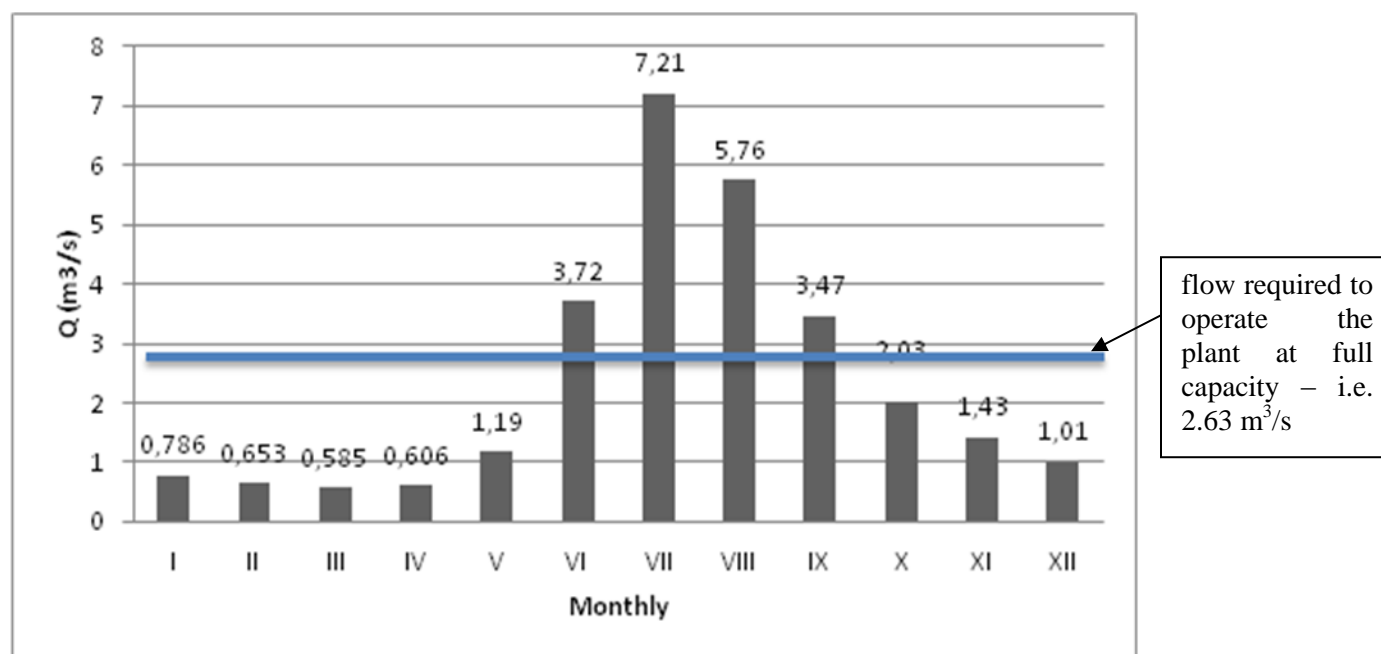


Table 9: Calculated average monthly flow at the Nam Nghe Dam

No	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
1	1968	0.698	0.607	0.522	0.595	1.23	3.47	9.98	5.59	3.29	1.77	1.49	0.968	2.52
2	1969	0.664	0.524	0.446	0.405	0.802	2.74	7.94	12.7	3.48	1.93	1.53	1.16	2.86
3	1970	0.711	0.592	0.479	0.487	1.44	2.98	13.0	5.71	3.36	1.72	0.925	1.08	2.71
4	1971	0.650	0.554	0.451	0.628	0.963	4.85	5.58	10.3	4.33	1.70	1.03	0.732	2.65
5	1972	0.625	0.469	0.425	0.451	1.13	4.03	9.04	4.16	2.71	2.22	1.60	1.27	2.34
6	1973	0.800	0.627	0.622	0.679	1.71	5.14	5.74	5.00	2.51	1.65	1.11	0.794	2.20
7	1974	0.559	0.462	0.437	0.469	0.534	2.97	7.48	5.17	6.38	3.06	1.26	0.809	2.47
8	1975	0.643	0.511	0.450	0.527	0.844	2.81	4.44	2.59	1.50	1.22	1.16	0.819	1.46
9	1976	0.575	0.664	0.499	0.499	1.70	3.71	6.00	5.21	2.89	1.75	1.43	0.763	2.14
10	1977	0.778	0.625	0.513	0.532	0.719	3.38	7.18	5.08	2.15	2.07	1.16	0.849	2.09
11	1978	0.846	0.651	0.527	0.468	1.36	3.24	3.50	3.54	2.69	1.25	0.925	0.675	1.64
12	1979	0.519	0.468	0.395	0.414	0.539	2.09	5.54	8.20	6.17	1.73	0.940	0.675	2.31
13	1980	0.516	0.453	0.376	0.339	0.453	0.811	3.49	6.08	2.53	1.41	0.898	0.703	1.51
14	1981	0.592	0.482	0.438	0.489	1.33	4.02	6.07	7.35	4.82	2.99	2.02	1.29	2.66
15	1982	0.881	0.688	0.524	0.711	0.689	2.94	4.74	6.95	4.11	3.03	1.87	1.11	2.35
16	1983	0.801	0.641	0.604	0.513	0.618	1.23	2.92	5.55	4.62	1.94	1.79	1.04	1.86
17	1984	0.740	0.589	0.508	0.580	1.88	4.54	6.96	3.87	3.77	3.37	1.67	1.06	2.46
18	1985	0.705	0.605	0.550	0.549	0.827	3.10	5.11	3.83	3.11	1.54	1.77	1.13	1.90
19	1986	0.718	0.553	0.448	0.544	1.21	3.46	7.42	3.58	2.74	1.76	1.10	0.655	2.02
20	1987	0.833	0.625	0.553	0.525	0.460	2.18	6.61	5.62	2.73	2.09	2.16	1.23	2.13
21	1988	0.837	0.733	0.603	0.622	1.33	1.76	7.94	5.52	6.44	1.47	0.768	0.558	2.38
22	1989	0.474	0.387	0.418	0.360	0.715	3.18	4.41	2.90	4.45	1.47	1.03	0.704	1.71
23	1990	0.546	0.477	0.623	0.572	1.48	4.36	9.39	3.53	1.69	1.16	0.814	0.566	2.10
24	1991	0.499	0.434	0.397	0.433	0.674	3.98	9.60	8.87	2.63	1.95	1.66	1.21	2.70
25	1992	0.986	0.885	0.800	0.696	1.01	3.35	5.29	2.86	2.40	1.68	1.31	1.08	1.86
26	1993	0.833	0.730	0.643	0.653	1.36	2.98	7.32	7.24	2.89	1.67	1.22	0.904	2.37
27	1994	0.743	0.627	0.590	0.579	0.764	3.47	4.24	3.34	2.36	2.29	1.32	1.08	1.78
28	1995	0.959	0.789	0.665	0.582	1.21	4.85	9.55	7.56	2.99	1.71	1.30	0.991	2.76
29	1996	0.683	0.596	0.583	0.572	1.53	4.53	8.46	6.14	2.91	2.06	1.34	1.03	2.54
30	1997	0.810	0.624	0.597	0.814	0.739	2.43	7.97	5.45	3.53	2.51	1.72	1.22	2.37
31	1998	0.757	0.657	0.588	0.633	1.07	7.71	12.7	7.11	2.74	0.611	0.437	0.260	2.94
32	1999	0.701	0.558	0.499	0.583	1.97	5.56	12.0	6.34	5.35	3.28	2.31	1.39	3.38

No	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
33	2000	0.894	0.714	0.610	0.555	1.22	4.22	6.07	6.73	3.28	2.13	1.20	0.904	2.38
34	2001	0.693	0.566	0.574	0.417	1.86	4.35	5.65	4.46	2.05	1.67	1.44	0.921	2.05
35	2002	0.769	0.664	0.609	0.551	2.52	6.34	8.05	7.61	2.49	1.68	1.34	1.17	2.82
36	2003	1.59	0.994	0.849	0.917	1.10	5.26	9.51	7.39	5.56	4.28	2.89	2.27	3.55
37	2004	1.96	1.69	1.65	1.76	3.00	4.07	8.83	5.67	5.07	3.07	2.42	2.03	3.43
38	2005	1.53	1.34	1.40	1.41	1.48	4.60	6.78	6.65	4.09	2.44	2.07	1.92	2.98
39	2006	0.879	0.737	0.594	0.636	1.01	3.02	6.35	2.20	1.71	2.02	1.03	0.612	1.73
40	2007	0.665	0.532	0.404	0.458	1.24	3.05	6.39	5.35	3.45	1.63	1.07	0.661	2.07
41	2008	0.579	0.660	0.530	0.639	1.04	5.92	10.2	7.23	4.20	2.15	2.10	1.19	3.04
Annual		0.786	0.653	0.585	0.606	1.	3.	7.	5.	3.	2.	1.	1.	2.

The Table 9 and Chart indicate that the plant will operate at full capacity for only 4 months of the year and that only during four months (June to September) will there be any significant flow in the section of river below reservoir and hydropower plant. The rest of the year the plant will operate at much reduced capacity and for some months it will only operate for a few hours per day.

While January is the month of least rainfall, the lowest flows in the river are experienced later in March as it takes time for ground water tables to be recharged. From October to May there is an average of less than 2.63 m³ flow in the river. The smallest daily flow experienced in the Nam Nghe river is estimated as 0.10 m³.

5. Current status of surface water quality

a. Water Environment

❖ Surface water

On August 25, 2010, water quality sampling was taken as part of the baseline survey. The information obtained indicates that water quality of rivers Nam Nghe and Nam Bum in the project site are in the range of permissible limits according to QCVN 08:2008 / BTNMT, column B1, B2 (water used for irrigation). But COD, BOD₅, DO in water exceed the Standard QCVN 08:2008 / BTNMT, column A1, A2 (water used for drinking). Therefore, water is not safe for drinking, but should only be used for irrigation. (see Annex 5 and table 10).

Table 10: Survey and Analysis Result on surface water quality

No.	Parameters	Unit	M1	M2	QCVN 08:2008/BTNMT			
					Column A1	Column A2	Column B1	Column B2
1	pH	-	7.0	6.8	6-8.5	6-8.5	5.5-9	5,5-9
2	COD	mg/l	15.29	20.9	10	15	30	50

3	BOD5	mg/l	9.4	8.4	4	6	15	25
4	Dissolved oxygen (DO)	mg/l	5.62	5.43	≥6	≥5	≥4	≥ 2
5	TSS	mg/l	22.68	24.38	20	30	50	100
6	Chloride (Cl-)	mg/l	125.3	122.5	205	400	600	-
7	Fluoride (F-)	mg/l	1.3	1.2	1	1.5	1.5	2
8	NH4+ (according to N)	mg/l	0.25	0.29	0.1	0.2	0.5	1
9	NO3- (according to N)	mg/l	2.36	2.58	2	5	10	15
10	NO2- (according to N)	mg/l	0.04	0.03	0.01	0.02	0.04	0.05
11	PO43- (according to P)	mg/l	0.17	0.16	0.1	0.2	0.3	0.5
12	Cyanide (CN-)	mg/l	not detected	not detected	0.005	0.01	0.02	0.02
13	Arsenic (As)	mg/l	0.012	0.015	0.01	0.02	0.05	0.1
14	Chrome (Cr6+)	mg/l	0.02	0.03	0.01	0.02	0.04	0.05
15	Iron (Fe)	mg/l	0.42	0.52	0.5	1	1.5	2
16	Lead (Pb)	mg/l	0.02	0.01	0.02	0.02	0.05	0.05
17	Coliform	MPN/1000	3,100	3,900	2,500	5,000	7,500	10,000

Note:

M1: Dam site in Nam Nghe river

M2: Planned powerhouse location

❖ **Underground water**

The information obtained indicates that underground water quality in the project site is in the range of permissible limits according to QCVN 09:2008 / BTNMT (see Annex 6 and table 11) .

Table 11: Analysis Result on underground water quality

No	Parameter	Unit	NN1	NN2	QCVN 09:2008/BTNMT
1	pH	-	7.0	7.1	5.5-8.5
2	Hardness (appropriate with CaCO3)	mg/l	162	153	500

3	Total solids	mg/l	252	312	1,500
4	Nitrite (NO ₂) (appropriate with N)	mg/l	0.031	0.039	0.1
5	Nitrate (NO ₃) (appropriate with N)	mg/l	2.214	2.145	15
6	Iron (Fe)	mg/l	1.824	1.915	5
7	Lead (Pb)	mg/l	0.001	0.001	0.01
8	Zinc (Zn)	mg/l	1.223	1.121	3.0
9	Mercury (Hg)	mg/l	not detected	not detected	0.001
10	Bronze (Cu)	mg/l	0.311	0.253	1.0
11	Chrome VI (Cr ⁶⁺)	mg/l	not detected	0.001	0.05
12	Cyanide (CN ⁻)	mg/l	not detected	not detected	0.01
13	Chloride (Cl ⁻)	mg/l	16.011	15.115	250
14	Arsenic (As)	mg/l	not detected	not detected	0.05
15	Manganese (Mn)	mg/l	0.029	0.035	0.5
16	Cadmium (Cd)	mg/l	not detected	not detected	0.005
17	Phenol	mg/l	not detected	not detected	0.001
18	Coliform	MPN/ 100ml	1	2	3

Note:

NN1: Dam site

NN2: Planned powerhouse location

QCVN 09:2008/BTNMT: National technical regulations on underground water quality.

b. Atmospheric environment

The survey result in Table 12, it shows that the basic parameters of air quality and dust content in the planned area of the hydropower plant and surrounding area is in the limit permitted by TCCP2. But there are two parameters (CO and SO₂) in the air that exceeds the Standard TCCP1. (see Annex 7 and table 12).

Table 12: Survey Result on atmospheric quality parameter

No	Parameter	Unit	K1	K2	TCCP1	TCCP2
I	Microclimate					
1	Temperature	oC	31.5	31.7	-	32
2	Wind velocity	m/s	0.3	0.25	-	1.5
3	Noise	dBA	68.7	75.8	-	85

4	Humidity	%	78.5	79.3	-	< 80
II	Air and dust					
5	Suspended dust	mg/m3	0.17	0.35	0.3	4.0
6	NO2	mg/m3	0.2	0.4	0.2	5
7	CO	mg/m3	10.52	15.24	30	30
8	SO2	mg/m3	0.45	0.56	0.35	20

Note:

K1: Dam site

K2: Planned powerhouse location

TCCP1: QCVN 05:2009/BTNMT: National technical regulations on surround air quality.

TCCP2: TC 3733-BYT/QĐ/2002: Standards of Ministry of Health for air quality in the

c. Land Environment

The land environment survey result shows that these indicators are within the permissible range compared to QCVN 03: 2008. (see Annex 8 and table 13)

Table 13: Analysis result on land environment

No.	Parameter	Unit	D1	D2	QCVN 03:2008/BTNMT (Forest land)
1	Arsenic (As)	mg/kg	4,24	3,23	12
2	Cadmium (Cd)	mg/kg	0,15	0,13	2
3	Bronze (Cu)	mg/kg	30,3	32,9	70
4	Zinc (Zn)	mg/kg	58,39	62,92	200
5	Lead (Pb)	m/kg	28,64	35,33	100

Note:

D1: Dam site

D2: Planned powerhouse location

QCVN 03:2008/BTNMT (Forest land): National technical regulations on permissible limits of heavy metals in forestland.

C. Ecological Resources

1. Terrestrial flora and fauna

❖ Forest Resources

There are many tree species in the project area, however rare and precious species cannot be found. The project site is located 70 km northeast of the Muong Nhe Nature Reserve. The site is not located within a protected area or special forest protection area.

The evergreen tropical rain forest and mixed forest of bamboo are found along Nam nghe stream. Due to human activities, this forest is strongly affected by slash burning and shifting cultivation. Vegetation is very much destroyed.

Muong Te district has 182,647.35 ha of forest, covering 46.8% of the total area. The timber forest takes 64.5% of total forestry land area (33.4% being young forest and 2.1% being planted.⁸)

The vegetation consists mainly of tree species including fast-growing species such as *Endospermum chinense*, *Litsea cubeba*, *Litsea mollis*, *Trema orientalis*, *Macaranga spp.*, *Sapium sp.*, *Qercus spp.* Along the streams, species such as Va, Phay, Nóng, and Lầu were found. These forests generally have one layer, with the forest cover rate of 30%. Many of these forests had no trees large enough for timbering. Most trees had a diameter below 10cm, and a height between 9-7m, with some trees measuring a mere 2-3m high.

Located at altitudes of 700m, the forests are in the range of humid tropical rain forests. These forests are not close to the project site. The forest cover is about 35.5%⁹ with several valuable types of wood such as: *Sindora tonkinensis*, *Sindora siamensis*, *Dacrydium pieriei*, *Erythrophleum fordii*. including larger trees with a trunk diameter of 60cm or more. These trees are often illegally targeted for construction. It is necessary that workers be warned to avoid any illegal collection of the wood.

❖ **Agricultural trees**

In the sub-project construction area, there are croplands belonging to ethnic minority people such as rice, cassava, soybean, corn, peanut as well as cotton and short-term crop.

❖ **Fauna**

According to Professional Animal Forest Inventory and Planning Institute in Dien Bien, there are 24 species of rare animals such as: the Malayan bear, the Tibetan bear, the black white-cheek chimpanzee, the red-faced monkey, and the red fox. There are about 222 species of birds, which include the white pheasant, the yellow-face fowl, and the white-chest mynah. This is a very valued resource. Due to hunting activities, these species of animals and birds are decreasing significantly both in species and quantity.

Wildlife and fauna in the project area is poor both in species and quantity, particularly rare and precious species such as the tiger, elephant, panther and bear, which have not seen for a long time.

2. Fish and Aquatic Resources

⁸ Source: <http://www.laichau.gov.vn>

⁹ Source: Forest Investigation and Planning Institute. <http://www.Fipi.vn>

The freshwater river environments of Vietnam are credited with a rich flora and fauna biodiversity including species of fish, shrimp, crab, snail, mussels, amphibians, insects and plants. Countrywide, there are 20 species of freshwater weeds; 1402 species of algae; 782 of invertebrates; 544 of fish species and 52 species of crabs.

Commercial fisheries make an important contribution to exports and yield more than US\$2.25 Billion annually to Vietnam. The major part of this figure is from marine fisheries, but nowadays, aquaculture has become increasingly important. Freshwater aquacultures include ponds, ditches, cages, net enclosures and pens in reservoirs, river channels and paddy fields. In the north, pond poly culture is the most important farming system – commonly for carp and bighead. The main area for aquaculture is in the south of Vietnam and especially with the use of cage culture. In the Mekong and Bassac rivers, catfish, carp and snakehead are the main species. In the Mekong Delta prawn monoculture is practiced extensively. Tilapia fish farm has become popular. Pond culture has been encouraged nationwide as part of the drive against poverty alleviation, diet improvement and the prevention of malnutrition. The Government supplies extension services free to farmers.

While aquaculture has spread with the use of introduced species, native aquatic species numbers in natural rivers and lakes are down. Only scarce quantitative data are available for inland aquatic ecosystems, and the extent of the deterioration of freshwater biodiversity is still poorly known. However, decline has been documented in various reservoirs and lakes. For instance, between 1998 and 2001, in the Ba Be Lake 20 species disappeared.

There are approximately 3600 reservoirs of various sizes in Vietnam. Most dams and reservoirs are multi-purpose dams for flood control, irrigation, hydropower, and water supply and most are more than 20 years old and only 15 percent are classified as large or medium size (capacity of over 1 million m³ or a height of more than 10 meters). These structures have been constructed without provisions to allow migratory fish movement up and down the river and with little consideration for environmental flows to protect aquatic life.

Stream and reservoir in the project area contains seaweed, alga and some other plant plankton. Aquatic fauna system includes Anopheles as the main species and crustacean species in many periods (*Nauplius*, *Mysis*, *Copepod*, etc.,)

The biodiversity is low. These are mainly shrimp and small fish species (*Nipponense*), field crab (*Somaniathelphusma*), and snail (*Lynema swinhoeni*).

Aquatic Resources- This includes the natural fresh water fish such as Carp, Anabas, Notopterus Pallas, black fish and some fish species typical of Lai Chau province. Apart from natural fish species in stream, there are fish cage farms on river, reservoir and pond such as: *Carp*, *amur*, *Ctenopharyngodon idella*, *Labeo rohita*, *Cirrhinia molitorella*, *Mrigan*, *Aristichthys nobilis*, *Hypophthalmichthys molitrix*, and *Cyprinus cetralus*.

There are no rare fish that are listed as threatened in the Red Data Book of Viet Nam. The amount of fish that are caught in the stream are not significant since the quantity of fish is small and local people only catch fish for food rather than commercial selling.

The project is constructed on a small river, where no fishing activities take place. There are a n insignificant number of people who catch fish, as supplement food source.

D. Socio-Economical and Cultural Environment

1. Rural infrastructure

❖ Transportation system

The Lai Chau topography is divided and many deep and narrow valleys make it difficult to develop a transport system. Lai Chau has a long border of 273km with China at the National Ma Lu border gate. This border gate is being updated as an international border gate, which is a favourable location to exchange goods, services and tourism.

The new Lai Chau town is some of 402 km away from Ha Noi capital, crossing Lao Cai province.

So far there have been 58 communes out of the total 98 communes in the province that have accessible roads. 3 other communal roads are now under construction.

Road 127 is the only access road connecting Muong Te District centre and the project area with Muong Lay. The road is currently in poor condition and difficult to access but is being upgraded.

❖ Power system

By the end of 2009, 80 communes out of the total of 98 communes and 74% of household (HH) connected to the power system. Many large hydropower projects had and have been under construction in the territory and region including Son La HPP (2 400MW), Huoi Quang HPP (520MW), Ban Chat HPP (220MW), Nam Nhun HPP (1 200MW), Nam Na 3 HPP (84MW) and particularly Lai Chau HPP (1 200MW) as well as 60 other small and medium hydropower projects. None of these hydropower projects are located along Nam Nghe and Nam Bum River.

❖ Water system

Water supply and drainage: By the end of 2009, 50% of urban population in the province was supplied with fresh water and 75% of the rural population use safe water.

Water for domestic use is collected through pipes, which are connected to the streams from the mountains. Some households have water tanks with filters. However these filter systems do not work affectively.

There will be 3.5 km of the Nam Nghe River downstream of the dam to the Nam Bum River, which will significantly be reduced of water for an extended period. There is one side-stream 800 m downstream of the dam.

Water from Nam Nghe and Nam Bum River do not have any irrigation value since the flows are between the steep rocks. Therefore locals use the water from side-tream for irrigation.

density of subscribed is 1.21/100 people, increasing by 162% compared to 2008.

❖ Communication system

By the end of 2009, there were 11 post offices in the whole province; 68/98 communes have a post office, of which 22 are agencies and delivery posts. 29/98 communes, 06 towns, 03/03 wards deliver newspapers daily. There were 221 BTS stations, increasing by 111 stations compared with

previous year. The density of subscribed telephones is 16.2 telephone/100 person, increasing by 143% compared to 2008. The internet service is sharply developed

❖ **Education and training**

In the school year of 2009 – 2010, there were 392 schools with 5,759 classes, which was 27 schools and 306 classes more compared to the school year of 2008-2009. The total number of students attending class was 104,209 children, 6,117 students more, compared to the previous school year. At the end of 2009 23 communes in the Province had secondary education.

❖ **Health care**

The common diseases in the commune are diarrhoea, red-eye, malaria, and dengue.

There are 42/98 communes (42.8%) having clinics with national standard, 3.55 doctors per 10,000 people, 12 general clinics with 1,114 beds in whole province. There are 8 District Health Centres including one centre in Muong Te District. The project site is located 25 km from the nearest health centre. There is also a protective health centre in Lai Chau town, general hospital Tan Uyen, 13 clinics under provincial level, provincial hospitals, health care training school, centre of malaria, parasitology and insect prevention, HIV/AIDS prevention centre, centre of social diseases prevention, provincial protective health care centre, reproductive health care centre, endocrinology centre, centre of health care education and information, centre of drug, cosmetic, food testing, appraisal centre, food safety department and birth control and population department.

❖ **Solid waste disposal**

There is no official solid waste collection system. General waste is scattered or dumped in informal areas where it pollutes groundwater and water sources in the area.

2. Socio-economic features

❖ **Population**

According to the 2010 population statistics, the District had 52,085 persons, of which 4,750 were classified as urban.

Table 14: District Population

Year	Gender		Urban – Suburban	
	Male	Female	Urban	Suburban
2010	27084	25001	4750	47335

Source: Muong Te district's annual statistic publication, 2010

Hua Bum Commune consists of four villages with 285 households and 1,511 persons, of whom all except eight persons are ethnic minority people. Chang Chao Pa village, which is the commune centre, is located at a distance of 16km through poor road from Muong Te district town. During the rainy season Hua Bum Commune regularly becomes inaccessible. As seen in Table 11 the three ethnic minority groups of Ha Nhi, Hmong and Mang live in ethnically separated villages: Chang Chao Pa village has Ha Nhi and Kinh population inhabited by 140 households, Pa Mu village at a

distance of 5km from the commune centre is inhabited by 65 Hmong households, Pa Cheo village 3.5km and Nam Nghe village 4km from the commune centre have Mang population. Pa Cheo and Nam Nghe villages lack road are accessible only by foot.

Table 15: Hua Bum Commune Villages, Population and Ethnicity

Villages	Total HHs	Total Population	Population by Ethnic Minority Types (%)			
			Hmong	Ha Nhi	Mang	Kinh
Chang Chao Pa	141	698		95%		5%
Pa Mu	53	376	100%			
Pa Cheo	45	259			100%	
Nam Nghe	31	178			100%	
Total	285	1511				

Source: Statistical yearbook of Muong Te District 2010

Table 16: Characteristics of population of Hua Bum commune – Muong Te district

No	Description	Unit	Total	Villages			
				Chang Chao Pa	Nam Nghe	Pa Cheo	Pa Mu
1	Total of people	Person	1420	664	151	240	365
2	Farmer	Person	1225	564	128	204	329
3	Non - farmer	Person	195	100	23	36	37
4	Total of labors	Labor	525	246	56	89	135
5	Total of household	Household	274	134	33	46	61
6	Total of house	House	230	100	32	45	53
7	Poor household	Household	154	74	18	25	37
8	Household size	Person /household	5,18	4,96	4,58	5,22	5,98

Source: Statistical Yearbook of Muong Te District 2010

❖ Agriculture and Production and breeding

Besides afforestation, the soil in Hua Bum is suitable for cereals such as rice, cassava, soybean, corn, peanut, upland rice or cotton. Livestock include horses, cows, and buffalos as cattle.

Table 17: Agricultural Profile of Hua Bum commune

No	Crop, livestock	Criteria	Unit	2006	2007	2008	2009	2010
1	Rice (Winter)	Area	ha	40.60	43.00	45.50	47.00	45.00
		Yield	kg/ha	3,700	3,700	3,850	3,900	4,200
		Gross output	ton	150.22	159.10	175.18	183.30	189.00

No	Crop, livestock	Criteria	Unit	2006	2007	2008	2009	2010
2	Rice (Spring)	Area	ha	59.00	67.00	72.00	74.70	80.00
		Yield	kg/ha	3,400	3,550	3,700	3,750	4,000
		Gross output	ton	200.60	237.85	266.40	280.13	320.00
3	Upland rice	Area	ha	21.00	22.00	24.50	25.00	15.00
		Yield	kg/ha	850	850	900	1,100	1,000
		Gross output	ton	17.85	18.70	22.05	27.50	15.00
4	Corn	Area	ha	78.00	81.00	82.00	85.00	105.00
		Yield	kg/ha	1,390	1,420	1,450	1,500	1,750
		Gross output	ton	108.42	115.02	118.90	275.50	183.75
5	Soybean	Area	ha	5.00	5.00	5.00	5.00	9.00
		Yield	kg/ha	610	620	650	680	670
		Gross output	ton	3.05	3.10	3.25	3.40	6.03
6	Cassava	Area	ha	49.00	52.00	52.00	55.00	55.00
		Yield	kg/ha	5,300	5,550	5,700	5,800	5,800
		Gross output	ton	259.70	288.60	296.40	319.00	319.00
7	Total buffaloes		nos	430	451	479	512	300
8	Total cows		nos	393	413	437	468	250
9	Total pigs		nos	415	435	461	494	543
10	Total poultry		nos	5,798	6,088	6,453	6,905	3,125
11	Goat		nos	185	194	206	220	200
12	Aquatic	Area		0.67	0.67	0.67	1.85	1.85
		Yield		6.50	6.50	7.00	10.00	10.00
		Gross output		0.44	0.44	0.47	1.85	1.85

Source: Statistical yearbook of Muong Te District 2010

❖ Income and Poverty

In the year of 2009, Muong Te people's income was 4-millionVND/ year. Before 2009, it was from 3.1 to 3.4 million VND/year. The food per capita is 378 kg/capita.

The commune is poor with as many as 59.3% of households below the poverty line (300,000 VND/1 month). The distribution of poor households by village is shown in Table 18.

Table 18 : Poor HHs in Hua Bum Commune

Village	HHs Below Poverty Line (%)
Chang Chao Pa	21.2

Pa Mu	72.9
Pa Cheo	77.8
Nam Nghe	73.8

Source: Statistical data – PC of Hua Bum Commune January 2011

Nam Nghe and Pa Mu villages have as many as 73.8% HHs who are poor while in Pa Cheo village 77.8% of households are classified under the national poverty line. The average income in the commune is 325,000VND/person/ month, meaning that even most of those households that are not classified poor are actually just a fraction above the poverty line. Rice produced locally is just enough for consumption for 2 months of a year (June and July). The government supports the rest of the year.

A vast majority of Hua Bum households is living on small-scale crop farming, cattle breeding and forest product collection. There are 6 households who have income from small business such as groceries, while 30 people are government employees. Other occupations are fishing in mountain streams and other small services. (Table 19).

Table 19: Distribution of Employment in Hua Bum Commune

Village	Employed HHs (%)			
	Agriculture	Govt employ	Private Busi	Other Services
Chang Chao Pa	84.2	2.5	2.15	11.15
Pa Mu	89.3	1.06	3.19	6.45
Pa Cheo	81.4	2.3	1.93	14.37
Nam Nghe	79.7	1.1	3.3	15.9

❖ Mineral resources exploitation

Mineral resources and construction materials can be found in almost all districts and towns in the province with schist, cement limestone, limestone agglomerate, and granite.

Coal is available at Nam Than and Huoi La, which are small in scale and of average quality. Metal minerals have been discovered including iron, copper, lead, zinc, gold, molybdenum, and rare metals such as gold and copper. There are 15 locations of gold mine, including one under study for investment. There are 7 copper mining sites and 3 iron ore, most with low iron content and small in scale.

There are four rare earth mines in the province, three of which produce more than 21 million tons.

Hot mineral water: largely potential in mineral water resources, hot water, 18 locations have been found including 7 mineral water resources, hot water with temperature >500 C.

❖ **Forestry**

Forestry development is significantly developed in the commune. However, for the past years, the potential of forestry is not fully exploit. Forestry productivities mostly serve the demands within the province.

3. Tourism

Lai Chau has abundant and attractive tourism opportunity, potentially develop in to many different aspects for tourism.

2 national classified relics have been identified in the Province i.e. Le Loi tombstone (Sin Ho) and Tien Son cave (Tam Duong) and there are 4 provincial classified relics: edifices of puppet Thai king Dao Van Long, Da O mountain (Sin Ho), Hang Han temple, and Tham Tao cave (Phong Tho).

Presently the Muong Te district has 1 relic, which has been classified as provincial cultural historic relic - the French military plot in Nam Cum, Muong Te commune.

There are many rivers and streams valuable for tourism.

IV. SCREENING OF ENVIRONMENTAL IMPACTS& MITIGATION

The ADB checklist for hydropower projects was used to screen for any potential impact and all impacts identified are addressed in mitigation. The Rapid Environmental Assessment (REA) checklist is attached in the Annex 2 of this document. Impacts, which were determined as having adverse environmental implications, are considered further and where significant impacts occur mitigation has been provided.

A. Project Impacts

1. Positive Impacts

As a result of the overall project under ADB Loan 2517-VIE, an additional 25–50 villages and about 3,000–5,000 households are expected to be provided with electricity in Vietnam. Specifically the Nam Nghe project aims to supplement power to the electricity grid system to supply about 285 households with a total population of around 1,511 in Hua Bum commune. With the further development of the national electricity distribution system, the people of Hua Bum, Muong Te District and the Province of Lai Chau as a whole will have the convenience of reliable power from the main line a twenty fours a day for domestic and business activities. Main power supply will provide convenient means for cooking and domestic lighting for those who can afford it and will reduce the pressure on the use of timber for heating and cooking purposes.

The project will also provide unskilled jobs during the construction phase and a limited number of jobs during the operational phase. This will be a bonus for the workforce in this predominantly agricultural community.

Hydropower is a clean and renewable source of energy and avoids contributions to pollution loads, which would result from the alternative use of thermal electricity generation. Hence, it is environment friendly. Currently, gas is the main source of energy in the country (43.7%) with coal also responsible for 14.6% and hydropower only constitutes 35.3%. Increased hydropower generation by small hydropower plants will stabilize the distribution network and provide better quality of electricity to consumers in remote areas.

Thermal power generation plants are also known for a large variety of toxic emissions i.e. carbon dioxide (CO₂), particulate matter (PM), sulphur dioxide (SO₂), carbon monoxide (CO) and Oxides of Nitrogen (NO_x) etc. Assuming the subproject generates of 36.43 GWh per year and 1092.9 Gwh over the project life (36.43x10⁶kWh/year) emissions in excess of 0.52 million tonnes of carbon dioxide (conservatively assuming an integrated emission coefficient of 472 t CO₂/GWh for the Vietnamese electricity grid) would be saved over a 30 year project life by generating power at Nam Nghe. Adopting the emission rates for a typical coal fired power plant of 950 t CO₂/GWh (Source - CO₂Emissions from Fuel Combustion – Highlights, International Energy Agency, 2011), the emission reduction would be more i.e. 1.04 million tonnes. The Nam Nghe project will, therefore contribute to reduction in carbon emissions by avoiding the alternative burning of fossil fuels.

When the project is constructed, there will be a number of local labour employed to work in various contractor's enterprises. This is great opportunity for peoples local to have more income, reduce negative cost to environment such as partially reducing cost of constructing worker camp, and reducing many negative things in domestic lives as well as to community culture, reducing quantity of domestic waste from worker camp. There will also be some limited opportunity for service industry in the local communities.

The construction of project shall create prerequisites for economic development and life improvement in material and spiritual aspects of ethnic minority. It shall be advantageous to provide scientific and technical knowledge for life and propagate the Party and State's guidelines to each household through means of communication.

The access roads for the construction will provide advantages of socio-economic development for people in the project area: Presently the access road to commune centre from Muong Te to Hua Bum is difficult to access particularly in rainy season. During preparation period and construction period, the access road to the area will be upgraded. The road constructed connecting to project will create conditions to local people living in the said area and in surrounding area, increasing chance for goods exchange between project area with surrounding areas, particularly with Muong Te town and create good conditions to develop socio-economy and living standard of local resident living in project area.

With electricity, living standard of ethnic minority people is improved: some households are using milling machine for servicing husk rice, which was very hard work of household in the past; light, television and radio improve spirit life of local people.

There is electricity, which is favourable for irrigation, increasing crop yields, expansion of agricultural crops to help ethnic minority poverty alleviation.

2. Adverse Impacts - Loss of Land and trees

The sub-project will affect a total of 14,700 square meters of agricultural land: 4,171.5 m² will be permanently affected and 10,528.5 will be temporarily affected (Table 20). No houses or associated buildings will be removed by the project. The permanently affected land will be allocated for the penstock, powerhouse and the access road to the powerhouse. The temporarily affected area will be used during construction of the penstock, powerhouse and access roads in Chang Chao Pa, Pa Cheo, Pa Mu and Nam Nghe village.

All the affected land in project, which the households had used for generations, they have yet to receive the Land Use Rights Certificate. But lack of tenure certificate will not bar them from receiving full compensation at replacement cost.

Table 20: Name of the Head of Affected Households and Area of Affected Land

No	Names of the Head of Affected households	No. of family member (No)	Total Productive Land (m ²)	Permanent affected land (m ²)	Temporary affected land (m ²)	Location
1	Thao A Lâu	06	900	400.5	499.5	Power house and access road to powerhouse
2	Vang A Tính	06	940	414	526	Power house and access road to powerhouse
3	Thào A Sùng	04	1,000	382.5	617.5	Powerhouse
4	Vàng Mò Lử	06	1,000	0	1,000	Powerhouse
5	Vàng A Cửa	07	1,100	225	875	Powerhouse
6	Thào A Chá	08	1,250	337.5	912.5	Access road to the Powerhouse
7	Thào A Dia	06	1,430	391.5	1,038.5	Access road to the Powerhouse
8	Thào A Khua A	07	1,100	351	749	Access road to the Powerhouse
9	Chang A Cầu	04	1,280	279	1,001	Access road to the Powerhouse
10	Giàng A Tủa	06	1,100	315	785	Access road to the Powerhouse
11	Thào A Khai	06	1,350	382.5	967.5	Access road to the Powerhouse
12	Lò A Đế A	09	1,200	351	849	Access road to the Powerhouse
13	Lò Chá Páo	09	1,050	342	708	Access road to the Powerhouse
	Total	84	14,700	4,171.5	10,528.5	

m² = square meter, No. = number.

The construction of Nam Nghe HPP will damage an area of vegetation. The vegetation impacted from project development is the area of mixed forest and bushes (secondary bushes forest along river, stream) with small quantity of biomass. In addition, in the powerhouse area, there is an area of agricultural cultivation along the river.

In the impacted vegetation area, no rare and precious tree is found. Therefore, in general of regional ecological system impact to vegetation and flora is very limited.

The project construction more or less will cause impact to fauna in the region, however species in the project area is poor both in quantity and species, particularly large animal that have not been seen for a long time. There are only some small animals such as porcupine, squirrel, wild pig and

some rodent species; reptile species therefore impacts to fauna is evaluated as limited. In the project area, no rare or precious flora/fauna species are found.

Most affected land is mixed forest with no economic value. Commune People's Committee of Hua Bum manages this kind of land. Of the 13 HHs affected with loss of agricultural land, (1.47 ha is paddy land) all will lose less than 10% of total land. There will be no impacts on associated human structures such as shelters for animals, poultry.

There will be no impacts either to any cultural, historic relics and archaeology.

B. Construction Impacts and Mitigation

1. Materials

Stone is available for construction purposes at Na Pay quarry located about 25km from the project site. The materials will be transported to the project site through the Muong Te - Pa Tan road, which is under construction. This is a stone quarry with high deposit and good quality, which can satisfy the project needs. At the moment the quarry is exploited for construction the Muong Te - Pa Tan road. Sand for project is ground from this quarry. This quarry is licensed for meeting all requirements in labour safety and environment conservation of Vietnamese Laws.

2. Construction Activities

There is potential for water contamination from construction activities and erosion of materials into the river at the dam and hydropower sites. The main construction activities for work in or close to the river will be scheduled in the dry season and bunds will be created to channel the river away from the dam abutment construction and powerhouse construction activity.

The penstock and channel will be constructed on steep slopes and could cause scarring of the landscape and for the road material to erode the slopes, particularly if not removed immediately to waste disposal areas and not consolidated properly. The penstock and channel will be constructed on steep slopes and raised slightly above the ground. Here there is also potential for erosion.

To avoid slippage of stone and earth material, stone gabions retaining structures will be used to prevent slippage of soil adjacent to the penstock and on certain road sections. Maximum use will be made of materials in fill areas and there will be proper spoils planning particularly on steep slopes with bench terracing for high cut areas to any erosion of material down slopes. Trees will be planted to consolidate and re-vegetate in the penstock, channel, roads and construction areas upon completion of work.

3. Road Access and Traffic

Currently, the road project Muong Te – Pa Tan is being developed. The access and service roads within the project site include the access road from provincial road to the headwork area and the power station is of 5 Km long. This road route shall be used as service road during the construction period and as the main access road to the headwork area and the power station later on. The temporary road for the construction of the headwork shall include two roads at the retaining dike and foundation pit Faze I and II of the headwork areas and the service road along the penstock (see Map 2).

There will be no problems of construction traffic affecting local activities, but any movement of soil and stone from quarries will be properly managed with traffic plans.

4. Construction Site and Camp Impacts

The construction of the project will be manpower intensive and where possible local labour force will be used. The contractor will require temporary labour camps at the dam and powerhouse sites. There will be a total workforce of approximately 250 staff during peak construction activity. The Contractors will employ manual labour from the local areas next to the project area. The camps for workers from outside will be away from all villages in Hua Bum Commune about 3 kms.

The construction camp has the potential for environmental impacts in terms of solid and wastewater generation. Clauses will be placed in construction sub-contracts requiring dedicated water supply, solid waste and sewage disposal systems.

For the construction sites, there is a potential for dust hazards at batching plant and material storage areas. Conditions requiring the contractor to suppress any dust hazards by the use of water spraying of roads and the covering of material haulage vehicles will be included in the contracts.

The construction sites and any temporary camp areas will be cleaned of all debris and properly restored on completion of construction when building contractors abandon the site.

C. Impacts of Loss of Water in the River System

1. Human Impacts

Upstream of the project, water is taken from the river for human usage. There is no one living downstream of the Nam Nghe River. There will be no impacts on any human activities in the stretch of water between the dam and powerhouse. Similarly, below the hydropower station, there is no immediate human activity or water usage in the downstream of the Nam Bum River.

2. Fish Impacts

If all the water is taken from the Nam Nghe stream during the dry season, there is likely to be impacts on fish and aquatic life. With construction of the dam, any movement of fish upstream will be impossible. The river upstream of the dam is about 12 km in length and there are, however, unlikely to be any substantial areas for fish spawning upstream of the dam in the river or its side streams.

Today, some catfish are caught in the Nam Nghe river, but the fish are small. The main source of fish for local people is from aquaculture sources.

Excavation of foundation and construction of dam on river, construction of cofferdam and diversion work with excavation, leveling activities will make the river section during construction period turbid. This will have an impact to aquatic life.

D. Specific Mitigation Measures

1. Compensation and Resettlement

891.930 million VND, (US\$ 42,752) has been allocated to cover the various elements of compensation and resettlement as covered in the RP.

Compensation for land as per Decision 35/2010/QĐ by the People's Committee dated 23/12/2010 of Lai Chau province published the price list of different types of land in 2011.

Table 21: Area Permanently Affected by Type of Use and Mitigation

No	Affected land types	Area (ha)	%	Notes
1	Rice land	1.47	10.33	Compensation as per RP
2	River, stream, wild land	1.2	8.43	None
3	Forest land	11.56	81.24	Compensation as per RP
	Total	14.23	100	

Source: Project Due Diligence Report, April 2011

2. Residual River Water Flow

If the project is implemented and takes water in the river for power generation, from October to May, (see Chart 1) there will be 9 months of the year with no flow in the river system between dam and power house. While this would have no impacts on human activities, there would be impacts on aquatic life in the river.

With lack of data, it is impossible to accurately define the quantitative impacts with respect to the ecology and habitat loss. The impacts may be significant in the no water scenario, where a section of the river is totally deprived of flow for a large part of the year.

Various methods have been used to assess minimum environmental flows in river situations where flows have been or will be regulated and water is denied to downstream uses. Simple hydrological and hydraulic methods have been employed where the level is set as a percentage of natural flow and takes into account river morphology and water levels. More sophisticated methods rely on habitat simulation and the incorporation of the needs of river ecosystem components and the flow needs of other water users. Where data is available it is possible to develop hybrid models to estimate environmental impacts and determine an acceptable minimum flow, which should be retained in the river system.

In the absence of any specific Vietnamese guideline for the amount of water to be retained in a watercourse when water is extracted from for hydropower purposes, it is recommended that some flow be retained in the Nam Nghe. The environmental flow retained in the river shall be 10% of the average dry season monthly flow = 0.1036 m³/s. 100 litres per second environmental flow will be provided and this discharge combined with discharges from various smaller side streams will

always be maintained for the benefit of aquatic life and flora immediately downstream of overflow dam.

Metal grills or screens will be provided to the weir intake. These screens have 2cm gaps and will prevent larger fish from passing downstream into the power water delivery system to the powerhouse.

3. Compensation for Loss of Trees and forest Land

After discussing with Hua Bum Commune on April 2011 about the replanting program, it is recommended that the forest is mixed with no economic value, so it doesn't require compensating trees on forestland. Only rice land is going to be compensated with an estimated cost of about 411,600,000 VND.

Table 22: Cost for compensation of tree and forest land

No	Item	Cost (vnd)
1	Compensation and Support for forest land (about 11.56 ha)	0
2	Compensation and Support for rice land	411,600,000
Total		411,600,00

4. Tree Planting Programme

A tree-planting programme will be implemented through either the District People's Committee or preferably through a private company. It is estimated that 5ha of land will need to be replanted at the project facilities and as part of the programme to rehabilitate the project roads, stone quarry and soil borrow areas. The costs of planting of trees for a one ha of plantation are estimated at VDN 40,000,000 and VDN 200,000,000 will be included in the budget for this.

V. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN AND INSTITUTIONAL REQUIREMENTS

NPC will be responsible for ensuring that conditions are included in project construction contract documents. It will also ensure that during the construction phase, environmental mitigation measures, as per the EMP, are effective and are implemented. The EMP implementation will be coordinated with relevant Government Agencies such as Water Resources and Environment Departments at District level, for such activities as implementation of environmental monitoring programmes.

The NPC uses its Power Development Project Management Board (PDPMB) to manage projects in rural areas. This Board has a staff who will be responsible for implementation of ADB projects. It has experience in undertaking World Bank funded projects but its engineering and support staff have no specific capacity or qualified personnel in the social, environment and resettlement fields. NPC will be responsible for other sub-projects under the ADB TA Loan 2517 sector project, hence, will need to expand its capacity. To handle its general environmental responsibilities, NPC and

PDPMB will develop the necessary capacity and allocate manpower to specifically implement the Nam Nghe environmental management plan and monitoring programme. Table 24 presents the institutional arrangements and the roles and responsibilities of the various organizations to ensure environmental compliance of the project.

NPC will create an Environmental and Social Development Cell (ESDC). The cell will consist of two members to cover environment, social and resettlement issues. The ESDC will work in close cooperation with the respective field-based office on the day-to-day activities of EMP implementation and the Resettlement Plan implementation. ToR for the environmental specialist is attached in Annex 2.

As NPC does not yet have the expertise and full capacity required for implementing the IEE and Resettlement Plan, it will have to depend on additional external technical assistance and will, therefore, hire the following additional expertise:

- A part-time Environmental Implementation Consultant will be directly hired by NPC, to provide technical assistance in implementation of the environment program and the EMP;
- The Implementation Consultant will carry out internal on-the-job training and institutional capacity building for the Environmental and Resettlement Development Cell, thus supporting NPC expertise to implement the EMPs and resettlement plans by itself in future. The cost for the Implementation Consultant is indicated below along with monitoring costs.

Table 23: Estimate for Environment Specialist and Monitoring

Item No.	Description	Unit	Estimated Amount	
			VND	US \$
1	Environment Specialist	Year	195,000,000	10,000
2	Environmental Monitoring & Evaluation	Year	250,000,000	12,820
3	Environment Implementation Consultant part time	Year	195,000,000	10,000
4	Training, Information Capacity building for NPC/ESDC	Once	58,500,000	3,000
	Total		698,500,000	35,820

Table 24: Institutional Arrangement for EMP Implementation

Organisation	Roles and Responsibilities		
	Preparation	Implementation	Operation
EVN/NPC through	<ul style="list-style-type: none"> Prepare IEE /CEP & EIA according to ADB 	<ul style="list-style-type: none"> Provide advice to PDPMB (Power 	<ul style="list-style-type: none"> Monitor EMP implementation;

Organisation	Roles and Responsibilities		
	Preparation	Implementation	Operation
ESDC	Environment Guidelines & Vietnam Government Regulation	<p>Development Project Management Board) Safeguards Officer on EMP implementation during construction;</p> <ul style="list-style-type: none"> • Monitor progress during construction; • Review and consolidate PDPMB environmental reports for submission to ADB and DONRE/MONRE. 	<ul style="list-style-type: none"> • Consolidate PDPMB environmental reports for submission to ADB (during loan effectivity) and DONRE/MONRE.
PPC/DPC	<ul style="list-style-type: none"> • Review of environmental documents that are not subject to MONRE approval. 	<ul style="list-style-type: none"> • To resolve environmental complaint from local people based on Grievance Redress mechanism during construction phase 	<ul style="list-style-type: none"> • To resolve environmental complaints from local people based on Grievance Redress Mechanism during operation phase
DONRE/ District Environmental Management Division	<ul style="list-style-type: none"> • Provide advice and guidance on environmental issues as required during Project preparation 	<ul style="list-style-type: none"> • Monitor implementation of EMP through their own internal monitoring system 	<ul style="list-style-type: none"> • Monitor implementation of EMP through their own internal monitoring system
PDPMB (PMU)	<ul style="list-style-type: none"> • Engage consultant and have overall responsibility for IEE preparation and submission for approval • Ensure that contract specifications and bidding documents include environmental requirements • Contract independent environmental monitoring consultants • Ensure staffs are adequately trained in environmental issues. 	<ul style="list-style-type: none"> • Responsible for EMP implementation during pre-construction and construction • Undertake inspections and monitoring of environmental issues during construction; • Coordinate with NPC on environmental monitoring and reporting 	<ul style="list-style-type: none"> • Responsible for EMP implementation during operation • Undertake inspections and monitoring of environmental issues during operation.

Organisation	Roles and Responsibilities		
	Preparation	Implementation	Operation
Management & Operation Unit of the HP Plant	n/a	n/a	<ul style="list-style-type: none"> - Operating hydropower plant, including management activities and environmental monitoring in operation phase according to IEE report - Quarterly report for State management agency on environment
Commune Supervision Boards (CSBs) and local community members ¹⁰	<ul style="list-style-type: none"> • Participate in public consultation activities to identify site and further improve project plans • Comment on environmental assessment documentation upon disclosure. 	<ul style="list-style-type: none"> • Participate in environmental monitoring activities 	<ul style="list-style-type: none"> • Participate in environmental monitoring activities
Construction contractor	n/a	<ul style="list-style-type: none"> • Prepare detailed site EMP to meet the Project EMP general requirements; • Implement mitigation measure during construction • Conduct internal monitoring and reporting on environmental issues to PDPMB (PMU) 	n/a
Independent Environmental Monitoring Consultant	n/a	<ul style="list-style-type: none"> • Conduct inspection, monitoring and reporting on Project packages and on implementation of the EMP 	n/a

¹⁰CSBs have been established under Decree 80 Regulation for Participatory Investment Supervision. Article 8 of Decree 80 provides the community with opportunities to inspect compliance, monitor implementation and evaluate the results of investments in the commune, including environmental impacts.

Table 25: Environmental Management Plan

Environmental Aspect & Potential Impact	Remedial Measure	Means of Implementation	Institutional Responsibility	
			Implementation	Supervision
Design /Pre-construction Components				
Unexploded ordnance	- Bomb and mine detection and disposal	Special Contract	Design Consultants	NPC
Impact of Da fault to the Nam Nghe Dam	- Include seismic risk analysis in the technical design of the dam. - Provide for an emergency plan in case of dam break.	Proper planning and design	Design Consultants	NPC
Project construction & potential loss of agricultural, forestry & grazing land	- Design for maximize ratio of waste cut and fill materials. - Reservoir design and alignment of tunnel, penstock, power house and tail race to avoid existing land uses wherever possible - Compensation at market rates, prior to work commencement.	Proper planning Measures to be added in relevant parts of contract s. Proper resettlement planning.	Design consultants & NPC.	NPC
Excavation of construction materials and development of quarries & borrow areas causing loss of alternative land use	- Maximum use of existing quarry & borrow areas already in operation. - Degraded, barren, riverbeds & wastelands to be used for borrow materials.	Proper planning and measures to be added in the relevant parts of contract documents.	Design consultants & NPC.	NPC
Reduced water flows and reduction in water quality in the existing river course.	- Ensure that dam construction is phased to ensure diversion of the stream with cofferdams during separate construction of left & right abutments & ensure construction activities avoid soil & construction materials entering river flow. - Ensure a minimum flow is retained in the river	Planning & add measure to relevant parts of contract documents.	Design consultants & design engineers.	NPC
Water diverted from the river leaving reduced water flow impacting aquatic life.	- Design to keep residual water flow in river to meet aquatic needs.	Design weir & intake facilities to allow residual flow to the stream	Design consultants	

Environmental Aspect & Potential Impact	Remedial Measure	Means of Implementation	Institutional Responsibility	
			Implementation	Supervision
Construction stage				
Earthworks for new access roads and construction of penstock on steep slopes leading to erosion & encroachment	<ul style="list-style-type: none">- Slopes along access roads & penstock will be provided with catchments/ cut-off drains & chutes to minimize soil erosion and masonry retaining structures- Formation of sediment basins & slope drains.-Maximum usage of material in fills areas. Spoils planning, particularly on steep slopes with bench terracing for high cut areas & to avoid any erosion of material on down slopes.- Tree-planting programme on penstock areas and roads.- Rehabilitate the temporary construction areas at the dam and powerhouse sites.	Careful monitoring.	Contractor's Environment Engineer	SC, NPC reports to DONRE,
Quarrying of Borrow Materials with potential for loss and degradation of land	<ul style="list-style-type: none">- No earth will be borrowed from cultivable lands.- Borrowing to take place from barren, wastelands, & riverbeds.- For new borrow areas, all measures will be taken to avoid loss of any productive soil.- Any borrow areas will be refilled, re-vegetated & landscaped with tree planting.	Conditions included in contracts. Careful monitoring	Contractor's Environment Engineer	SC, NPC reports to DONRE,
Taking of Quarry Materials with loss and degradation of land	<ul style="list-style-type: none">- Quarry materials will be obtained from existing operating sites with proper licenses & environmental clearances.- New quarries to be opened only with permission of respective authorities.	Careful monitoring	Contractor's Environment Engineer	SC, NPC reports to DONRE,
Operation of construction equipment and construction activities and contamination of soils, loss of water quality & water pollution	<ul style="list-style-type: none">- Fuel storage & refuelling will have adequate containment away from water bodies/channel. Equipment will be properly maintained.- Precautions to be taken to prevent water pollution due to increased siltation & turbidity for weir site & road construction particularly in dry months when flows are low.	Careful monitoring of conditions included in contracts	Contractor's Environment Engineer and NPC	SC, NPC reports to DONRE,

Environmental Aspect & Potential Impact	Remedial Measure	Means of Implementation	Institutional Responsibility	
			Implementation	Supervision
	<ul style="list-style-type: none"> - Approved sites defined for storage & disposal of wastes materials - Any waste petroleum products will be collected, stored, & disposed of at approved sites.. 			
Construction activities causing disruption of existing surface drains.	<ul style="list-style-type: none"> - Appropriate rain-storm-water channels will be constructed. - Provision for cross drainage structures will be made. 	Proper planning and measures to be added in the relevant parts of contract documents. Careful monitoring of site conditions	Design consultants & NPC. Contractor's Environment Engineer	NPC
Construction Camp & Residential colony. Social impacts & pollution from wastewater & solid waste	<ul style="list-style-type: none"> - Construction camps will be located adjoining the dam and powerhouse sites & away from any settlement. Manual labour will be employed locally. - Camps & residential colony will have properly designed sewage system for wastewater effluent and solid waste collection. 	Careful monitoring of site conditions and implementation of contract conditions.	Contractor's Environment Engineer	SC, NPC reports to DONRE
Emission from Construction Vehicles & Equipment causing air pollution	<ul style="list-style-type: none"> - Emission levels of all construction vehicles & equipment will conform to Vietnamese emission standards. - Pollutant parameters will be monitored during construction. - Crushing, & concrete batching plant will be away from population centres at dam and powerhouse sites. 	Careful monitoring	Contractor's Environment Engineer	SC, NPC reports to DONRE
Dust particulate causing health impacts for workers and villagers	<ul style="list-style-type: none"> - All precautions to be taken to reduce dust level emissions from batching plants & portable crushers at dam and powerhouse sites. - Regular water spraying at all mixing sites & temporary service roads will be undertaken. - All delivery vehicles will be covered with tarpaulin. 	Careful monitoring	Contractor's Environment Engineer	SC, NPC reports to DONRE

Environmental Aspect & Potential Impact	Remedial Measure	Means of Implementation	Institutional Responsibility	
			Implementation	Supervision
Construction activity - Noise from Vehicles, Plant & Equipment causing noise pollution	<ul style="list-style-type: none"> - All construction equipment & plants will conform to Vietnamese noise standards. - All vehicles & equipment to be fitted with noise abatement devices. - Construction workers will be provided with personal protection. 	Careful monitoring	Contractor's Environment Engineer	SC, NPC reports to DONRE
Noise pollution from any blasting activities at dam and power tunnel and penstock,.	<ul style="list-style-type: none"> - Any blasting works will be in accordance with Vietnamese Explosives Act. - No blasting between dusk & dawn. - Residents close by will be informed well in advance of blasting times. - Workers associated with blasting sites will be provided with earplugs, helmets & other personal safety devices. 	Careful planning & monitoring	Contractor's Environment Engineer	SC, NPC reports to DONRE
Construction of dam, reservoir, tunnel, penstock with loss of vegetation & tree cover.	<ul style="list-style-type: none"> - No trees to be removed without prior approval, - Compensation for lost trees on private land, - Plantation Programme implemented at dam area, tunnel, penstock, temporary construction areas, roads and other elements of the project. Indigenous tree species being accorded priority over exotic species. 	Careful monitoring of measures to be implemented using Forestry Department of private contractor.	Contractor's Environment Engineer using District Peoples Committee or sub-contractor	SC, NPC reports to DONRE
Work force during construction causing impacts to wildlife	<ul style="list-style-type: none"> - Construction workers to be educated for wildlife conservation with no hunting & poaching to be allowed for workers. 	Contractor to enforce measures included in contract	Contractor's Environment Engineer	SC, NPC reports to DONRE
Construction Activities & Accident Risks	<ul style="list-style-type: none"> - All blasting sites will have warning & clearance signals. Site will be inspected prior/after blasting. - Workers will be provided helmets, masks & safety goggles etc. - A readily available first aid unit will be available with dressing materials etc. - Road safety education will be given to construction vehicle 	Inclusion of measures in contracts and follow up monitoring	Contractor's Environment Engineer	SC, NPC, EPA

Environmental Aspect & Potential Impact	Remedial Measure	Means of Implementation	Institutional Responsibility	
			Implementation	Supervision
	<p>drivers.</p> <ul style="list-style-type: none"> - Traffic management will be ensured during road construction periods. - Information dissemination will take place through the Commune's People Committee regarding activities causing disruption. 			
Construction activities causing disruption to public utilities	Any public utilities likely to be impacted, such as water supply pipe system, power/phone lines etc must be relocated to suitable places, in consultation with local beneficiaries.	To be added in the relevant parts of contract documents.	Design consultants & NPC.	NPC
Any discovery of artefacts or articles of historic interest and importance	For all finds of an historic or cultural value, work will be stopped and the find reported to the nearest office of the Department Culture, Sport and Tourism or the Department of Culture and Information	To be added in the relevant parts of contract documents.	Contractor's Environment Engineer	NPC
Operational Stage				
Reduced water flow in river effecting aquatic life	<ul style="list-style-type: none"> - Provide guaranteed minimum dry season flow of water in the stream of 100 l/sec. - Regular monitoring of the quantity of daily water flows below the weir intake. 	Measurements Undertaken by NPC hydrology engineers	NPC Environment Engineer	NPC
Change nature of flows with peaking operations of the plant.	<ul style="list-style-type: none"> - Monitor the impact of the change in flows, which is immediately down stream left bank from the power plant. 	NPC to monitor and take necessary action	NPC Environment Engineer	NPC
Scouring and erosion in Nam Bum river bed from tail race discharge	<ul style="list-style-type: none"> - Repair and/or extend the reinforcement at the Nam Bum tail race discharge with the Nam Bum river - Provide stilling basin at tail race. 	NPC to monitor & undertake necessary action	NPC Environment Engineer	NPC reports to DONRE
Soil erosion, land degradation & vegetation loss particularly on steep slopes	<ul style="list-style-type: none"> - Maintenance of trees and vegetative cover over initial five year of project around the dam, tunnel, penstock, access road and at other project infrastructure. 	Using sub-contractor or Government agency.	NPCs Environment Engineer	NPC

Table 26: Environmental Monitoring Measures

Aspects/Parameters to be Monitored and Applicable Standard	Location	Means of Monitoring	Schedule/Frequency	Responsible to Undertake Monitoring	Estimated Cost (VND)
Construction stage					
Implementation of construction phase: environmental mitigation measures specified in EMP Table 25	Locations indicated in EMP Table 25 for specific mitigation measures	Site visit, interviews with local residents, coordination with concerned agencies	Quarterly (on a regular basis) Random checks and to validate complaints	Social-Environmental Unit (ESDC)/ and NPC	100,000,000
- Noise in dB(A) compared to standards specified in QCVN 26:2010/BTNMT - Dust in mg/l compared to standard specified in QCVN 05 : 2009/BTNMT	Residential area in Hua Bum commune	Noise measurement	Quarterly (on a regular basis) Random checks and to validate complaints	Contractor/ NPC	50,000,000
- Surface water quality (faecal coliform, dissolved oxygen, pH, TSP.oil and grease, BOD5) in QCVN08: 2008:BTNMT - Other parameters to be sampled, as appropriate, to validate complaints and pollution event(s) due to project activities	Upstream, downstream of dam, Downstream of Hydro-power plant	Field sampling	Quarterly (on a regular basis) Random checks and to validate complaints	Contractor/ NPC	20,000,000
Landscaping tree planting programme	Roads, dam and hydropower sites and renovation of	Site visit, interviews with local residents, coordination with concerned agencies	During construction and after construction completion	Social-Environmental Unit (ESDC)/ and NPC	200,000,000

Aspects/Parameters to be Monitored and Applicable Standard	Location	Means of Monitoring	Schedule/Frequency	Responsible to Undertake Monitoring	Estimated Cost (VND)
	temporary camp and construction sites Which are close to town				
Operation Stage					
Reduced water flow/Minimum flow (m ³ /s)	Downstream of dam to Nam Bum confluence	Measurement of Discharge	Quarterly (on a regular basis) in the first year Random checks and to validate complaints	NPC	35,000,000
Landscaping program maintained for five years	Various locations	Checking and replacing material if required	Quarterly	NPC Environment Officer	Included in Power plant budget
Discharge to the Nam Bum	Immediately down stream of power station	Observation	At regular times during dry season and particularly at peaking discharge.	NPC Environment Officer	Included in Power plant budget

VI. PUBLIC CONSULTATION, INFORMATION DISCLOSURE AND GRIEVANCE REDRESS MECHANISM

NPC organized 2 public consultation meetings. The first one was held in 21th November 2010 for informing the general clearance plan of Nam Nghe hydropower project and collect data on natural and socio-economic conditions of the project area. The second meeting was held in 25th April 2011 for disclosing information about social, environmental and resettlement issues.

A. The meeting for informing the general clearance plan and collect data on natural conditions socio-economic of project area in 21th November 2010

1. Objectives of the Workshop

- To inform the general clearance plan
- To receive comments from beneficiaries and affected peoples, local officials, community leaders, Societies, and others
- Collect data on natural conditions socio-economic of project area

2. Disclosed information

- Subproject's locations, designs & cost estimates
- GOV & ADB policies & procedures about: Resettlement & Compensation, Environment and Social issues
- Potential impacts caused by subproject

3. Meeting Participants

The participants expected to attend the meeting are:

- NPC's representatives
- Board of compensation and resettlement assistance
- Local authorities: representatives of district and commune PCs.

Total of participants for one subproject: 22 people (included PAPs and Representatives of NPC, District Agencies, Local Authorities people PAPs)

4. General Comments from Participants of subproject's Public Consultation Meeting

The comments from the participants can be summarised as follows:

- There is agreement on the construction of Nam Nghe hydropower subproject because this project will connect to the national power network and improve the quality of power supply to the local people of Muong Te District.
- Agreement the resettlement rate is according to the compensation pricelist of Province People's Committee published in 2010.

- Agreement on the general clearance plan of Nam Nghe project.
- Need the mitigation measures for negative impacts of environment caused by this subproject.
- Construction time should be widely informed beforehand to affected household to plan agricultural produce & cultivation for acquisition agricultural land

Conclusion

- There is agreement on the construction of the Nam Nghe subproject and desired early construction

B. The public consultation meeting in 25th April 2011

1. Objectives of the Workshop

- To inform the stakeholders the Project information
- To receive comments from beneficiaries and affected peoples, local officials, community leaders, Societies, and others
- Ensure community consensus for project implementation & information disclosure to local people with precisely

2. Disclosed information

- Subproject's objectives
- Subproject's locations, designs & cost estimates
- GOV & ADB policies & procedures
- Potential impacts caused by subproject
- Proposed mitigation measures
- Environmental Management Plan & Environmental Monitoring Program

3. Meeting Participants

The participants expected to attend the meeting are:

- NPC representatives, NPC's Consultation
- Provincial Agencies: representatives DARD, DONRE
- Local authorities: representatives of district and commune PCs, representatives of District/Commune Woman Union, Public Health, Environment Division at District & Commune level, representatives of local communities.
- Representatives of project affected people (PAP) to ensure they are meaningfully involved in the public consultation. PAPs representatives included affected by environmental impacts both direct and indirect negative impacts

Total of participants for one subproject: 17-25 people (included PAPs and Representatives of NPC, District Agencies, Local Authorities)

4. Meeting Agenda

Time Duration for presentation (minutes)	Content	Presented by
5	Welcome	PAP
10	Introduction of ADB's Project & Nam Nghe subproject	
20	Presentations on the Project layout, location and potential impacts, compensation methods	Pham Trung Dung – Project Owner
40	Discussion on potential impacts & mitigation measures & monitoring of mitigation measure implementation	All participants
5	Wrap-up & Closing	NPC

5. General Comments from Participants of subproject's Public Consultation Meeting

The comments from the participants can be summarised as follows:

- There is agreement on the construction of Nam Nghe hydropower subproject because this project will connect to the national power network and improve the quality of power supply to the local people of Muong Te District.
- Land compensation rates are agreed according to the compensation pricelist of Province People's Committee published in 2011, cooperatively with technical assistance and seed, fertilize subsidy for affected people to reclaim new land.
- Before that, people are not provided sufficient information about this project, especially about Resettlement & compensation policy. Adequate Resettlement & compensation policy for affected households due to their agricultural land acquisition.
- Measures for minimizing land occupy: It is necessary to minimize land occupy at most, materials and machines should be gathered at site as scheduled, construct the accommodation for workers and suitably arrange machine in conformity with specifications without impacting on the people's daily life.
- The local residents propose the Contractor to repair damaged roads caused by execution, transport under the project.
- People of Hua Bum commune hoped Nam Nghe hydropower project will bring high economic benefit, and not affect significantly to environment and not cause environmental pollution during operation period
- Agreement on the assessment result of positive and negative impacts caused by this subproject, mitigation measures.

Conclusion

- Consensus is achieved on socio-environmental impacts and mitigation measures recommended by the Project

Memoranda of the public consultation meeting at People's Committee of Hua Bum commune and public consultation meetings in the villages can be found at Appendix 9

C. Grievance Redress Mechanism

A grievance redress mechanism (GRM) will be established soon after project commencement. The first level and most accessible and immediate avenue for the fastest resolve of grievances is through the Project Manager of the Power Company. Grievances will be resolved through continuous interactions with affected persons and the PMU will answer queries and resolve grievances regarding various issues, which are the Company's responsibility. Corrective measures will be undertaken at the field-level within seven days. All grievances will be documented with full information of the aggrieved person and the issue and the resolution of complaint.

Complainants not satisfied with the response of the Company have the option of using the procedure available under the Civil Law and the Land Law 2003 (Article 138) and Decree 197/2004/ND-CP (Art. 63, 64), which specifies:

1. Complaints will be sent to the commune Peoples Committee (PC), which must respond to a complainant within 15 days,
2. If the complainant is not satisfied with resolution of the commune PC, the next level of appeal is to the District PC which has the responsibility to respond and resolve complaints within 15 days,
3. If not satisfied with the resolution of the district PC, the complainant can bring the complaint to the provincial PPC,
4. As a final resort, if not satisfied with resolution of PPC, the complainant can take the case to the District Court.

VII. CONCLUSION, FINDINGS AND RECOMMENDATIONS

7.1. Conclusions

The sub-project of Nam Nghe Hydropower Plant will be implemented by NPC. The IEE was conducted using the ADB Screening Matrix. There are no impacts on sites of historic or archaeological importance. The project is located far away from all villages and next to the Muong Te – Pa Tan road. There is a potential loss of rice land and impacts on some areas of mixed forest by project facilities such as: reservoir, dam, channel and penstock. There is no use of water or human activity on the section of the river potentially deprived of water.

Apart from the loss of land in Chang Chao Pa, Pa Cheo, Pa Mu and Nam Nghe villages, the main impact identified in this environmental examination is the impact of the construction phase of the project and of the changed water conditions below the dam. Water will be removed or experience very much reduced flows along the 3.5 km stretch of the Nam Nghe Stream in the dry season. If the

scheme is implemented with full use of the river water flow in the dry season, there would be significant impact on aquatic life. It is proposed to retain a minimum environmental flow in the river of 100 l/sec.

The other environmental consideration is to mitigate the impacts of construction activities particularly with the need to build 5 km of roads. With the mitigation and environmental management plan proposed, environmental impacts will be limited.

It is important, also, that NPC as the EA develops its internal capacity to implement and monitor the measures in the EMP. This has been designed into the project by requiring the setting up of an ESDC in NPC and the appointment of environmental & resettlement specialists

7.2. Recommendations

Except for some negative impacts as commonly seen in many other hydropower projects (most of which can be mitigated by proposed measures), Nam Nghe will not cause significant adverse impacts but rather significant positive impacts on Muong Te District, Lai Chau province and the neighbouring areas.

This IEE with the associated EMP is regarded as sufficient environmental assessment of this project and a full EIA is not required for ADB purposes.

ANNEXES

Annex 1: Rapid Environmental Assessment (REA) Checklist

Instructions:

- (i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by Director, RSES and for approval by the Chief Compliance Officer.
- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

LOAN 2517-VIE: RENEWABLE ENERGY AND
NETWORK EXPANSION AND REHABILITATION FOR

Sector Division:

Energy

A. Basic Project Design Data

- 1. Dam height, m = 16,5m
- 2. Surface area of reservoir, (ha) = 61ha
- 3. Estimated number of people to be displaced = 0
- 4. Rated power output, (MW) = 2x3.75 MW

Other Considerations:

- 1. Water storage type: ☒ reservoir ☐ run of river ☐ pumped storage
- 2. River diversion scheme: ☐ trans-basin diversion ☐ in-stream flow regulation
☒ in-stream diversion
- 3. Type of power demand to address: ☐ peak load ☐ base load

ANNEX 2: SCREENING QUESTIONS

SCREENING QUESTIONS	Yes	No	REMARKS
B. Project Location Is the dam and/or project facilities adjacent to or within any of the following areas?			
Unregulated river	x		The River is a small stream. The project is run of river with a water retention dam of only 34,490 m ³ .
Undammed river tributaries below the proposed dam		x	There's one undammed tributary below the proposed dam
Unique or aesthetically valuable land or water form		x	The area is primarily used for agriculture and forest land
Special area for protecting biodiversity		x	The project site is not located in an area requiring special biodiversity protection.
Protected Area		x	No protected areas are within the project's area of influence.
Buffer zone of protected area		x	
Primary forest		x	Hydropower projects are usually constructed on upstream area of rivers, so it's impossible to avoid impacts on forest. There are about 11.56 ha of forest land and 1.2 ha of river bank and spring bed land which will be affected by the reservoir, dam, channel, penstock and access road.
Range of endangered or threatened animals		x	There are no reported endangered or threatened animals.

SCREENING QUESTIONS	Yes	No	REMARKS
Area used by indigenous peoples	x		People in Hua Bum Commune are almost ethnic minority people. Only 5% of them are Kinh. They're almost officers and live in the centre of the Commune. There are 4 villages (Chang Chao Pa, Pa Mu, Pa Cheo and Nam Nghe) in Hua Bum in 3 ethnic groups: Ha Nhi, Mong, Mang.
Cultural heritage site		x	There are no known archaeological, cultural or religious heritage site located within proximity of the project.
Wetland		x	Not applicable
Mangrove		x	Not applicable
Estuary		x	Not applicable
C. Potential Environmental Impacts			
Short-term construction impacts such as soil erosion, deterioration of water and air quality, noise and vibration from construction equipment?	x		Temporary Impacts are expected to water quality during construction and for soil erosion in steep terrain,
Disturbance of large areas due to material quarrying?		x	There is a stone quarry at Na Pay about 25 km from the project area. It is estimated that this quarry satisfies both in quantity and quality for project construction.
Disposal of large quantities of construction spoils?		x	Some disposal of construction spoil is required at designated sites close to the dam and powerhouse.
Clearing of large forested area for ancillary facilities and access road?		x	Some forest will be destroyed but it is not primary forest, being either secondary growth or plantation forest.
Impounding of a long river stretch?		x	This is as small reservoir only 0.61 ha in area. The length of the reservoir upstream is 100 m

SCREENING QUESTIONS	Yes	No	REMARKS
Dryness (less than 50% of dry season mean flow) over a long downstream river stretch?		x	From the dam to the plant is only about 3.5 km (but still maintain environmental flow in the stream of water)
Construction of permanent access road near or through forests?	x		5 km of total access roads are required to the dam and plant. It is forest land with no economic value.
Creation of barriers for migratory land animals		x	
Loss of precious ecological values due to flooding of agricultural/forest areas, and wild lands and wildlife habitat; destruction of fish spawning/breeding and nursery grounds?		x	A small area of land lost to reservoir. Total land loss to reservoir is about 1.2 ha of river, stream and wild land.
Deterioration of downstream water quality due to anoxic water from the reservoir and sediments due to soil erosion?		x	The reservoir is small & there will be only temporary loss of water quality during the construction stage.
Significant diversion of water from one basin to another?		x	
Alternating dry and wet downstream conditions due to peaking operation of powerhouse?	x		There will be peak operation use during the dry season months. But quantities of water released are small - maximum of 2.63 m ³ /s. There will be minimum flow retained in the river is 0.100 m ³ /s and immediately below the dam there are 01 side streams which augment flows.
Significant modification of annual flood cycle affecting downstream ecosystem, people's sustenance and livelihoods?		x	Reservoir is small, Small water retention. Water regulation daily
Loss or destruction of unique or aesthetically valuable land or water forms?		x	Small dam in steep valley
Proliferation of aquatic weeds in reservoir and downstream impairing dam discharge, irrigation systems, navigation & fisheries, & increasing water loss through transpiration?		x	Small retention area only
Scouring of riverbed below dam?		x	Not applicable
Downstream erosion of recipient river in trans-basin diversion?		x	Not applicable

SCREENING QUESTIONS	Yes	No	REMARKS
Increased flooding risk of recipient river in trans-basin diversion?		x	Not applicable
Decreased groundwater recharge of downstream areas?		x	Small run of river operation only and no impact
Draining of downstream wetlands and riparian areas?		x	Not applicable
Decline or change in fisheries below the dam due to reduced peak flows and floods, submersion of river stretches and resultant destruction of fish breeding and nursery grounds, and water quality changes?		x	Not applicable
Loss of migratory fish species due to barrier imposed by the dam?	x		The dam will form a barrier to fish movements. However fish are not important as a food source in the area.
Formation of sediment deposits at reservoir entrance, creating backwater effect and flooding and waterlogging upstream?		x	insignificant
Significant disruption of river sediment transport downstream due to trapping in reservoir?		x	Sediment deposits will be flushed through the system in periods of high flow when the dam gates are opened
Environmental risk due to potential toxicity of sediments trapped behind the dams?		x	Not applicable
Increased saltwater intrusion in estuary and low lands due to reduced river flows?		x	Not applicable
Significant induced seismicity due to large reservoir size and potential environmental hazard from catastrophic failure of the dam?		x	Not applicable – small dam and reservoir
Cumulative effects due to its role as part of a cascade of dams/ reservoirs?		x	Not applicable
Depletion of dissolved oxygen by large quantities of decaying plant material, fish mortality due to reduced dissolved oxygen content in water, algal blooms causing successive and temporary eutrophication, growth and proliferation of aquatic weeds?		x	Not applicable – small reservoir and no long term retention of water. NPC will implement vegetation clearance prior to operation
Risks and vulnerabilities related to occupational health & safety due to physical, chemical, biological, & radiological hazards during project construction & operation?	x		In short time, local and mitigation measures

SCREENING QUESTIONS	Yes	No	REMARKS
Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		x	Small work force and Camp areas required. They're far enough to existing communities, about 3,5km from villages.
Creation of community slums following construction of the hydropower plant and its facilities?		x	Small labor force only required. Temporary camps will be removed and land renovated.
Social conflicts if workers from other regions or countries are hired?	x		Temporary camps for construction in between the main villages will need proper control
Uncontrolled human migration into the area, made possible by access roads and transmission lines?		x	Not applicable – small scheme only
Disproportionate impacts on the poor, women, children or other vulnerable groups?		x	
Community health and safety risks due to the transport, storage, and use and/or disposal of materials likely to create physical, chemical and biological hazards?		x	
Risks to community safety due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g. dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		x	

ANNEX 3: Terms of Reference for ESDC Staff

Terms of Reference for NPC/ ESDC Environment Engineer

Specific Job Description

- Responsible on behalf of NPC for ensuring the implementation of the IEE and EMP.
- Facilitate NPC and the design/supervision consultants in the site-specific environmental issues to ensure the least damages and disturbances to the natural environment and social values of the local residents.
- Examine, evaluate and advise persons in adopting suitable, cost-effective, socio-cultural, socially sensitive, and sound engineering project design, where the local residents receive the least disturbance.
- Conduct a cross checking and vetting of design/specification, tender, and contract documents, making them suitably orientated towards the environmental and sound engineering needs for the successful site selection, construction, and post-completion operation and maintenance of the project in an environment friendly manner.
- Recommend revision of Environmental Management and Monitoring Plans to PMU so that the proposed mitigation measures are properly implemented in a cost effective manner.
- Ensure water testing on regular basis, note any changes and adopt suitable measures, accordingly and analyse results and make recommendations to NPC if there is deterioration in water quality.
- Supervise implementation of water quality testing and fish monitoring programmes.
- Provide information as necessary to external consultants.
- Ensure environmental conditions included in contracts are fulfilled by contractors.
- Establish regular contacts and on-going liaison Peoples Committees and Government Departments, local/regional NGOs, local officials, and all other stakeholders connected with the project related environmental issues.
- Collect environment related ecological/social data/information, make computer data entries, carry out the analysis and apply the results.
- Liaison between NPC and the Government Agencies, particularly the Environmental Water Resources Department who must receive 6 monthly reports on compliance with the EMP.

Qualifications

The ESDC Environmental Engineer is required to at least, to hold a Bachelor's degree and five years work experience in road engineering or as an environmental engineer on construction projects

ANNEX 4: Photos of Nam Nghe Project Site



Plant Location



Typical image of forest in project area



Nam Bum streams



Transportation project area



House of Ha Nhi people



Water system

ANNEX 5: Surface Water Environment
Inorganic Materials Technology Research Center

Address: C3-303 Hanoi University of Science and Technology – 1 Dai Co Viet Street

Analyzing results

Client: Power consulting and investigation development jsc. Thanh Xuan 68

Address: #1a, B5, Alley 9, Luong Ngoc Quyen Street, Ha Dong District, Hanoi

Sample location: Nam Nghe hydropower project, Muong Te District, Lai Chau Province

Type of sample: surface water samples

Date of sample taken: 25 August 2010

No.	Parameters	Unit	M1	M2	QCVN 08:2008/BTNMT			
					A Column		B Column	
					A1	A2	B1	B2
1	pH	-	7.0	6.8	6-8.5	6-8.5	5.5-9	5,5-9
2	COD	mg/l	15.29	20.9	10	15	30	50
3	BOD5	mg/l	9.4	8.4	4	6	15	25
4	Dissolved oxygen (DO)	mg/l	5.62	5.43	≥6	≥5	≥4	≥ 2
5	TSS	mg/l	22.68	24.38	20	30	50	100
6	Chloride (Cl-)	mg/l	125.3	122.5	205	400	600	-
7	Fluoride (F-)	mg/l	1.3	1.2	1	1.5	1.5	2
8	NH4+ (according to N)	mg/l	0.25	0.29	0.1	0.2	0.5	1
9	NO3- (according to N)	mg/l	2.36	2.58	2	5	10	15
10	NO2- (according to N)	mg/l	0.04	0.03	0.01	0.02	0.04	0.05
11	PO43- (according to P)	mg/l	0.17	0.16	0.1	0.2	0.3	0.5
12	Cyanide (CN-)	mg/l	not detected	not detected	0.005	0.01	0.02	0.02
13	Arsenic (As)	mg/l	0.012	0.015	0.01	0.02	0.05	0.1
14	Chrome (Cr6+)	mg/l	0.02	0.03	0.01	0.02	0.04	0.05

15	Iron (Fe)	mg/l	0.42	0.52	0.5	1	1.5	2
16	Lead (Pb)	mg/l	0.02	0.01	0.02	0.02	0.05	0.05
17	Coliform	MPN/ 1000	3,100	3,900	2,500	5,000	7,500	10,000

M1: Dam site

M2: Planned powerhouse location

Note:

QCVN 08:2008/BTNMT: National technical regulations on surface water quality.

Hanoi, 03 September 2010

Tester

Director

Nguyen Van Dan
(signed)

PhD. Dao Xuan Phai
(signed and stamped)

TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI
TRUNG TÂM NGHIÊN CỨU CÔNG NGHỆ VẬT LIỆU VỎ CƠ
Đ/c : C3-303 Trường Đại học Bách Khoa Hà Nội - Số 1 Đại Cồ Việt

PHIẾU KẾT QUẢ PHÂN TÍCH

Tên khách hàng : Công ty CP tư vấn và đầu tư phát triển điện Thanh Xuân 68
Địa chỉ : Nhà 1A - B5, ngõ 9 Lương Ngọc Quyến, Hà Đông, Hà Nội
Địa điểm lấy mẫu : Công trình thủy điện Nậm Nghe - H. Mường Tè - tỉnh Lai Châu
Loại mẫu : Mẫu nước mặt Ngày lấy mẫu : 25 tháng 8 năm 2010

TT	Chỉ tiêu	Đơn vị	M1	M2	QCVN 08:2008/BTNMT			
					Cột A		Cột B	
					A1	A2	B1	B2
1	pH	-	7,0	6,8	6-8,5	6-8,5	5,5-9	5,5-9
2	COD	mg/l	15,29	20,9	10	15	30	50
3	BOD ₅	mg/l	9,4	8,4	4	6	15	25
4	Ôxy hòa tan (DO)	mg/l	5,62	5,43	≥6	≥5	≥4	≥2
5	TSS	mg/l	22,68	24,38	20	30	50	100
6	Clorua (Cl ⁻)	mg/l	125,3	122,5	250	400	600	-
7	Florua (F ⁻)	mg/l	1,3	1,2	1	1,5	1,5	2
8	NH ₄ ⁺ (tính theo N)	mg/l	0,25	0,29	0,1	0,2	0,5	1
9	NO ₃ ⁻ (tính theo N)	mg/l	2,36	2,58	2	5	10	15
10	NO ₂ ⁻ (tính theo N)	mg/l	0,04	0,03	0,01	0,02	0,04	0,05
11	PO ₄ ³⁻ (tính theo P)	mg/l	0,17	0,16	0,1	0,2	0,3	0,5
12	Xianua (CN ⁻)	mg/l	KPHĐ	KPHĐ	0,005	0,01	0,02	0,02
13	Asen (As)	mg/l	0,012	0,015	0,01	0,02	0,05	0,1
14	Crom (Cr ⁶⁺)	mg/l	0,02	0,03	0,01	0,02	0,04	0,05
15	Sắt (Fe)	mg/l	0,42	0,52	0,5	1	1,5	2
16	Chì (Pb)	mg/l	0,02	0,01	0,02	0,02	0,05	0,05
17	Coliform	MNP/100ml	3100	3900	2500	5000	7500	10000

Ký hiệu, vị trí mẫu: M1 - Tại khu vực tuyến đập
M2 - Suối Hua-Bun, tại điểm dự kiến là cửa xả nước sau tua-bin của nhà máy

Ghi chú:

QCVN 08:2008/BTNMT : Quy chuẩn kỹ thuật Quốc gia về chất lượng nước mặt.

Hà Nội, ngày 03 tháng 9 năm 2010

KIỂM ĐỊNH VIÊN



Nguyễn Văn Đan

GIÁM ĐỐC



PGS.TS Đào Xuân Phái

ANNEX 6: Underground water Environment

Inorganic Materials Technology Research Center

Address: C3-303 Hanoi University of Science and Technology – 1 Dai Co Viet Street

Analyzing results

Client: Power consulting and investigation development jsc. Thanh Xuan 68

Address: #1a, B5, Alley 9, Luong Ngoc Quyen Street, Ha Dong District, Hanoi

Sample location: Nam Nghe hydropower project, Muong Te District, Lai Chau Province

Type of sample: underground water samples

Date of sample taken: 25 August 2010

No.	Parameter	Unit	NN1	NN2	QCVN 09:2008/BTNMT
1	pH	-	7.0	7.1	5.5-8.5
2	Hardness (appropriate with CaCO ₃)	mg/l	162	153	500
3	Total solids	mg/l	252	312	1,500
4	Nitrite (NO ₂) (appropriate with N)	mg/l	0.031	0.039	0.1
5	Nitrate (NO ₃) (appropriate with N)	mg/l	2.214	2.145	15
6	Iron (Fe)	mg/l	1.824	1.915	5
7	Lead (Pb)	mg/l	0.001	0.001	0.01
8	Zinc (Zn)	mg/l	1.223	1.121	3.0
9	Mercury (Hg)	mg/l	not detected	not detected	0.001
10	Bronze (Cu)	mg/l	0.311	0.253	1.0
11	Chrome VI (Cr ⁶⁺)	mg/l	not detected	0.001	0.05
12	Cyanide (CN ⁻)	mg/l	not detected	not detected	0.01
13	Chloride (Cl ⁻)	mg/l	16.011	15.115	250
14	Arsenic (As)	mg/l	not detected	not detected	0.05
15	Manganese (Mn)	mg/l	0.029	0.035	0.5
16	Cadmium (Cd)	mg/l	not detected	not detected	0.005
17	Phenol	mg/l	not detected	not detected	0.001
18	Coliform	MPN/ 100ml	1	2	3

NN1: Dam site

NN2: Planned powerhouse location

Note:

QCVN 09:2008/BTNMT: National technical regulations on underground water quality.

Hanoi, 03 September 2010

Tester

Director

Nguyen Van Dan (signed)

PhD. Dao Xuan Phai (signed and stamped)

TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI
TRUNG TÂM NGHIÊN CỨU CÔNG NGHỆ VẬT LIỆU VỎ CƠ
Đ/c : C3-303 Trường Đại học Bách Khoa Hà Nội - Số 1 Đại Cồ Việt

PHIẾU KẾT QUẢ PHÂN TÍCH

Tên khách hàng : Công ty CP tư vấn và đầu tư phát triển điện Thanh Xuân 68
Địa chỉ : Nhà 1A - B5, ngõ 9 Lương Ngọc Quyến, Hà Đông, Hà Nội
Địa điểm lấy mẫu : Công trình thủy điện Nậm Ngệ - H. Mường Tè - tỉnh Lai Châu
Loại mẫu : Mẫu nước ngầm Ngày lấy mẫu : 25 tháng 8 năm 2010

TT	Thông số phân tích	Đơn vị	NN1	NN2	QCVN 09:2008/BTNMT
1	pH	-	7,0	7,1	5,5 - 8,5
2	Độ cứng (tính theo CaCO_3)	mg/l	162	153	500
3	Chất rắn tổng số	mg/l	252	312	1500
4	Nitrit (NO_2^-) (tính theo N)	mg/l	0,031	0,039	0,1
5	Nitrat (NO_3^-) (tính theo N)	mg/l	2,214	2,145	15
6	Sắt (Fe)	mg/l	1,824	1,915	5
7	Chì (Pb)	mg/l	0,001	0,001	0,01
8	Kẽm (Zn)	mg/l	1,223	1,121	3,0
9	Thủy ngân (Hg)	mg/l	KPH	KPH	0,001
10	Đồng (Cu)	mg/l	0,311	0,253	1,0
11	Crom VI (Cr^{6+})	mg/l	KPH	0,001	0,05
12	Xianua (CN^-)	mg/l	KPH	KPH	0,01
13	Clorua (Cl^-)	mg/l	16,011	15,115	250
14	Asen (As)	mg/l	KPH	KPH	0,05
15	Mangan (Mn)	mg/l	0,029	0,035	0,5
16	Cadimi (Cd)	mg/l	KPH	KPH	0,005
17	Phenol	mg/l	KPH	KPH	0,001
18	Coliform	MPN/100 ml	1	2	3

Ký hiệu, vị trí mẫu: M1 - Tại khu vực tuyến đập
M2 - Tại khu vực gần nhà máy

Ghi chú:

QCVN 09:2008/BTNMT : Quy chuẩn kỹ thuật Quốc gia về chất lượng nước ngầm.

Hà Nội, ngày 03 tháng 9 năm 2010

KIỂM ĐỊNH VIÊN

Nguyễn Văn Đan

GIÁM ĐỐC



PGS.TS Đào Xuân Phái

ANNEX 7: Air Environment

Inorganic Materials Technology Research Center

Address: C3-303 Hanoi University of Science and Technology – 1 Dai Co Viet Street

Analyzing results

Client: Power consulting and investigation development jsc. Thanh Xuan 68

Address: #1a, B5, Alley 9, Luong Ngoc Quyen Street, Ha Dong District, Hanoi

Sample location: Nam Nghe hydropower project, Muong Te District, Lai Chau Province

Type of sample: air and microclimate samples

Date of sample taken: 25 August 2010

No.	Parameter	Unit	K1	K2	TCCP1	TCCP2
I	Microclimate					
1	Temperature	oC	31.5	31.7	-	32
2	Wind velocity	m/s	0.3	0.25	-	1.5
3	Noise	dBA	68.7	75.8	-	85
4	Humidity	%	78.5	79.3	-	< 80
II	Air and dust					
5	Suspended dust	mg/m3	0.17	0.35	0.3	4.0
6	NO2	mg/m3	0.2	0.4	0.2	5
7	CO	mg/m3	10.52	15.24	30	30
8	SO2	mg/m3	0.45	0.56	0.35	20

K1: Dam site

K2: Planned powerhouse location

Note:

TCCP1: QCVN 05:2009/BTNMT: National technical regulations on surround air quality.

TCCP2: TC 3733-BYT/QĐ/2002: Standards of Ministry of Health for air quality in the production area.

Hanoi, 03 September 2010

Tester

Nguyen Van Dan
(signed)

Director

PhD. Dao Xuan Phai
(signed and stamped)

TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI
TRUNG TÂM NGHIÊN CỨU CÔNG NGHỆ VẬT LIỆU VỎ CƠ

Đ/c : C3-303 Trường Đại học Bách Khoa Hà Nội - Số 1 Đại Cồ Việt

PHIẾU KẾT QUẢ PHÂN TÍCH

Tên khách hàng : Công ty CP tư vấn và đầu tư phát triển điện Thanh Xuân 68

Địa chỉ : Nhà 1A - B5, ngõ 9 Lương Ngọc Quyến, Hà Đông, Hà Nội

Địa điểm lấy mẫu : Công trình thủy điện Nậm Nghe - H. Mường Tè - tỉnh Lai Châu

Loại mẫu : Mẫu khí và vi khí hậu

Ngày lấy mẫu : 25 tháng 8 năm 2010

TT	Tên chỉ tiêu	Đơn vị	K1	K2	TCCP1	TCCP2
I	Vi khí hậu					
1	Nhiệt độ	$^{\circ}\text{C}$	31,5	31,7	-	32
2	Tốc độ gió	m/s	0,3	0,25	-	1,5
3	Tiếng ồn	dBA	68,7	75,8	-	85
4	Độ ẩm	%	78,5	79,3	-	<80
II	Khí và bụi					
5	Bụi lơ lửng	mg/m^3	0,17	0,35	0,3	4,0
6	NO_2	mg/m^3	0,2	0,4	0,2	5
7	CO	mg/m^3	10,52	15,24	30	30
8	SO_2	mg/m^3	0,45	0,56	0,35	20

Ký hiệu, vị trí mẫu: K1: Khu vực tuyến đập

K2: Tại khu vực dự kiến xây dựng nhà máy

Ghi chú: Phiếu kết quả chỉ có giá trị với mẫu được đo kiểm trong ngày

- **TCCP1: QCVN 05:2009/BTNMT:** Quy chuẩn kỹ thuật quốc gia về chất lượng không khí xung quanh

- **TCCP2: TC 3733-BYT/QĐ/2002:** Tiêu chuẩn của Bộ y tế về chất lượng không khí khu vực sản xuất

Hà Nội, ngày 03 tháng 9 năm 2010

KIỂM ĐỊNH VIÊN

Nguyễn Văn Đan

GIÁM ĐỐC



PGS.TS Đào Xuân Phái

ANNEX 8: Soil Environment

Inorganic Materials Technology Research Center

Address: C3-303 Hanoi University of Science and Technology – 1 Dai Co Viet Street

Analyzing results

Client: Power consulting and investigation development jsc. Thanh Xuan 68

Address: #1a, B5, Alley 9, Luong Ngoc Quyen Street, Ha Dong District, Hanoi

Sample location: Nam Nghe hydropower project, Muong Te District, Lai Chau Province

Type of sample: soil samples

Date of sample taken: 25 August 2010

No.	Parameter	Unit	D1	D2	QCVN 03:2008/BTNMT (Forest land)
1	Arsenic (As)	Mg/kg	4,24	3,23	12
2	Cadmium (Cd)	Mg/kg	0,15	0,13	2
3	Bronze (Cu)	Mg/kg	30,3	32,9	70
4	Zinc (Zn)	Mg/kg	58,39	62,92	200
5	Lead (Pb)	Mg/kg	28,64	35,33	100

D1: Dam site

D2: Planned powerhouse location

Note:

QCVN 03:2008/BTNMT (Forest land): National technical regulations on permissible limits of heavy metals in forest land.

Hanoi, 03 September 2010

Tester

Nguyen Van Dan (signed)

Director

PhD. Dao Xuan Phai (signed and stamped)

TRUNG TÂM NGHIÊN CỨU CÔNG NGHỆ VẬT LIỆU VÔ CƠ

Đ/c : C3-303 Trường Đại học Bách Khoa Hà Nội - Số 1 Đại Cồ Việt

PHIẾU KẾT QUẢ PHÂN TÍCH

Tên khách hàng : Công ty CP tư vấn và đầu tư phát triển điện Thanh Xuân 68

Địa chỉ : Nhà 1A - B5, ngõ 9 Lương Ngọc Quyến, Hà Đông, Hà Nội

Địa điểm lấy mẫu : Công trình thủy điện Nậm Ngệ - H. Mường Tè - tỉnh Lai Châu

Loại mẫu : Mẫu đất

Ngày lấy mẫu : 25 tháng 8 năm 2010

TT	Thông số	Đơn vị	Đ1	Đ2	QCVN 03:2008/BTNMT (Đất lâm nghiệp)
1	Asen (As)	mg/kg	4,24	3,23	12
2	Cadimi (Cd)	mg/kg	0,15	0,13	2
3	Đồng (Cu)	mg/kg	30,3	32,9	70
4	Kẽm (Zn)	mg/kg	58,39	62,92	200
5	Chì (Pb)	mg/kg	28,64	35,33	100

Ký hiệu, vị trí mẫu: Đ1: Khu vực tuyến đập

Đ2: Tại khu vực dự kiến xây dựng nhà máy

Ghi chú:

QCVN 03:2008/BTNMT (Đất lâm nghiệp): Quy chuẩn kỹ thuật Quốc gia về giới hạn cho phép của kim loại nặng trong đất lâm nghiệp.

Hà Nội, ngày 03 tháng 9 năm 2010

KIỂM ĐỊNH VIÊN

Nguyễn Văn Đan

GIÁM ĐỐC



PGS.TS Đào Xuân Phái

ANNEX 9: Memorandum of the public meeting in April 25, 2011

SOCIALIST REPUBLIC OF VIETNAM

Independence – Freedom - Happiness

MINUTES ON COMMUNITY ADVISORY

Project: Nam Nghe Hydropower Plant

The Meeting is executed at the Hua Bum Commune – Muong Te District – Lai Chau Province

On Project of Nam Nghe Hydropower Plant

Today, 25th April 2011

At the Hua Bum Commune

We have organized the meeting with the participation of people to make the assessment on environment, resettlement and ethnic minorities' development related to **Nam Nghe Hydropower Plant**

Participants:

- | | |
|-------------------------------|--|
| 1. Full name: Po Lo Po | Title: Chairman of People's Committee of the Commune |
| 2. Full name: Phung Me Chu | Title: Secretary of the commune |
| 3. Full name: Pho Hu Chu | Title: Deputy Secretary |
| 4. Full name: Po Xa Long | Title: Chairman women |
| 5. Full name: Phung Ha Xo | Title: Fatherland Front President |
| 6. Full name: Chim Van Quan | Title: Land Survey Officials |
| 7. Mr./Mrs.: Phạm Trung Dung | Represented for Resettlement Consultant/Specialist |
| 8. Mr./Mrs.: Nguyen Thai Dao | Represented for Environment Consultant/Specialist |
| 9. Mr./Mrs.: Nguyen Thi Tuyet | Represented for Gender and ethnic minorities |
- Consultant/Specialist

Representatives of affected people : 13 (enclosed list)

In which: Male: 8 people accounting for 61.5%

Female: 16 people accounting for 38.5%

Ethnic minorities: 100% (if any)

Advisory content:

1. To provide project related information: A report that summarizes the content of subproject

2. Environmentalists shall state environmental impacts including natural and social impacts of the project site and reduction methods for negative impacts. Environmental management plan and environmental monitoring programs

3. Resettlement specialist shall state the impact upon taking back the land and asset on land, policies of the ADB, Vietnam and localities, policies of the Project within compensation upon taking back the land and asset on land.

4. Community and ethnic minorities Specialist shall state the ethnic minorities' policies frame of the Project, social impacts during the Project implementation. Introduction of ethnic minorities' policies of the ADB, Vietnam and localities.

Discussion:

1. In terms of environmental issues of the Project and environmental impact mitigation measures

- The local people agreed with the negative impacts and mitigation measures the negative impact made by project owner.

- Local people expect Nam Nghe hydropower project will bring economic benefits and not affect the environment during operation

- The local peoples propose the contractors shall be responsible for strictly implementing environmental impacts mitigation measures, which are given in the summary report. Such as water for dust prevention for people, compliance monitoring mechanism in the process of preparing the project and operation in accordance with current regulations of the Law. Repair damaged roads by the transportation of project materials.

- Measures for minimizing land occupy: It is necessary to minimize land occupy at most, materials and machines should be gathered at site as scheduled, construct the accommodation for workers and suitably arrange machine in conformity with specifications without impacting on the people's daily life.

2. In terms of issued related to land and asset on land return; compensation and policies

After listening to experts exchange resettlement issues related to compensation for loss of land area for people. People totally agree with the opinion of experts about getting compensation cost of Lai Chau province in 2011 as compensation cost. The local people proposed project owner, CPC technical assistance and seed, fertilizer for affected people to reclaim new land.

3. In terms of gender, fragile group and ethnic minority

When Nam Nghe hydropower project completed will enable local people to use the power grid serving the daily needs and daily production. So, people want the project done soon, and recommend the project owner recruiting local laborers for subproject

Conclusion:

After hearing the opinions of citizens and investors, representatives of Hua Bum commune People's Committee concluded:

- The CPC fully agree with the opinions of project owner about the impacts and mitigation measures for the project
- No air and water resources pollution during building and operating the project
- No forest exploitation in the region for camps and other purposes without the consent of local authorities
- Keep close contact with local authorities for employee's recruitment and contributing to protect the local security and order.
- Agree to build subproject locally.

The meeting is ended at 10 o'clock in 25th April 2011. Authorized representatives of commune and village authorities, of mass organizations and of the whole local people participating in the meeting unanimously read and agree upon the contents of minutes and signed hereunder.

PARTIES SIGN THEIR NAME

**Authorized representatives of mass
organizations**

(Signed)

Representatives of Consultant

(Signed)

On behalf of People's Committee

(Signed and sealed)

Authorized representatives of effected people

(Signed)

LIST OF PARTICIPATORS IN THE COMMUNITY COMMENTS CONSULTATION

(People's Committee of Hua Bum Commune 25 /4/2011)

No.	Name	Position	Note
1	Phong Ma Chu	Party Secretary of Hua Bum Commune	<i>Signed</i>
2	Pho Hu Chu	Party Vice-Secretary of Hua Bum Commune	<i>Signed</i>
3	Po Lo Po	Chairman of PC of Hua Bum Commune	<i>Signed</i>
4	Ly Mu Mia	Vice-Chairman of PC of Hua Bum Commune	<i>Signed</i>
5	Po Xa Long	Chairman of Fatherland Frontier of Hua Bum Commune	<i>Signed</i>
6	Phung Ha Beo	Chairman of Women Union of Hua Bum Commune	<i>Signed</i>
7	Po Gia Hu	Cultural-social officer	<i>Signed</i>
8	Chim Van Quan	Cadastral officer	<i>Signed</i>
9	Thao A Lau	Affected person	<i>Signed</i>
10	Vang A Tich	Affected person	<i>Signed</i>
11	Thao A Sung	Affected person	<i>Signed</i>
12	Vang Mo Lu	Affected person	<i>Signed</i>
13	Vang A Qua	Affected person	<i>Signed</i>
14	Thao A Cha	Affected person	<i>Signed</i>
15	Thao A Khua A	Affected person	<i>Signed</i>
16	Chang A Cau	Affected person	<i>Signed</i>
17	Giang A Tuc	Affected person	<i>Signed</i>
18	Lo A De A	Affected person	<i>Signed</i>
19	Lo Cha Pao	Affected person	<i>Signed</i>

CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

BIÊN BẢN THAM VẤN CỘNG ĐỒNG
Dự án: Công trình thủy điện Nậm Ngệ

Cuộc họp được tiến hành tại xã Hua Bum huyện Mường Tè tỉnh Lai Châu.

Dự án **Công trình thủy điện Nậm Ngệ**

Hôm nay là ngày 25 tháng 4 năm 2011

Tại địa điểm: UBND xã Hua Bum

Tổ chức họp dân về vấn đề: Đánh giá môi trường, tái định cư và phát triển dân tộc thiểu số dự án **Công trình thủy điện Nậm Ngệ**

I. Thành phần tham dự:

1. Họ và tên: Pà Lò Pơ..... Chức vụ: Chủ tịch UBND xã Hua Bum
2. Họ và tên: Phùng Mé Chư..... Chức vụ: Ban thư xã Hua Bum
3. Họ và tên: Phù Hư Chư..... Chức vụ: Phó Ban thư xã Hua Bum
4. Họ và tên: Pà Xá Long..... Chức vụ: Chủ tịch hội nhân dân tộc
5. Họ và tên: Phùng Hư Xá..... Chức vụ: Chủ tịch hội phụ nữ xã
6. Họ và tên: Chăm Văn Quai..... Chức vụ: Cán bộ địa chính xã
7. Ông/Bà: Phạm Tuấn Dương.....Đại diện tư vấn/ Chuyên gia Tái định cư
8. Ông/Bà: Nguyễn Sơn Thái Đức.....: Đại diện tư vấn/Chuyên gia Môi trường
9. Ông/Bà: Nguyễn Sơn Thị Tuyết..... Đại diện tư vấn/Chuyên gia Giới, DTTS
10. Đại diện những người bị ảnh hưởng: 43 người(chỉ tiết xem danh sách đính kèm)
Trong đó: Nam: 8 người chiếm 18%
Nữ: 5 người chiếm 12%
Dân tộc thiểu số: 100%

II. Nội dung tham vấn:

1. Cung cấp thông tin về dự án: Có báo cáo tóm tắt nội dung dự án kèm theo
2. Chuyên gia môi trường trình bày những tác động môi trường bao gồm tác động lên môi trường tự nhiên và xã hội của khu vực dự án và các biện pháp giảm thiểu các tác động tiêu cực. Kế hoạch quản lý môi trường và chương trình giám sát môi trường

3. Chuyên gia tái định cư trình bày về những tác động khi thu hồi đất và các tài sản trên đất, những chính sách của ADB, Việt Nam và địa phương, chính sách của dự án trong vấn đề bồi thường thiệt hại khi Nhà nước thu hồi đất đai và các tài sản trên đất.
4. Chuyên gia về cộng đồng, dân tộc thiểu số trình bày về Khung chính sách dân tộc thiểu số của dự án, các tác động xã hội trong quá trình thực hiện dự án. Giới thiệu về những chính sách của ADB, Việt Nam và địa phương về dân tộc thiểu số.

III. Ý kiến thảo luận:

1. Về các vấn đề môi trường của dự án và các biện pháp giảm thiểu tác động môi trường

- Người dân thống nhất với các tác động tiêu cực và biện pháp giảm thiểu các tác động môi trường của chủ đầu tư đưa ra.
- Người dân hy vọng dự án thủy điện Nậm Nghe sẽ mang lại lợi ích kinh tế cao và không ảnh hưởng đến môi trường trong quá trình vận hành.
- Người dân đề nghị nhà thầu nghiêm túc thực hiện các biện pháp giảm thiểu môi trường đã đưa ra trong bản tóm tắt, như: tưới nước giảm bụi, tuân thủ cơ chế giám sát từ quá trình chuẩn bị thực hiện dự án đến khi đưa vào hoạt động theo đúng quy định hiện hành của pháp luật. Sửa chữa đường bị hư hỏng do quá trình vận chuyển nguyên vật liệu của dự án.
- Đề nghị nhà thầu bố trí hợp lý các khu vực phục vụ quá trình thực hiện dự án như lán trại cho công nhân, vị trí bãi thải, vị trí tập trung nguyên vật liệu, máy móc để không ảnh hưởng đến đời sống hàng ngày của người dân

2. Về các vấn đề liên quan đến thu hồi đất, các tài sản trên đất và đền bù, các chính sách

Sau khi nghe chuyên gia tái định cư trao đổi các vấn đề liên quan đến đền bù diện tích mất đất cho người dân. Người dân hoàn toàn đồng ý với các ý kiến của chuyên gia về việc lấy đơn giá đền bù của UBND tỉnh Lai Châu năm 2011 làm đơn giá đền bù. Và đề nghị Chủ đầu tư, UBND xã hỗ trợ kỹ thuật và hạt giống, phân bón cho những người bị ảnh hưởng để canh tác trên các vùng đất mới.

3. Về các vấn đề về Giới, Nhóm dễ bị tổn thương và Dân tộc thiểu số

Dự án thủy điện Nậm Nghe khi hoàn thành sẽ giúp cho người dân địa phương có diện tích để sử dụng phục vụ các nhu cầu sinh hoạt và sản xuất hàng ngày. Do đó người dân mong muốn dự án sớm được thực hiện, đồng thời đề nghị chủ đầu tư tạo việc làm cho người dân địa phương.

IV. Kết luận

DANH SÁCH THAM GIA CUỘC HỌP

Stt	Họ và tên	Tuổi	Dân tộc	Giới tính		Ký	Ghi chú
				Nam	Nữ		
1	Pô Lô Pô		Hà Nhì	✓			Chủ tịch xã
2	Phùng Ng' Chư		"			Chữ	Bí thư xã
3	Pho Hui Chư		"				Phó Bí thư
4	Pô Xá Lông		"				Chủ tịch MTTQ
5	Phùng Hà Xô		Mông				Chủ tịch hội PV
6	Chim vại Quao		"			Xô	Cán bộ địa phương
7	Thào A Lâu		Hà Nhì				Người bí thư huyện
8	Vàng A Tí		"			Tí	Người bí thư huyện
9	Thào A Sùng		"				"
10	Vàng Nô Lú		"				"
11	Vàng A Cui		"				"
12	Thào A Chai		"				"
13	Thào A Dia		"				"
14	Thào A Khua A		"				"
15	Chang A Gai		"				"
16	Đang A Đa		"				"
17	Thào A Khui		"				"
18	Lô A Đa A		"				"
19	Lô Chá Pô		"				"
20							
21							
22							
23							
24							
25							

Sau khi nghe ý kiến của người dân và chủ đầu tư, đại diện UBND xã Hua Bum kết luận:

- UBND xã hoàn toàn đồng ý với các ý kiến của chủ đầu tư về các tác động và biện pháp giảm thiểu cho dự án
- Hạn chế gây ô nhiễm môi trường không khí và nguồn nước trong quá trình xây dựng và vận hành dự án.
- Không khai thác lâm sản trong khu vực để làm lán trại và các mục đích khác khi chưa được sự đồng ý của chính quyền địa phương.
- Liên hệ chặt chẽ với chính quyền địa phương trong công tác tuyển dụng lao động, góp phần đảm bảo an ninh trật tự tại địa phương.
- Đồng ý với xây dựng dự án tại địa phương.

Cuộc họp kết thúc vào lúc 17 giờ ngày 25 tháng 4 năm 2011. Đại diện chính quyền xã, bản, đại diện các tổ chức đoàn thể và người dân địa phương tham dự cuộc họp cùng đọc và thống nhất với các nội dung biên bản cuộc họp và cùng ký tên dưới đây.

CÁC BÊN THỐNG NHẤT KÝ TÊN

Đại diện cộng đồng



Phùng Hà Xó

Đại diện tư vấn



Phạm Trung Dũng

Đại diện UBND xã



Pô Lô Pô

Đại diện người bị ảnh hưởng



Thảo A Lâu