

Initial Environmental Examination

November 2013

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

So Vin Hydropower Project

Prepared by Institute of Energy Science for the Asian Development Bank.

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INITIAL ENVIRONMENTAL EXAMINATION

SO VIN HYDROPOWER PLANT

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

NORTHERN POWER COMPANY



Prepared by
INSTITUTE OF ENERGY SCIENCE
Ha Noi, 2012

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CURRENCY EQUIVALENTS

As of 30 April 2012
Currency Unit Vietnamese Dong (VND)
US\$1.00 = 19,500 VND
1 VND = 0.00005

LIST OF ACRONYMS

ADB	Asian Development Bank
CEP	Commitment to Environmental Protection
NPC	Northern Power Company
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
CREB	Central Rural Electricity Project Management Board
SEA	Strategic Environmental Assessment
SC	Supervision Consultant
SONRE	Section on Natural Resources and Environment
SO _x	Oxides of Sulphur
TA	Technical Assistance

WEIGHTS AND MEASURES

ha	hectare
km	kilometre
km ²	square kilometres
litres/s	litres per second
m	metre
m ³	cubic metre
m ²	square metre
mm	millimetre
s	seconds

EXECUTIVE SUMMARY

Objectives and Approach

1. Son La Power Company which belongs to the Northern Power Company (NPC) of Vietnam Electricity (EVN) commissioned studies in the past for the So Vin Hydropower Project and in 2010 an environmental assessment was undertaken. NPC has been trying to obtain funding for the project as part of a programme to increase power supply to the rural areas.
2. As part of the ADB Loan 2517-VIE: Renewable Energy Development and 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 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 stage involves the construction of these mini-hydropower projects. So Vin hydropower project has been identified for consideration under the programme and further feasibility studies are underway and this environmental assessment study is part of this process.
3. The project is a small (2.8 MW) hydropower dam scheme designed to provide electricity to the rural electricity system. Under ADB's Environmental Guidelines (2003), So Vin is a Category B project, and, as such, an Initial Environmental Examination (IEE) is required. A resettlement plan has also been undertaken as part of the ADB Technical Assistance 7262.
4. Vietnamese regulations only require hydropower projects with reservoirs larger than 300,000 m³ to have a full Environmental Impact Assessment (EIA). Projects of the size of So Vin (46,490 m³) require only that a Commitment of Environmental Protection (CEP) is made when the plans for the project are submitted to the relevant People's Committee. The So Vin hydropower project obtained the necessary CEP approval on 13th April 2010 from the People's Committee of Moc Chau District.
5. The project consists of an 8 m high spillway dam and intake works, penstock and a powerhouse and tailrace. Water is taken from the So Vin stream and delivered to the powerhouse through penstock and returned to the river some 1.4 km downstream. The water delivery system is designed to provide a maximum of 1.18 m³ to two turbines and supply peak power to the national grid system. In the long dry season months, natural flows in the river are much reduced. For nine months of the year, the powerhouse will operate below design capacity and in the driest month, it will operate for just a few hours to supply the evening peak requirement.
6. As a result of the project, in the dry season months, the So Vin stream will experience reduced water flow in the 1.4 km of the stream between the dam and power house. The river immediately downstream of the powerhouse will experience changed conditions in the long dry season as all the retained water is used for a few hours to generate power.

Environmental concerns and impacts

7. No removal of houses is required but there is a loss of agricultural land at the upstream end of the reservoir and some forest land is also lost at the dam site and for other facilities. The main potential environmental impacts of the project relate to:

- 4 people (1 HH) will suffer permanent loss of agricultural and forest production land.
- Construction along some steep and hilly slopes could result to landscape scarring and loss of trees since the penstock and the project construction and access roads are on steep land. There is also potential for scarring and encroachment on existing land on downhill slopes, resulting to siltation of the downstream So Vin stream.
- The project has been designed to maximize water use with no environmental flow being retained in the river system below the dam site. As a result, a 1.4 km section of the river between the dam and powerhouse will be denied water flow for approximately nine months of the year. Reducing water flow in the river has implications for fish and aquatic life.
- There is an irrigation channel on the left bank of the river with an off-take immediately below the proposed dam site which has an estimated flow of 0.015 m³. The discharge from the plant operation at 1.18 m³ is relatively small but will flow immediately downstream of the powerhouse through the lower Hao village. Local villagers have their houses on the left bank and their fields and animal grazing on the right bank. The stream is used by local livestock and there are also irrigation channels in the village on the left bank which may be disrupted in the dry season by irregular flows and the new flow regime. This will need to be regularly monitored during the operation phase.

Environmental mitigation

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

Table 1. Summary of Mitigation

	Potential Impact	Mitigation
1	Construction impacts with destruction and scarring of land in steep mountain terrain	Implementation of detailed EMP attached to the IEE to include provision of catchments/cut-off drains, silt traps, masonry retaining structures, spoils planning, planting of grass and vegetation of disturbed areas.
2	Use of borrow materials	Borrow materials will not be derived from cultivable and arable lands but only from permitted and existing quarry areas.
2	Loss of agricultural land and forest land	Resettlement plan and compensation package for loss of land & trees will be implemented
3	Reduced water flows in the 1.4 km section of the So Vin stream and impact on left bank irrigation channel.	16 litres/s will be retained in the river system downstream of the dam to benefit fish and other aquatic life in the dry season and another 15 litres/s will be retained for the existing left bank irrigation channel.
4	Erosion and loss of vegetation cover	A tree planting programme for 6ha planting area will be included in the mitigation plan, costing 40,000,000 million VND per ha.

9. Aside from compensation for the loss of land and for the temporary use of land during the one-year construction period, funding is also incorporated in the budget for an environmental cell to strengthen the capacity of the Northern Power Corporation.

Conclusions

10. This project will have some impacts on human activities. A loss of agricultural and forest production land will be compensated for in the resettlement plan prepared for the project. The main impacts identified in this environmental examination are the result of construction activities and the potential long-term removal of water flow from the 1.4 km stretch of the So Vin stream for nearly nine months of the year and the potential impacts on aquatic species.

11. There is a need to ensure mitigation for construction activities and particularly for the upgrading of 2km of roads. The proposed environmental management plan (EMP) attached to this IEE will mitigate the impacts of construction activities. The proposed retention of 16 litres/s environmental flow in the river system and 15liters/s on the left bank will also help reduce impacts of the proposed project.

12. Hao village is located right after the proposed power plant. When the project is constructed, there will be some unwanted effects to the village as a consequence of water being stored and released for just a few hours per day. In addition, noise, dust and impacts to natural environment of village are seen clearly in the construction stage of the project. However, with the development of the project, the economy and living standard of the local people will be improved and villagers will have a sustainable source of electricity.

13. 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 Environmental Monitoring Unit in the Son La Power Company and the appointment of environmental & resettlement specialists.

I INTRODUCTION

A. Purpose and Scope of Environmental Report

14. So Vin Hydropower Project is a sub-project which has been identified under ADB Loan 2517-VIE: Renewable Energy Development and Network Expansion and Rehabilitation for Remote Communes Sector Project. The overall project will finance the development of between 5 and 10 mini-hydropower plants, each with a capacity of less than 7.5 MW in northern and central provinces of Vietnam. The loan will finance the connection of these mini-hydropower plants to the national grid and the expansion of the low voltage network to supply nearby villages which are currently not electrified. The Project is expected to contribute over 30 MW of combined generation capacity to the national power system, and extend the medium voltage power network in remote areas of Viet Nam by 75 –100 kilometers (km).

15. This Initial Environment Examination (IEE) is undertaken as part of the overall feasibility study for the So Vin Hydropower Project and is designed to meet the requirements for environmental assessment under the guidelines of ADB. The Executing Agency (EA) for the project is Northern Power Company (NPC) and this report and the Environment Management Plan (EMP) should be submitted to the District Office for Environment and Water Resources (DONRE) to assist in monitoring the project for environmental and permitting purposes.

16. The project will change water flow characteristics in the So Vin stream and has the potential for environmental impacts to the watershed of this river system, particularly in the section where water will be diverted away from the natural river to feed the proposed powerhouse. This study looks at the potential impacts of construction and operation of the project on the So Vin stream and its watershed.

17. The construction of the lines, which will link So Vin project to the national grid, are part of the project.

18. An IEE along with a resettlement plan was conducted in 2011 by the Institute of Energy Science and the information contained therein has been updated and incorporated in this report, where appropriate public consultation meetings organised by NPC on January 12, 2011 took place to disclose information to the public. The issues discussed during this meeting are described in Chapter VI while the minutes of the Public Consultation and list of participants are included in the Appendix of this document.

Figure 1. General Location Map of So Vin hydropower project

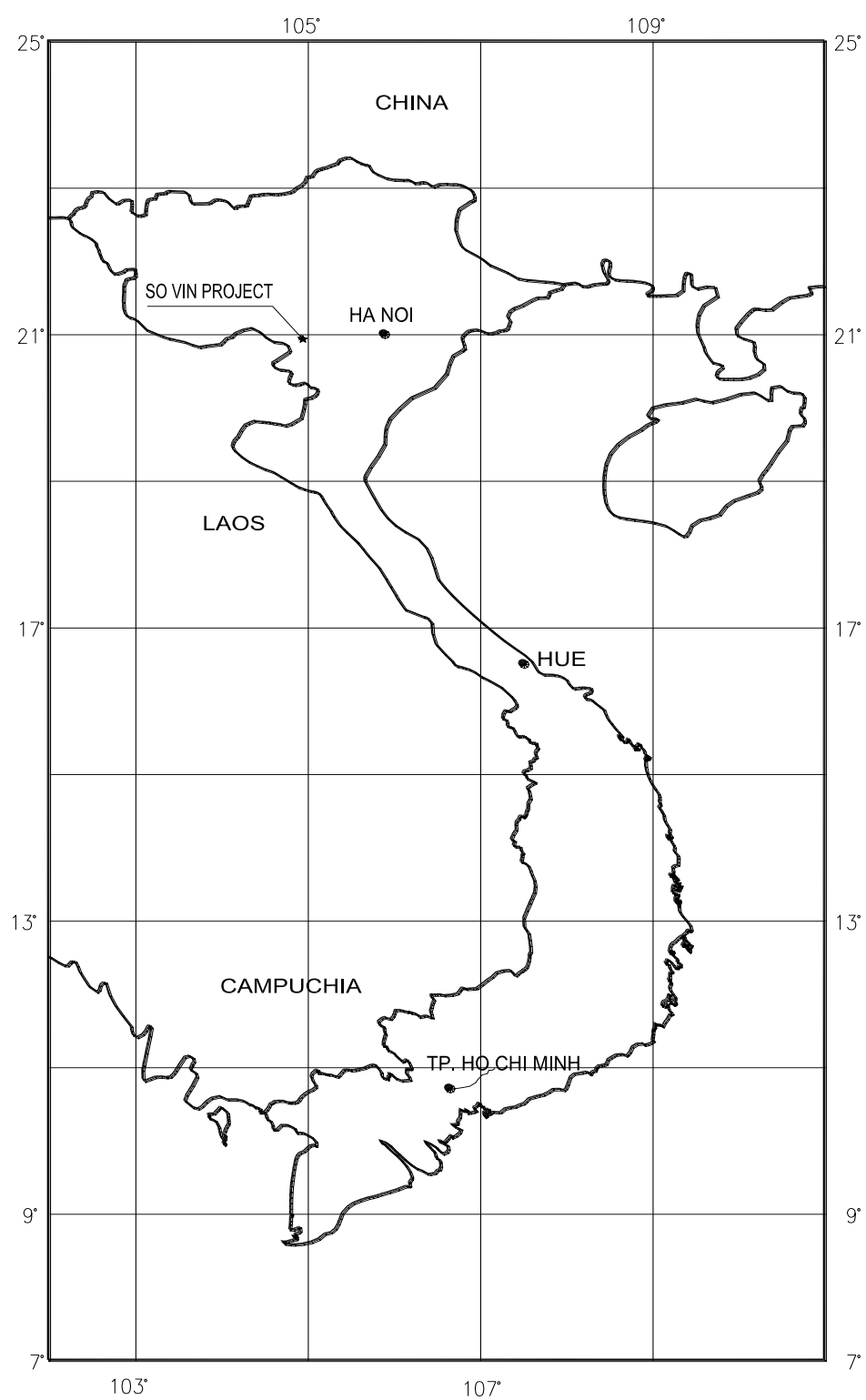


Figure 2. Location of Project Components
Scale 1/2000

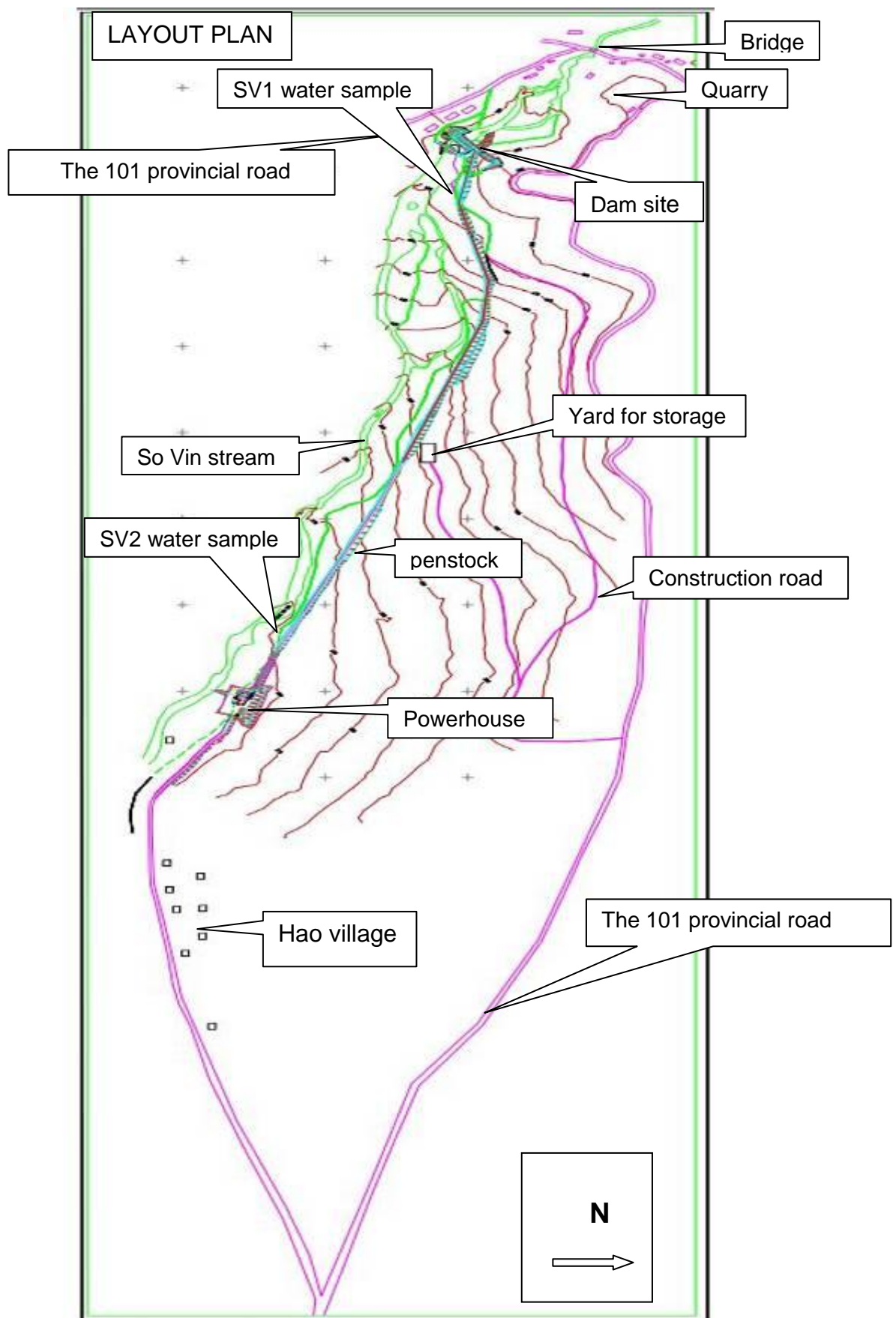
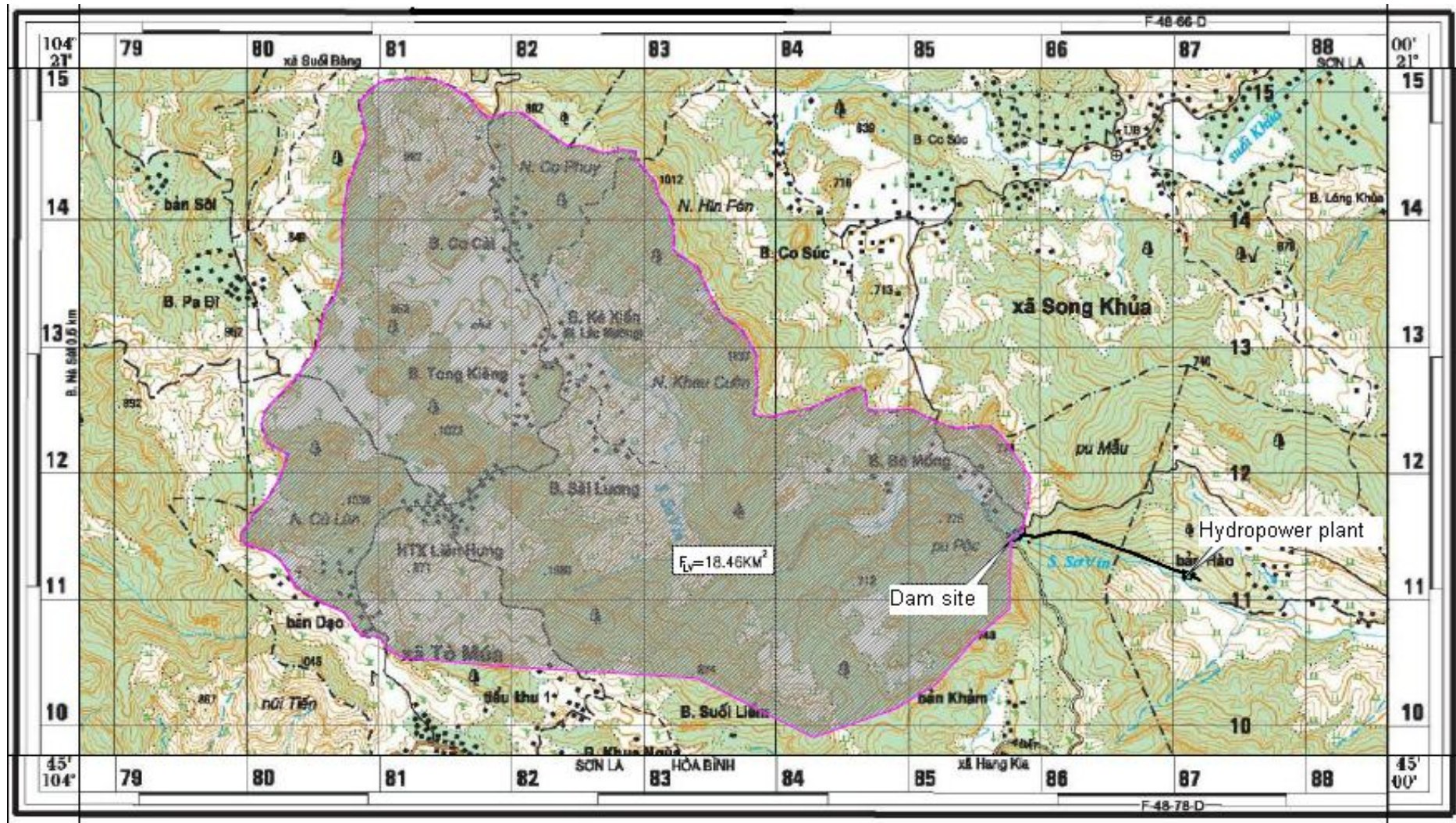


Figure 3. Map of flooded area of So Vin hydropower plant

Scale 1/20000



II DESCRIPTION OF THE PROJECT

A Type of and Category of the Project

1 ADB Categorization

19. The 2.8MW So Vin hydropower project is a relatively small project. Using ADB's Rapid Environmental Assessment Checklist for hydropower projects (Annex 1), the project is classified as Category "B", in accordance with ADB's *Guidelines for Environmental Assessment, 2003*. An IEE is required to determine if there are significant impacts and if a more detailed impact assessment is necessary.

2 Vietnamese Approval Requirements and Regulations

20. **Environmental Assessment.** Requirements for environmental assessment in Vietnam are laid down 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 impact 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 preparations, review and appraisal, monitoring, and confirmation of implementation of the mitigation measures.

21. The regulations² published in 2008 categorise which type of projects are required to undertake EIA. With respect to the requirements for environmental assessment of hydropower projects, an "environmental impact assessment" report is only required for hydropower plants having reservoir areas of 300,000 m³ or above and for high voltage transmission lines with a length of over 100 km.

22. So Vin hydropower project has a reservoir volume of 46,490 m³ and 1.5 km of 35 kV transmission lines, which connect to the national electricity grid system. As such, there is no requirement under Vietnamese regulations to undertake the type of IEE or EIA required under ADB guidelines and regulations. 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 district. Since 2008, therefore, detailed environmental assessments have not been undertaken for small hydropower projects. The So Vin hydropower project obtained the necessary CEP on 13th April 2010 from the People's Committee of Moc Chau District.

23. 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

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

² GOV's Circular No. 21/2008/ND-CP dated 28 February 2008 and Article 24 of the LEP

³ Article 26 of the LEP

⁴ Article 17c of Decree 21-2008

of environmental assessment reports, the Ministry of Industry and Trade (MOIT) is required to coordinate with the Provincial People's Committees (PPC) to ensure that the respective SONREs are assisted by the provincial DONREs during the review and approval of written CEPs.

24. **Utilization of Water Resources.** For the use of water, there is also a requirement to obtain a permit under the Water Resources legislation. Article 24 of The Law on Water Resources⁵ entitled "Issuing permits for exploitation and use of water resources" requires organizations and individuals that exploit and use water resources to obtain permission from the competent State agencies.

25. Article 64 of the Act entitled "the Management of the river basin planning" specifies that the agency managing the planning of river basins is a non-business agency of the Ministry of Agriculture and Rural Development (MARD)

26. 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.

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

28. 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. Among other things, information is required on the analysis of quality of water according to State's regulations. Also papers must be attached to the permit application regarding existing land use rights. There must be a written agreement on land use between the organization exploiting the water and the organization or individual having the land use right. The agreement must be certified by the competent People's Committee.

29. **Environmental Flow.** Decree No 112/2008⁷ prescribes the scope of environmental management protection requirements for integrated exploitation of hydropower and irrigation reservoirs (Article 1). The need for a minimum flow is established 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."

30. Reservoir construction must conform to the river basin planning approved by a competent state agency (Article 4) and exploitation and use of natural resources and environment in reservoir protection corridors and reservoir zones must be based on approved master plans (Article 8).

31. Dam owners shall annually formulate a water regulation plan for reservoirs and notify the People's Committee at all levels of the relevant localities in order to reduce adverse impacts on people's production and life and the environment (Article 9.3). Water regulation plans for reservoirs shall be formulated on the basis of minimum flow requirements among other things (Article 9.4).

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

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.

32. Ministry of Natural Resources and Environment (MONRE), according to Article 12.2, are to assume responsibility for and coordinate the concerned ministries, branches and localities in specifying minimum flow requirements for reservoirs.

33. Despite attempts by MONRE to establish standards for determination of "Minimum Flow" for reservoirs through a Danida project, no standards have up to this time been agreed for adoption by MONRE.

34. Land use permit for the project will be applied for to the District People's Committee and water use permit will be applied to Son La Department of Natural Resource and Environment later when financing is approved for the project.

35. **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:

- a. Cultural Heritage Law, June 2001,
- b. Decree No. 92/2002/ND-CP November 11, 2002 relating to the implementation of some articles of the Law on Cultural Heritage,
- c. Regulation on exploration of archaeological excavations Decision No. 86/2008/QD-BVHTTDL December 30, 2008 of the Ministry of Culture, Sports and Tourism.
- d. 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 status quo at the location and promptly notify and hand 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

36. So Vin Hydropower Project is to be implemented in So Vin Spring in To Mua Commune, Moc Chau District – Son La Province. The location of the construction works is 23 km far from the Moc Chau District toward East-Northeast direction and 36 km far from Mai Chau District toward North-Northwest direction and 230 km far from Hanoi toward Northwest direction (Figure 1).

37. The project is designed to take the waters from the So Vin stream which has a small catchment area of only 18.46 km². The So Vin stream is an upstream branch of the Da river.

38. The geographic coordinates of the dam site and power plant as follows:

+ Geographic coordinates of the dam route:

- 20°52'54" northern latitude
- 104°52'44" east longitude;

+ Geographic coordinates of the Plant area:

- 20°51'47" northern latitude
- 104°53'11" east longitude

39. The main elements of the project are as follows: (Figure 2):

- Dam to be constructed 0.1 km from the provincial road. It is on a rock platform and will be 10 m high with a length at the top of 111.5m;
- Reservoir with a volume of 46,490 m³ and surface area of 12,163m²;
- Water intake on the left bank of So Vin stream;
- Sluicing outlet on the left bank of So Vin stream;
- Penstock: 0.8 m diameter, 1,388 m long pressure pipe on the left bank of the river;
- Powerhouse with two turbines and transmission yard on the left bank of the So Vin stream;
- Tail race, 15 metres long, with outfall to return the water flow to the So Vin stream
- Traffic roads: The access road to the dam site is from the 101 provincial road and has a length of 100m. The access road is a temporary road. There is also a 2km access road to the downstream of the power plant from the provincial road and it needs to be upgraded for the construction of the plant and penstock.

40. The main works of the project is divided into three zones: dam site, transmission line and power plant. The dam site includes the left and right bank dam, spillway, a water intake, sluicing outlet and a traffic bridge. The volumes of the main earthworks and materials for the dam site as follows:

Table 2. Volume of earthworks and materials for dam site

No	Works	Unit	Volume
1	Soil excavation	m ³	2,227.4
2	Rock excavation	m ³	557.8
2	Landfill	m ³	2,459.7
2	Rock fill	m ³	131.2
3	M100 concrete	m ³	144.5
3	M150 concrete	m ³	1,597.9
4	M200 concrete	m ³	1,903.3
5	M250 concrete	m ³	467.4
6	Steel	Ton	66.5

Source: Volume 5: Total investment of So Vin design report of IES

41. The volume of materials for the transmission line is as follows:

Table 3. Main works of energy line

No	Works	Unit	Volume
1	Soil excavation	m ³	75,091
2	Rock excavation	m ³	5,012.8
3	Landfill	m ³	2,000
4	M100 concrete	m ³	111.2
5	M200 concrete	m ³	1,110.1
6	M250 concrete	m ³	420
7	M300 concrete	m ³	100
8	Steel	Ton	50.2

Source: Volume 5: Total investment of So Vin design report of IES

42. Power plant area includes plant, transmission station and operation and control house. The main earthworks and materials for this area are as follows:

Table 4. Volume of earthworks and materials for power plant zone

No	Works	Unit	Volume
1	Soil excavation	m ³	46,731
2	Rock excavation	m ³	1,000
3	M200 concrete	m ³	949.2
4	M250 concrete	m ³	80
5	Steel	ton	72.2

Source: Volume 5: Total investment of So Vin design report of IES

43. The main landfill volume of the project is about 2,400 m³ and landfill is exploited from the quarry which is 500m far from the construction site. It is used mainly for construction of dam. There is no cultivation here and exploitation is licensed by To Mua authorities.

44. The Reservoir formed by the dam is in the narrow valley bottom. When the reservoir is full, the water will back up more than 143 m and reaches a point about 3.3 m upstream of the So Vin stream where some rice and forest land are affected.

45. Apart from the right abutment of the dam, all the project construction and operation activities are on the left bank of the river. The water delivery system has a calculated head of 286.52 m, which is designed to deliver maximum flow of 1.18m³/s to two turbines and generate 2.8 MW of power. As a result of the project, in the dry season, the So Vin stream will experience loss of water flow for approximately nine months over the 1.4 kilometres of the river between dam and powerhouse.

46. The roads for construction of dam and powerhouse are mainly along existing tracks. There is a need for upgrading the 2km access track for the construction and operation of powerhouse and to have improved access to the 101 Provincial Road. This road passes through Hao hamlet. A new 100m road will also be constructed from the 101 provincial road to the dam site. This road passes through some HHs of Bo Mong hamlet.

47. Aside from the hydropower infrastructure, there will be permanent office facilities (0.25 ha) close to the dam location. An area of 1.7 ha is needed for both temporary use of construction activities and camps at the dam site and powerhouse. There are 4 households near the dam along the old alignment of the 101 provincial road. The work camp location for the dam site is close to these HHs. The camp at the power plant will be constructed upstream of Hao village.

C. Construction Schedule

48. Main construction activities:

- a. Preparation time (from September to November of the first year)
 - Clear the ground, construct access road inside and outside of the project site, build communication system, water supply system, camps, tents, operation houses and related facilities.
 - Implement excavation works right after having access road.
- b. First phase: From December of the first construction year to January of the second construction year.

- ✓ **Dam site area:**
 - Construct coffer dam phase 1 at the end of November of the first construction year.
 - Continue excavation works of dam, water intake and sluicing outlet to the design level; construct reinforcement for the water intake, sluicing outlet and the area upper the water level.
 - Construct wing wall and right side of the dam.
 - ✓ **Pipeline area:**
 - Construct foundation for pressure pipe and power plant.
- c. Phase 2: From February to April of the second construction year
- ✓ **Dam site area:**
 - Construct upstream cofferdam
 - Construct the rest of the spillway
 - Install the hydraulic, mechanical equipment
 - ✓ **Pipeline area:**
 - Construct the foundation for the pressure pipe.
 - Continue to construct the foundation for the power plant and pipeline.
- d. Phase 3: From May to December of the second construction year:
- ✓ **Power line area:**
 - Install the steel pipeline, construct reinforcement and install equipment in power plant.
 - At the end of December: finish construction works.
49. Estimated time for construction is 12 months.
- Commencement: December in the first construction year
 - Impoundment: February in the second construction year
 - Power generation of the machine assembly No. 1: November of the second construction year
 - Power generation of the machine assembly No. 2: December of the second construction year

Table 5. Construction Schedule of So Vin Hydropower Project

Period	Retaining building	Flow (m ³ /s)	Upstream water level (m)	Downstream water level (m)
December of the first year to the January of second year (dry season)	Narrowed riverbed	0.99	517.85	517.72
February to April of the second year	Sluicing outlet	4.02	519.26	518.07

Source: Volume 1: General description of So Vin design report of IES

III. DESCRIPTION OF THE ENVIRONMENT

A. Provincial and District Context

50. Son La Province has an area of 14,125 km², with population of 1,080,641 people. Son La Province comprises Son La City, Moc Chau, Yen Chau, Mai Son, Song Ma and Thuan Chau District. The proposed project will be located in To Mua commune in Moc Chau district. The population, land area, and population density of Son La Province, Moc Chau District, and To Mua Commune are presented in Table 6.

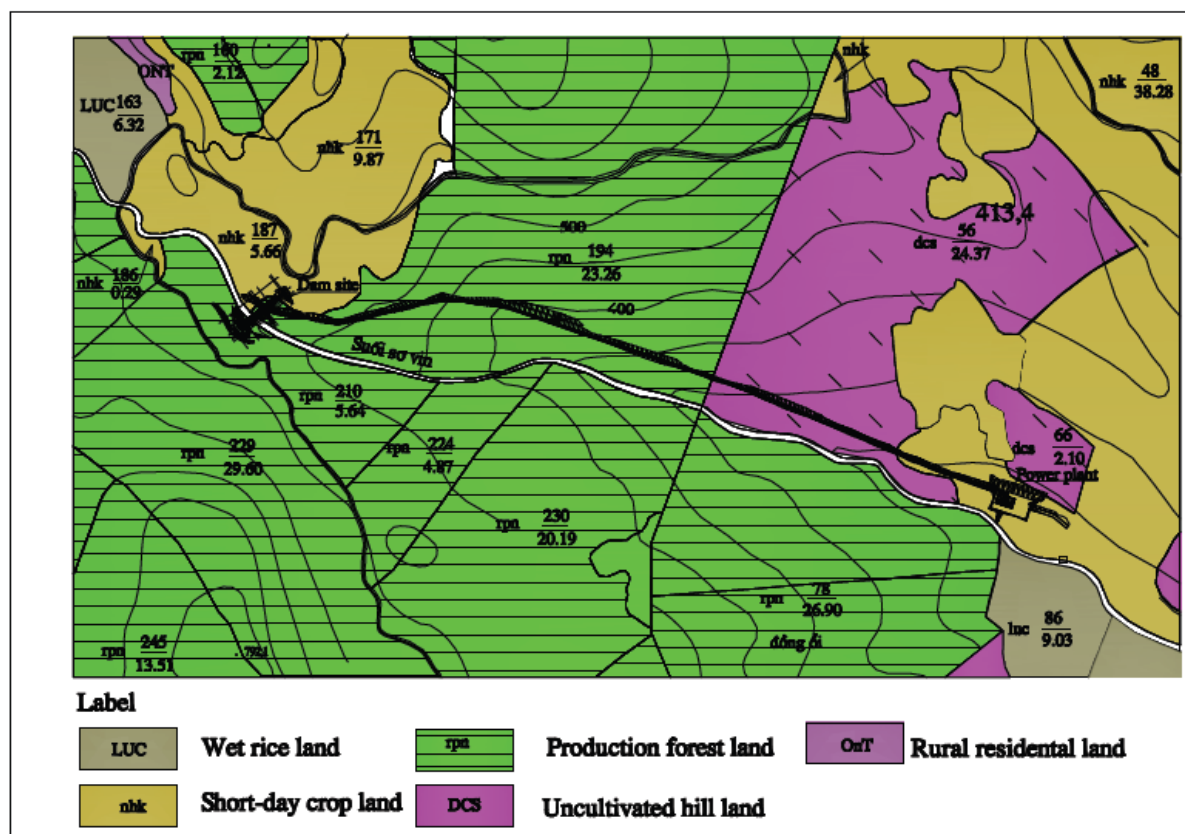
Table 6. Population and Land Area

	Population 1000's	Area Km ²	Density Persons per Sq Km
Vietnam	86024.6	331051.4	260
Son La Province	1080.6	14125	76.5
Moc Chau District	150.8	1940	77.8
To Mua Commune	4.414	45.95	96

Note: Figures for Vietnam and Province come from the 2009 Census; District figures from the 2009 District Statistics Book

51. Of the 194,000 ha which comprise the District area, only 1.5 % (29,100 ha) is classified as agricultural and 43.5% is regarded as forest and the rest as unused hill and mountain land.

Figure 4. Land use map of So Vin hydropower project



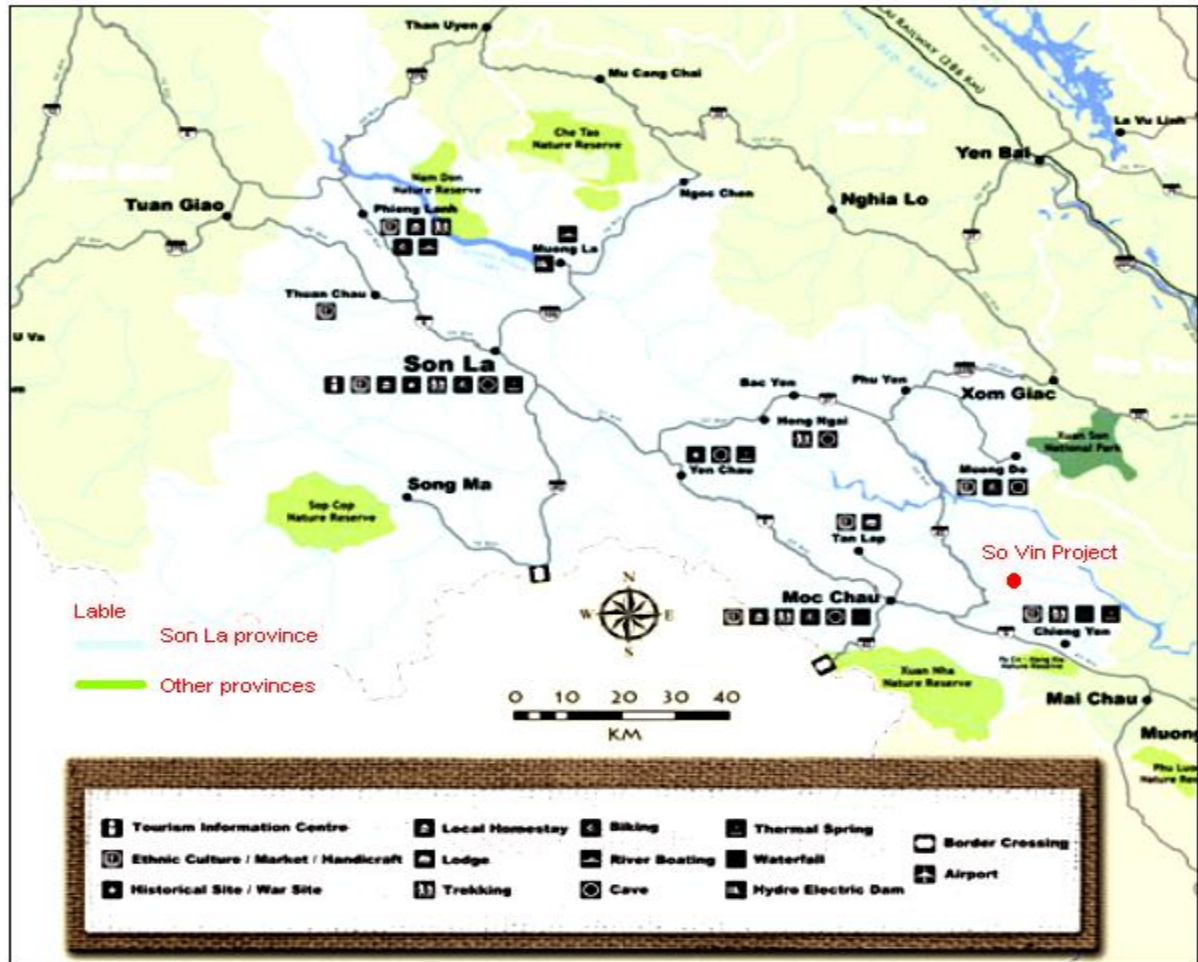
52. There are five Nature Reserves that are near the project site. See Table 7 and Figure 5 below:

Table 7. Nature Reserves near the Project Site

No	Name	Location	Area (ha)	Forest land	Buffer zone (ha)	Distance (km) from the dam site
1	Copia	Thuan Chau district-Son La	11.996	6,655	10.755	115

2	Sop Cop	Song Ma district-Son La	17.369	13,654	26.578	120
3	Ta Xua	Bac Yen district-Son La	13.412	12,257	24.672	80
4	Xuan Nha	Moc Chau district-Son La	16.317	14,644	5840.8	30
5	Pa Co-Hang Kia	Mai Chau district-Hoa Binh province	7.091	2.680	8.010	25

Figure 5. Map of nature reserves near the project site



53. Pa Co-Hang Kia is the closest natural reserve to So Vin hydropower plant site and is 25km far from the proposed site. The Pa Co-Hang Kia Nature Reserve is located in six communes: Pa Co, Hang Kia, Tan Son, Bao La, Cun Pheo and Pieng Ve of Mai Chau district, Hoa Binh province.

54. The So Vin project site is not located in any protected area or the buffer zone of a protected area.

B Physical Environment

55. **Topography.** The proposed project is located between altitudes 230m and 530m about 23km from Moc Chau center.

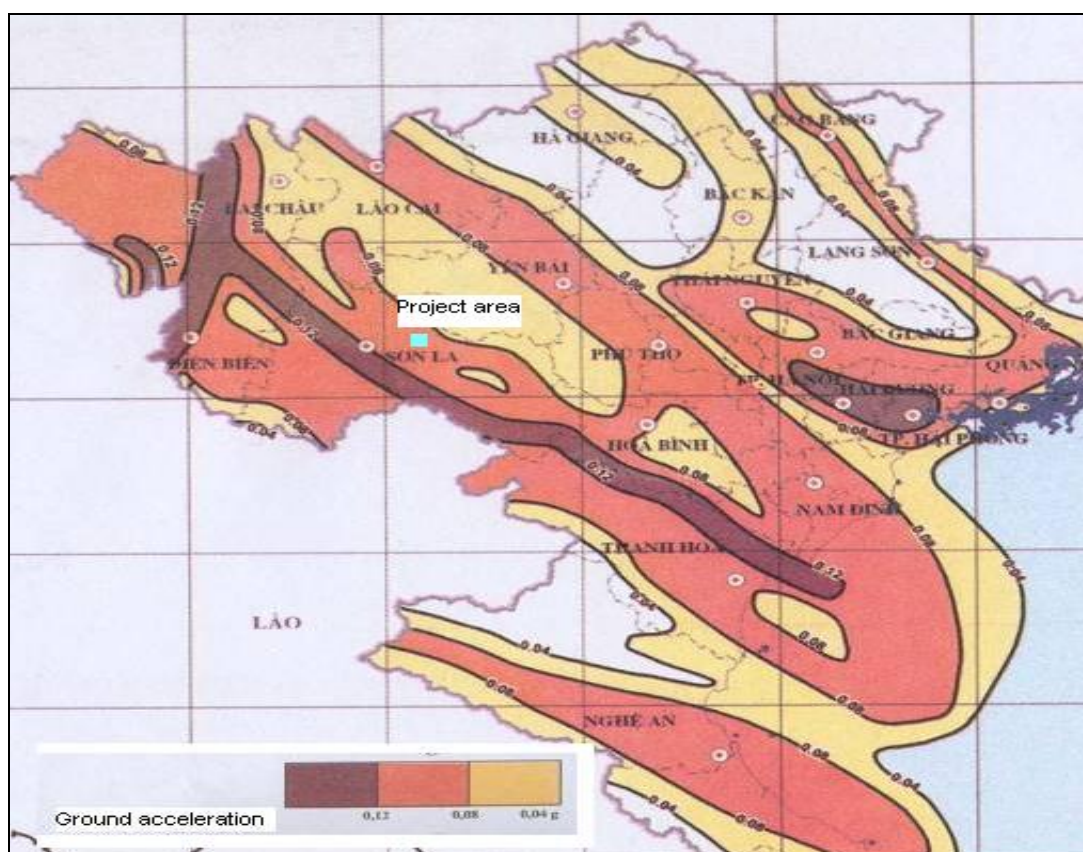
56. The project area is in a narrow valley on the northwest. So Vin stream is derived from the Co Phuy at level of 892m in Moc Chau. The stream flows through a waterfall to To Mua commune on the Northwest-Southeast and continue to change direction from West to East. Finally, after 17km it joins the Da River. There are no waterfalls at the downstream area of the dam site.

57. **Soils:** The surveyed zone has quite a small area and belongs to Da River rift composition. In So vin hydropower project area, Moc Chau district has four layers: Ban Nguon ($D_1\ bn$), Ban Dap ($D_{1-2}\ bp$) and sedimentations.

- The main layers are soft soil and separated soil: clay, clay with sand.
- Original rocks mainly are carbonate stone with brown-black colour.

58. According to the Vietnam territory seismic map in Vietnam construction standard TCXDVN-2006, Moc Chau district belongs to an area which has ground acceleration of 0.1197, equivalent to VII earthquake level in MSK – 64. There will be very small impact of earthquake at this level at the project site.

Figure 6. Vietnam territory seismic map



Source: Institute of Physics of the Earth – Vietnam Academy of Science and Technology

59. **Hydrology and Climate.** So Vin stream is the first branch on the right bank side of Da River. The catchment has an area of 84km² and total length of its basin is about 23 km with the average height of 708m. The mean slope of the river's section in the construction area ranges from 20 to 92%. So Vin catchment belongs to quite strong Karst.

60. Head works as well as the surveyed area are located in the Northwest of the Northern area with distinctive monsoon climate. Climate and the weather in the year is divided into two distinct seasons. Rainy season starts from May to September and dry season starts from December to February. October and November are transitional months

of the rainy season to dry season and March and April are transitional months of the dry season to rainy season.

61. In rainy season, the weather is like the summer climate which is hot and rains a lot. Average temperature ranges from 25 to 30°C while humidity is 80% to 85%, with much of rain or 70-85% of annual rainfall. In the dry season, the weather is like winter with little rain, low humidity, with average temperature ranging from 10 to 20°C and humidity of 75% to 80%.

62. Monsoon regime has little impact on the project site. The prevailing direction of wind is the North. Frequency of northern wind is 80.4%, with average speed of 2.1 m/s; Northwest wind is 16.7% with average speed of 1.9 m/s.

63. Compared with the North-Northwest, the South-Northwest area experiences small amount of rainfall. The average rainfall each year ranges from 1400 to 1600 mm. However, the annual rainfall changes significantly according to the characteristics of local terrain.

64. The rainy season in South-Northwest always begins in April and ends in October, sooner than the other areas of Northern about one month. The maximum rainfall occurs from May to October. The rest of the year from November to April belongs to the dry season. December and January are the driest months of the year.

Table 8. Average monthly rainfall at Chieng Khoa gauging station from 2000 to 2008

Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Mean
2000	11.8	38.0	3.0	195.1	353.4	147.6	280.2	239.6	522.7	297.6	4.2	9.1	175.2
2001	18.3	16.1	172.5	65.0	344.5	282.9	632.3	491.9	495.8	345.9	67.6	20.7	246.1
2002	33.5	15.5	14.1	85.4	401.3	452.5	352.5	335.7	352.1	159.8	75.2	53.9	194.3
2003	35.6	57.0	8.3	176.9	185.1	108.9	474.8	337.8	429.3	71.9	0.0	4.3	157.5
2004	11.0	25.1	23.5	348.9	392.4	252.0	407.4	378.3	294.4	13.5	68.0	15.4	185.8
2005	10.6	5.1	27.4	21.0	146.7	301.4	520.9	627.2	1034.8	38.0	103.7	45.0	240.2
2006	6.6	13.0	14.7	145.5	216.9	221.6	418.6	504.3	302.3	153.2	0.0	6.0	166.9
2007	19.5	37.3	57.1	115.0	289.8	208.3	442.9	275.0	479.6	940.7	42.3	0.0	242.3
2008	14.4	41.5	116.6	133.9	292.0	391.8	296.7	312.5	426.0	417.4	185.1	27.4	221.3
Mean	17.9	27.6	48.6	143.0	291.3	263.0	425.1	389.1	481.9	270.9	60.7	20.2	203.3

65. The maximum daily rainfall according to the design frequencies on the basin is calculated based on the data from Moc Chau and Chieng Khoa gauging station using similar catchment method.

66. At the Lam Son gauging station, there are sufficient data and is located in the climatic consistency area with the project area to act as the similar basin for the calculation of the runoff. The actual data of the basin in 39 years at Lam Son Station as follows:

Table 9. Monthly and annual runoff of So Vin Dam route

Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Mean
1970	0.148	0.114	0.107	0.072	0.107	0.275	1.065	1.724	1.962	0.764	0.424	0.298	0,59
1971	0.219	0.170	0.158	0.107	0.159	0.408	1.581	2.560	2.913	1.135	0.630	0.443	0,87
1972	0.216	0.167	0.156	0.106	0.156	0.402	1.556	2.519	2.866	1.117	0.620	0.436	0,86
1973	0.329	0.255	0.238	0.161	0.239	0.613	2.375	3.845	4.375	1.704	0.946	0.665	1,31

Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Mean
1974	0.112	0.087	0.081	0.055	0.081	0.208	0.807	1.306	1.487	0.579	0.321	0,226	0,45
1975	0.175	0.135	0.126	0.085	0.127	0.325	1.260	2.040	2.322	0.904	0.502	0,353	0,70
1976	0.058	0.045	0.042	0.028	0.042	0.108	0.417	0.676	0.769	0.299	0.166	0,117	0,23
1977	0.066	0.051	0.048	0.032	0.048	0.123	0.475	0.769	0.875	0.341	0.189	0,133	0,26
1978	0.232	0.180	0.168	0.114	0.169	0.433	1.677	2.714	3.089	1.203	0.668	0,470	0,93
1979	0.149	0.115	0.108	0.073	0.108	0.277	1.075	1.739	1.980	0.771	0.428	0,301	0,59
1980	0.216	0.167	0.156	0.106	0.157	0.402	1.558	2.523	2.871	1.118	0.621	0,436	0,86
1981	0.115	0.089	0.083	0.056	0.083	0.214	0.829	1.341	1.527	0.595	0.330	0,232	0,46
1982	0.140	0.109	0.101	0.069	0.102	0.261	1.013	1.640	1.866	0.727	0.403	0,284	0,56
1983	0.162	0.125	0.117	0.079	0.117	0.301	1.167	1.889	2.150	0.837	0.465	0,327	0,64
1984	0.255	0.197	0.184	0.125	0.185	0.474	1.838	2.976	3.386	1.319	0.732	0,515	1,02
1985	0.206	0.160	0.149	0.101	0.150	0.384	1.488	2.409	2.741	1.068	0.593	0,417	0,82
1986	0.121	0.094	0.088	0.059	0.088	0.226	0.875	1.416	1.612	0.628	0.348	0,245	0,48
1987	0.063	0.049	0.046	0.031	0.046	0.118	0.458	0.742	0.844	0.329	0.182	0,128	0,25
1988	0.090	0.070	0.065	0.044	0.066	0.169	0.653	1.057	1.203	0.469	0.260	0,183	0,36
1989	0.124	0.096	0.089	0.061	0.090	0.230	0.893	1.445	1.645	0.641	0.356	0,250	0,49
1990	0.150	0.116	0.108	0.073	0.109	0.279	1.081	1.750	1.992	0.776	0.431	0,303	0,60
1991	0.105	0.081	0.076	0.052	0.076	0.196	0.759	1.229	1.399	0.545	0.302	0,213	0,42
1992	0.113	0.088	0.082	0.056	0.082	0.211	0.819	1.326	1.509	0.588	0.326	0,229	0,45
1993	0,131	0,101	0,094	0,064	0,095	0,243	0,943	1,527	1,738	0,677	0,376	0,264	0,52
1994	0,273	0,212	0,197	0,134	0,198	0,509	1,972	3,192	3,632	1,415	0,785	0,552	1,09
1995	0,129	0,100	0,093	0,063	0,094	0,241	0,933	1,511	1,719	0,670	0,372	0,261	0,52
1996	0,231	0,179	0,167	0,113	0,168	0,431	1,670	2,703	3,077	1,198	0,665	0,468	0,92
1997	0,195	0,151	0,141	0,096	0,142	0,364	1,411	2,284	2,600	1,013	0,562	0,395	0,78
1998	0,101	0,079	0,073	0,050	0,074	0,189	0,732	1,185	1,349	0,526	0,292	0,205	0,40
1999	0,155	0,120	0,112	0,076	0,112	0,288	1,118	1,810	2,059	0,802	0,445	0,313	0,62
2000	0,193	0,149	0,140	0,095	0,140	0,360	1,393	2,255	2,567	1,000	0,555	0,390	0,77
2001	0,323	0,250	0,234	0,158	0,235	0,602	2,334	3,778	4,300	1,675	0,929	0,654	1,29
2002	0,064	0,050	0,046	0,031	0,047	0,119	0,463	0,749	0,852	0,332	0,184	0,130	0,26
2003	0,136	0,105	0,098	0,067	0,099	0,254	0,983	1,591	1,810	0,705	0,391	0,275	0,54
2004	0,111	0,086	0,080	0,054	0,080	0,206	0,799	1,293	1,472	0,573	0,318	0,224	0,44
2005	0,218	0,169	0,158	0,107	0,158	0,406	1,573	2,547	2,899	1,129	0,627	0,441	0,87
2006	0,174	0,135	0,126	0,085	0,126	0,324	1,255	2,031	2,312	0,900	0,500	0,351	0,69
2007	0,227	0,176	0,164	0,111	0,165	0,423	1,639	2,653	3,019	1,176	0,653	0,459	0,91
2008	0,368	0,285	0,266	0,180	0,267	0,686	2,658	4,303	4,897	1,908	1,059	0,745	1,47
Mean	0,169	0,131	0,122	0,083	0,123	0,315	1,220	1,976	2,248	0,876	0,486	0,342	0,67

Source: General description of So Vin design report of IES

67. While January is the month of least rainfall, the lowest flows in the river are experienced later in April as it takes time for ground water tables to be recharged. From November to June there is an average of less than 0.49 m³ flow in the river.

68. Only in three months on average (July, August and September) does the power plant have consistently enough water (in excess of 1.18m³) to run at full capacity. In the remaining months, the power plant operation is designed to make maximum use of all the water in the river. Peak demand requirements will be supplied and in some months the plant may operate for only a few hours.

69. So Vin stream is a first branch of Da River. The distance between So Vin project site and intersection point of So Vin stream and Da River is about 17km. The Hoa Binh hydropower project which is located in Da river, Hoa Binh province, is 40km far from So Vin project area.

70. The water quality of So Vin stream was also tested on March 10, 2011. Two water samples were taken to the laboratory for analysis. The results complied with National technical regulation on surface water quality: QCVN: 08-2008/BTNMT and are within the permitted limits. The results of the test are shown in Table 10:

Table 10. Results surface of water quality in So Vin stream

No	Parameter	Unit	SV1	SV2	QCVN:08-2008/BTNMT
1	pH	-	7,45	7,19	5,5 - 9
2	O ₂	mg/l	4.10	4,35	> 4
3	Sediment content	NTU	302	290	-
4	COD	mg/l	25	28	30
5	BOD ₅	mg/l	12	11	15
6	Nacl	%	0.00	0.00	-
7	TSS	mg/l	38	42	50
8	NO ₂ -N	mg/l	0.03	0.02	0.04
9	NO ₃ -N	mg/l	2.80	3.02	10
10	Fe	mg/l	0.11	0.15	1.5
11	Mn	mg/l	0.01	0.02	-
12	Cd	mg/l	KPHĐ	KPHĐ	0.01
13	Pb	mg/l	< 0.001	< 0.001	0.05
14	Hg	mg/l	KPHĐ	KPHĐ	0,001
15	As	mg/l	< 0.002	< 0.04	0.05

Note:

TCVN: 08-2008/BTNMT: National technical regulation on surface water quality.

SV1: Water sample at the dam site area

SV2: Water sample at the powerhouse area.

C. Ecological Resources

1 Forest Resources

71. The surface of the basin is composed of strongly alternated rock and soil including granite biotic, loam combined with gravel. Regime of a tropical monsoon climate and a temperate climate at the level of more than 1,000 m has created diverse vegetation, tropical forests mixed with temperate trees such as poplar, pine, sa mu and many valuable herbs in the lower layer in the basin. Vegetation blanket cover of the basin is relatively good.

72. Vegetation blanket can be divided into five main forms: closed broadleaf forest, mixed forest, coniferous forest, low trees forest and grassland. Coniferous forests are usually at the level of more than 2500m, from 1700 - 2500m is the mixed forest with coniferous trees; from 800-1700 m is the mixed forest which consists of broadleaf trees. At the level of less than 800 m, it is the broad-leaf forest, low trees forest and grassland. Low trees forest and grassland also grow in the top of rocky mountains or recycled forest area.

73. The vegetation in the area is diverse with more than 950 species of 500 generas and 100 families under the five lines including tropical plants, subtropical plants and temperate plants. However, all of them are not in the list of IUCN and Vietnamese Red Book.

74. Forests in the basin are mainly poor forest with average wood reserve of less than 120m³/hectare. There is only a few rich primeval forests, but it is still the source of gene of rare plant species including wood trees in the group 1 such as Po Mu, Hoang Dan and rare wood trees in the group 2 like Nghien wood, three leaf pine, and Dinh wood. In addition, there are many types of other valuable wood such as fir, De, Sam Sao, Doi, Bach, Vau, small bamboo, and acacia.. There are many kinds of herbs such as Dang ginseng, Ha Thu O, Tuc Doan, Bach Hop, Thach Boi, Ich Mau, Kim Ngan, and Duong Quy.

75. Vegetation cover and other natural factors has affected the runoff oscillation in a year. It causes the reduction in flood peaks and increased runoff in the dry season. However, the deforestation increased so the percentage of forest and the regulation ability of the basin have decreased.

2. Wildlife

76. In accordance with observations of local people, there is no threatened or endangered species detected in the project area but a relatively small quantity of birds like bulbul and spotted dove were reported.

3. Fish and Aquatic Resources

77. The freshwater river environment 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 invertebrates; 544 fish species and 52 species of crabs⁸.

78. Commercial fisheries make an important contribution to exports and are worth more than US Billion 2.25 annually to Vietnam. The major part of this figure is from marine fisheries, but aquaculture has become increasingly important. Freshwater aquaculture production environments include ponds, ditches, cages, net enclosures and pens in reservoirs, rivers channels and paddy fields. In the north, pond poly culture is the most important farming system using carp and bighead. The main area for aquaculture, however,

⁸ Water Environment Partnership in Asia (WEPA)

is in the south of Vietnam and especially with the use of cage culture in the Mekong and Bassac rivers and catfish, carp and snakehead are the main species. In the Mekong Delta prawn monoculture is practiced extensively in rice fields. Tilapia in cultured ponds has also 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.

Photo 1. Fish Culture Ponds in Hao Village



79. 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, from 1998 to 2001, in the Ba Be Lake 20 species disappeared.

80. 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)¹. These structures have been constructed without provision to allow migratory fish movement up and down the river and with little consideration for environmental flows to protect aquatic life.

81. So Vin is a quite small stream with extremely high slope. Therefore, only very little number of fish is seen in the stream bed. Downstream of the power plant, due to the decline in the slope and nearness of the Da river, there are some kinds of fish living in there but that area will not be affected by the project. There are no large fish in the stream and fish is not an important source of protein for local people.

D. Socio-Economical and Cultural Environment

1. Socio-economical features

Population and peoples

82. The population of Moc Chau district (2009) is 150,750 people; 33,669 households and divided in 12 different ethnic groups. The Thai ethnic minority comprises the highest

with 33%, followed by H'Mong (18%), and Kinh (15%). In addition, there are Dao, Kho Mu, Tay people. The poverty rate of the district is 22.1% and in which 33.8% is ethnic minority (December 2009).

83. Three communes - To Mua, Muong Te and Suoi Bang in Moc Chua district, Son La province will benefit from the construction of the project and the provision of electricity. However, the construction of the project also has negative impacts to the 4 HHs of Bo Mong hamlet, To Mua commune due to the fact that all the main components of the project are located in To Mua commune. In addition, 7 HHs of Hao hamlet, Muong Te commune will be affected by the access road to the power plant which runs through these HHs.

84. There are 4 HHs of Bo Mong hamlet, To Mua commune and 7 HHs of Hao hamlet, Muong Te commune which will be affected by the project.

Table 11. Population and ethnic groups around the project site

Commune	HHs	Population	Ethnic group
Muong Te	786	3.451	Thai, Muong
To Mua	1.022	4.414	Thai, Dao, Kinh
Suoi Bang	658	2.950	Muong, Dao, Thai, H'Mong

Source: Commune Statics Books 2009

85. To Mua commune has 16 hamlets with 1,022 HHs and 40 km far from Moc Chau district centre toward 101 Provincial Road and National Road No 6. The population and ethnic groups of To Mua commune are as follows:

Table 12. Population and ethnic groups of To Mua commune

Hamlet	Number of HHs	Population			Average number of people per HH	Ethnic group
		Total	Male	Female		
Giao Vien	10	38	19	19	4	Kinh
Co Cai	77	340	172	168	4,5	Thai
Lac Muong	63	301	152	149	5	Thai
Sai Luong	41	173	87	86	4	Kinh
Tong Kieng	41	174	88	86	4	Thai
Lien Hung	145	549	277	272	4	Kinh
Dao	78	328	162	166	4	Thai
Men	73	320	162	158	4	Thai
To Mua	113	458	231	227	4	Kinh
Pan	56	231	111	114	4	Thai
Khu Ngua	22	108	55	53	5	Thai
Suoi Liem	74	332	164	168	4,5	Thai
Cho Day	89	431	213	218	5	Thai
Da Mai	28	134	68	66	5	Dao
Kham	62	287	142	145	4,5	Thai
Bo Mong	50	210	104	106	4	Thai
Sum	1,022	4,372	2,213	2,201		

Source: Commune Statics Books 2009

86. Muong Te commune has 12 hamlets with 786 HHs and population of 3,415 people. The population and ethnic groups of Suoi Bang commune are as follows:

Table 13. Population and ethnic groups of Muong Te commune

Hamlet	Number of HHs	Population			Average number of people per HH	Ethnic group
		Total	Male	Female		
Nhung	110	473	234	239	4	Thai
Hao	87	398	201	197	4,5	Thai
Hang	121	540	267	273	4,5	Thai
Muong Te	66	297	150	147	4,5	Thai
Chieng Ban	116	494	249	245	4	Thai
Hinh	71	347	175	172	5	Muong
Po Tao	76	299	148	151	4	Muong
San Hieng	95	411	208	203	4	Thai
Hua Phu	44	192	95	97	4,5	Thai
Sum	786	3,451	1,728	1,723		

Source: Commune Statics Books 2009

87. There are total of 39% of the HHs in Muong Te commune, 38% of To Mua and 47% of Suoi Bang are poor households. The average income of the communes is about 200,000 VND per month.

Agriculture

88. In recent years, the productive area and yield of crop plants of Moc Chau district have increased. Crop plants are mainly wet rice, dry rice and a variety of vegetables. Food plants here are mainly rice and local corn. The main fruit trees and vegetables of Moc Chau district are very abundant like bullage, a plum which is a special and popular fruit in Northwest mountain area, in general, and at Son La, in particular. The amount of fruit and vegetables of Moc Chau is supplied for Hanoi and other provinces.

89. The area for planting tea tree is 3,500 ha and the yield is about 35,000 tons. Total area of fruit tree is approximately 4,000 ha and food yield of about 55,000 tons.

Production and breeding

90. Cattle, pigs, buffaloes, goats and poultry are all raised by individual families in the district. Number of buffaloes has increased to meet the extra help in agricultural fields and for soil excavation. Cattle are highly valued and are bred by many families, as this can bring a significant increase in family income. The number has increased significantly with the total of 51,000, in which there are 5,500 milk cows. Fresh milk yield is 12,000 tons per year. At the So Vin project area, animal breeding is also one of the main income earning activities of the people.

Aquaculture

91. In Moc Chau, the area of fish ponds is insignificant. Fish mainly is captured in reservoir of Hoa Binh hydropower project and only enough for local people in Moc Chau district. Hoa Binh reservoir is a big reservoir which runs through Moc Chau district and its aquaculture products is the main source for people around it. The reservoir of Hoa Binh hydropower project is erected in Hoa Binh province.

Forestry

92. Much of the forest in the area has been destroyed in the recent past. In the last ten years, there has been focus by local government on the management of forestry and forest land. In 2007, Son La has planted over 3,800,000 trees of all kinds on the area of 1,700 ha

and focuses on water conservation area, transportation and protected area near the Da and Ma River. More than 61,000 ha has been restored (replanted) and 7,000 ha is protected from the previous year. There are 1,200 posters and notice boards made in important areas for protecting forest and prevention of hunting.⁹

Industry and small industry and handicraft

93. The industry, small and handicraft industry in the project area are not developed. Most of the HHs depend on small-scale agriculture, raising of animal and catching fish in some small streams. The area for agriculture is insignificant and can be done by machine due to the fact that the households plant the crops on hills.

2. Rural infrastructure

Transportation system

94. The transportation system of Moc Chau District has received heavy investment recently, and all towns and communes in the District are connected by concreted roads to the District centre.

95. In addition, there is a National Highway Road No. 6 which connects Ha Noi with the northwest provinces. This road also goes through the project area which is favourable for the construction of the project.

Irrigation system

96. The irrigation system at To Mua commune is poorly developed. The sources of water for agricultural production are mainly from side streams or depend on seasonal rainfall rather than irrigation works. There is an irrigation channel at the left bank of So Vin stream, immediately below the dam site which takes water for irrigation of fields. Mitigation will be incorporated to ensure that the flow is retained. The estimated flow in this channel is 0.015m³/s.

Telecommunication system

97. As of 2007, all communes in the District are provided with telephone system.

Electrical power system

98. The electrical power system in Moc Chau district is well-established. Nearly all of the households in the commune have access to the national grid but is always interrupted by more than 2/3 per week. The people only have enough electricity for lighting, TV and rice milling, while for cooking and for heating, they still use wood. The weather is extremely cold in winter. Through the project, people who are living in three communes: To Mua, Muong Te, Suoi Bang will receive better electricity.

Health care

99. By 2005, Moc Chau District has two hospitals, 27 healthcare centre of Ward with 30 doctors, 101 medical doctors and medical officers, 13 nurses. There are 10 midwives with 200 beds for patients. However, due to the complexity of the topography, difficulty in travelling, insufficiency of medical equipment, medical care and healthcare services for local people are still limited.

⁹ Source: Tree planting program of Son La department of Natural Resources and Environment

Education

100. In terms of education, up to the year 2004-2005, Moc Chau District has 1,557 classes in which there are 1,076 primary classes, 415 secondary classes and 66 high school classes. The number of teachers is 1,122 with a total number of students of 15,737. In recent years, education at the local level has been given attention to. Classrooms have been constructed in remote villages, so the proportion of school-age children increased.

Water supply and solid waste disposal

101. There is no central water supply system in the area and people generally use supplies from the steep side of streams which are piped down to individual houses using plastic pipes or bamboo.

102. There is no official solid waste collection system and waste is scattered or dumped in informal areas where it has the tendency to pollute groundwater and water sources in the area.

3. Site of Archaeological and Historic Importance

103. Various archaeological locations and remains are to be found in Vietnam and the SE Asian mainland in general including prehistoric (Neolithic, Bronze-Iron age), pre-Ankorian and Ankorian sites.

104. No archaeological or cultural sites have been determined in the project area but there are procedures set down relating to chance discoveries of an archaeological nature.

IV SCREENING OF ENVIRONMENTAL IMPACTS & MITIGATION

105. The ADB checklist for hydropower projects was used to screen for any potential impact and all impacts identified are provided with mitigation. The Rapid Environmental Assessment (REA) checklist is attached in the Annex 1 of this document. Impacts, which were determined as having environmental implications, are considered further and where significant impacts occur mitigation has been provided.

A. Project Impacts

Positive Impacts

106. As a result of the overall ADB Loan 2517, an additional 25–50 villages and about 3,000–5,000 households will be provided with electricity in Vietnam. Specifically, the So Vin hydropower project aims to supplement power to the electricity grid system to supply 2 communes: To Mua and Suoi Bang. There are 283 HHs with 1115 people that will benefit from the power generation of the project. In addition, the generation of electricity to the national grid will improve power quality for 2216 HHs near the project site. . With the further development of the national electricity distribution system, the people of four communes mentioned above and Moc Chau district as a whole will have the convenience of reliable power supply twenty four hours a day for domestic and business activities. Main power supply will provide convenient means for cooking and domestic heating for those who can afford it and will reduce the pressure on the use of timber for heating and cooking purposes.

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

108. 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%. Hydropower only constitutes 35.3% and Vietnam imports significant amounts of its energy from China. Increased hydropower generation will reduce dependence on importation.

109. 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). The following table provides a comparative analysis of estimated emissions of CO₂ from a power station generating the same amount of energy over a 30-year period using oil, gas & coal as a fuel source. Discharges of between 0.06 and 0.11 million tonnes of carbon dioxide are saved over a 30-year project life by using hydropower rather than fossil fuels. The So Vin project will, therefore, contribute to reduction in carbon emissions by avoiding the alternative burning of fossil fuels.

Table 14. Comparative Analysis of CO₂ Emission using Oil, Gas & Coal over 30 Years in So Vin

	Fuel Source		
	Oil	Gas	Coal
Grams CO ₂ /Gwh discharge	297	232	410
Total Discharge (million tonnes CO ₂) generating 296.4Gwh	0.08	0.06	0.11

Note: Assumes generation of 9.88GWh per year (29.25×10^6) kWh/year over a 30 year project life = 296.4Gwh

Adverse Impacts

Loss of Land

110. No houses will be lost as a result of the project. The number of HHs and people that will be affected by loss of land is as follows:

Table 15. Number of HHs and people affected by loss of land

Type of soil	HHs	People	Percentage
Hill land	4	12	27%
Forest land	6	29	40%
Agricultural land	5	25	33%
Residential land	0	0	0%
Total	15	67	100%

Source: Project Due Diligence Report

Table 16. Land Requirement during Construction and Operation

Type of Impact	Area (ha)	Number of Affected Persons
AREA OF TEMPORARY IMPACT		
Work area, camps and area for construction materials and equipment	1.7	35 (8 household)
AREA OF PERMANENT IMPACT		
Reservoir	2.6	9 (2 household)
Head works(include dam site and power plant)	2.2	4 (1 household)
Access roads and camp area	2	19(4 household)
Service zone	0	0 (0 household))
Total	8.5	67

Source: Project Due Diligence Report

Note: Some HHs and affected persons are impacted by more than one component.

111. Around 13.5 percent of permanently affected land area (6.8 ha) is production forest and 8.8% is the agricultural land and the rest is unused one. The agricultural land which is lost is mainly land for planting corn.

112. The transmission line which links the hydropower plant with the national grid has a length of 1.5km. This system will be designed precisely through the discussions with the electrical sector.

B. Construction Impacts and Mitigation

1 Materials

113. Construction material includes sand and stone that will be bought from Hoa Binh province and fill area is about 500m from the construction site. Other materials are brought from Moc Chau centre. Particular consideration will be given to any quarry and fill areas on completion of works with a tree planting programme.

2. Construction Activities

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

115. There is potential for the penstock to be constructed with scarring of the landscape and for the road material to erode down the slopes. If soil is not consolidated and not transferred properly to waste disposal areas, erosion and soil runoff is expected to occur because the penstock area will be constructed on steep slopes

116. To avoid erosion 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 material in fill areas and there will be proper spoils planning particularly on steep slopes with bench terracing for high cut areas and avoidance of any erosion of material down slopes. Trees should be planted and area will be re-vegetated at the penstock, roads and construction areas on completion of work.

3. Road Access and Traffic

117. Road access to the site is very good and the project site is away from the nearest Hao village. There are 4 HHs of Bo Mong hamlet situated along the 101 provincial road. The construction materials will be transported through these HHs at Hao village when building the dam and the power house.

4. Construction Site and Camp Impacts

118. 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 108 staff during peak construction activity. The Contractors will employ manual labour from the District. The camps for workers from outside will be away from Hao village.

119. The construction camp has the potential for environmental impacts in terms of solid and wastewater emissions. Clauses will be placed in construction sub-contracts requiring

dedicated water supply, solid waste and sewage disposal arrangements at the construction camp.

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

121. 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 to the River System

1. Human Impacts

122. There are 4 HHs at the upstream of the dam site. These HHs and small patch of rice land will be affected by the construction activities of the project. Downstream of the plant, the density of population is higher. In the driest months of the year, with peaking operations, there will be flow in the river below the power plant for just a few hours. The river passes through a village immediately downstream of the plant. This presents a potential problem of safety for the local villagers who have their houses on the left bank and their fields and animal grazing on the right bank. There are also irrigation channels in the village on the left bank which may be disrupted in the dry season by irregular flows and the new flow regime.

2. Fish Impacts

123. Between the dam site and powerhouse, there are steep rock formations so fish cannot move from the plant to the dam site. In addition, So Vin is a small stream with low flows. The construction of the project is likely to have no impact to fish resources in project site.

D. Specific Mitigation Measures

1 Compensation and Resettlement

124. 2.34 billion dong has been allocated to cover the various elements of compensation and resettlement as covered in the RP.

Table 17. Area Permanently Affected by Type of Use and Mitigation:

No.	Land Use	Area (ha)	%	Mitigation
1	Residential area	0.00	0	
2	Agriculture	0.6	12.5	Compensation as per RP
3	Aquaculture	0.00	0	
4	Production Forest	0.4	8.3	Compensation as per RP
5	Roads and transport	0	0	Replacement facilities provided
7	Rivers and springs and unused	3.28	68.3	None
8	Open area	0.52	10.9	Replacement area has been allocated to the community
9	Total	4.8	100.00	NA

Source: Project Due Diligence Report, May 2011

2. River Water Flow

125. If the project is implemented, as assumed in the feasibility report, and all the water in the river is used for power generation, from November to June, there will be extended periods when no water is in the 1.4km section of the river between dam site and power house. Moreover, as mentioned above, the irrigation channel of local villagers on the left bank will be affected as the consequence of changing flow regime. The project will guarantee the 0.015 m³/s flow is retained to supply the left bank channel.

126. 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.

127. 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 down stream 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.

128. In the absence of any specific Vietnamese guideline for the amount of water to be retained in a watercourse when water is extracted for hydropower purposes, it is recommended that some flow be retained i.e. 10% of the average monthly dry season flow and a guaranteed flow of 16 l/s is retained in the river. Therefore the residual flow below the dam will be 0.016m³/s plus 0.015m³/s for the irrigation channel.

129. 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.

130. Before the power plant is constructed, Son La Power Company will hold meetings with the local villagers to raise people's awareness of the new regime of water flow in the river below the power house.

3. Compensation for Loss of Trees and forest Land

131. Forest land lost is production forest and mainly tree lost by the project are bush and low value wood. These trees were compensated by NPC with estimated cost of about 730,000,000 VND.

Table 18. Cost for compensation of tree and forest land

No	Item	Cost (vnd)
1	Compensation and Support for forest land	400,000,000
2	Compensation and Support for plants and fruit trees	330,000,000
Total		730,000,000

Source: Compensation and resettlement plan, So Vin Hydropower Plant

Tree planting programme

132. The EA shall be responsible for compensating agricultural and other affected land by the project in compliance with the State's regulations.

133. Some trees will also be planted at locations such as dam site, road, along the penstock and the power house site, to ensure landscape and environment. The re-planting programme will be planned and approved by the competent local authority. Trees re-planted will be given priority for local available ones and limited for trees. There should be allowance for this with a programme to provide 6 ha of plantation and also to include quarries and borrow areas. Cost of the planting per ha basis is about 40 million VND per ha.

V. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN AND INSTITUTIONAL REQUIREMENTS

134. 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 activities such as implementation of environmental monitoring programmes.

135. The NPC uses its Son La power company to manage So Vin project. This company will be responsible for implementation of ADB projects. NPC will be responsible for 3 more hydropower schemes under the C1 component of the ADB sector loan 2517 project, hence, needs to expand its capacity to implement the environmental mitigation measures. To handle its general environmental responsibilities NPC and Son La Power Company will develop the necessary capacity and allocate manpower to specifically implement the So Vin hydropower plant environmental management plan and monitoring programme.

136. 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.

137. 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 a part time Environmental Implementation Consultant to provide technical assistance in implementation of the environment program and the EMP.

138. 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 EMP and resettlement plan by itself in the future. The cost for the Implementation Consultant is indicated below along with monitoring costs.

Table 19. Estimated Budget 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	Year	195,000,000	10,000

Item No.	Description	Unit	Estimated Amount	
			VND	US \$
	Consultant part time			
4	Training, Information Capacity building for NPC/ESDC	Once	58,500,000	3,000
	Total		698,500,000	35,820

Source: Compensation and resettlement plan, So Vin Hydropower plant

VI. PUBLIC CONSULTATION MEETING

139. NPC organized one public consultation meeting held on January 12, 2011 at To Mua commune to inform the general clearance plan of So Vin Hydropower project and to disclose information about the social, environmental and resettlement issues of the project.

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
- To inform the stakeholders about the Project
- Ensure community consensus for project implementation & information disclosure to local people.

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
- Subproject's objectives
- Proposed mitigation measures
- Environmental Management Plan & Environmental Monitoring Program

3. Meeting Participants

The participants who attended the meeting included representatives from:

- NPC, Son La power company, NPC's Consultants
- Board of compensation and resettlement assistance
- 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 those affected by both direct and indirect negative environmental impacts.

140. Total of participants for one subproject: 40-50 people (including PAPs and Representatives of NPC, Provincial Agencies, Local Authorities people. The PAPs comprised about 20-35% of the total PAPs.)

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

141. The comments from the participants can be summarized as follows:

- There is agreement on the construction of So Vin hydropower subproject because this project will connect to the national power network and improve the quality of power supply to the local people of Moc Chau.
- Hoping the resettlement rate is higher than in the previous projects.
- Agreement on the general clearance plan of So Vin project.
- Need for mitigation measures for negative impacts of environment caused by this subproject.
- Construction time should be widely disseminated beforehand to affected households so that they can plan for their agricultural production & cultivation in preparation for the acquisition of agricultural land
- The So Vin hydropower project is a welcome development as it will bring high economic benefit, will not significantly affect the environment and not cause environmental pollution during operation period.
- Agreement on the assessment results of positive and negative impacts caused by this subproject and the mitigation measures.

5. Meeting Agenda

Time Duration for presentation (minutes)	Content	Presented by
5	Welcome	PAP
10	Introduction of ADB's Project & So Vin subproject	
30	Brief presentation on the subprojects/ADB safeguard policy	Social Consultant
90	Discussion on potential impacts & mitigation measures & monitoring of mitigation measure implementation, Resettlement & Compensation, Environment and Social issues.	All participants
5	Wrap-up & Closing	NPC

6. Conclusion

- There is agreement on the construction of the So Vin subproject and the participants desired its immediate construction
 - 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 To Mua and Muong Te commune and public consultation meetings in the villages can be found in the Annex.

VII. CONCLUSION, FINDINGS AND RECOMMENDATIONS

142. The IEE was conducted using the ADB screening matrix. There are no impacts on sites of historic or archaeological importance. The project dam is located immediately next to the Bo Mong hamlet/village and near the provincial road. There is a loss of corn and rice growing land and forest plantation trees at the head of the reservoir.

143. Apart from the loss of land in the downstream Hao village, 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. The river will experience very much reduced flows along the 1.4 km stretch of the So Vin stream for half of the year. Immediately

downstream of the hydropower plant, water will be discharged for a few hours daily during the dry season. There is a village (lower Hao) immediately below the power plant and the changed flow regime in the river may affect the activities and safety of villagers. The So Vin area has no wildlife or threatened species. It is proposed to retain a minimum environmental flow in the river of 16 l/sec to benefit the section of the river left without water. A further 15 l/sec will be retained to supply an irrigation channel on the left bank of the river immediately below the dam.

144. The other environmental consideration is to mitigate the impacts of construction activities particularly with the need to upgrade 2 km of road. With the mitigation and environmental management plan proposed, environmental impacts will be limited. This IEE proposed and the EMP and monitoring program attached to the IEE will ensure that the project environmental impacts will successfully be mitigated and no further environmental assessment is required.

145. 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 Environmental Monitoring Unit in NPC and the appointment of environmental & resettlement specialists.

Table 20. Environmental Management Plan

Environmental Impacts	Remedial Measure	Means of Implementation	Responsibility	
			Implementation	Supervision
Design /Pre-construction Components				
Agricultural, forestry land impacts	<ul style="list-style-type: none">- Design for maximizing ratio of waste cut and fill materials.- Design for reservoir, tunnel, penstock, power house and hydropower plant to avoid existing land uses, wherever possible.- Compensation in accordance with the State's regulations prior to commencement of work.	Proper planning Measures to be added in relevant parts of the project . Preparation of proper resettlement plan.	Design consultants & NPC	NPC
Excavation of materials and development of disposal site causing loss of alternative land use	<ul style="list-style-type: none">- Maximum use of existing quarry & borrow areas already in operation.- Degraded, barren, riverbeds & waste lands to be used for borrow materials.- Only permitted quarry and borrow areas will be utilized.	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 during the construction process.	<ul style="list-style-type: none">- Ensure that dam construction is phased to ensure diversion of the river.- Ensure construction activities will prevent soil & construction materials from entering river flow.- Ensure a minimum flow is retained in the river.	Plan & add measures to be added in the relevant parts of the contract.	Design consultants & design engineers.	NPC
Aquatic life impacts.	<ul style="list-style-type: none">- Design to discharge water flow in the downstream after building the dam to meet aquatic needs herein.	Design flow discharge outlet to allow residual flow to the dam downstream.	Design consultants	
Construction stage				
Earth Works for new access roads and construction of penstock on steep slopes leading to erosion &	<ul style="list-style-type: none">- Slopes along access roads & penstock will be provided with catchments, cut-off drains & chutes to minimize soil erosion.- Tree planting programme at the temporary construction areas to rehabilitate the landscapes and minimize soil erosion (6 ha at dong 40,000,000 per ha.)	Regular monitoring.	Contractor's Environment Engineer	SC and NPC prepare reports to DONRE,

Environmental Impacts	Remedial Measure	Means of Implementation	Responsibility	
			Implementation	Supervision
encroachment.				
Material exploitation with potential for loss and degradation of cultivate land.	<ul style="list-style-type: none"> - No earth will be borrowed from cultivable lands. - Exploit materials from quarry sites with environmental exploitation license. - For new stone quarries, exploitation will only be implemented with the permission of the competent authorities. 	Regular monitoring.	Contractor's Environment Engineer	SC and NPC prepare reports to DONRE,
Operation of construction equipment and construction activities and contamination of soils, reduction of water quality & water pollution.	<ul style="list-style-type: none"> - Oil storage & refuelling areas will have adequate containment away from rivers and streams. - Fuel and refuelling methods for machines will be properly implemented. Equipment will be properly and regularly maintained. - Precautions to be taken to prevent water pollution due to dam construction by constructing alternatives to ensure no influence on river water resources. - Approving sites defined for storage & disposal of wastes materials - Any waste petroleum products will be collected, stored, & disposed in compliance with the regulations. 	Careful monitoring of conditions included in contracts herein.	Contractor's Environment Engineer and NPC	SC and NPC prepare reports to DONRE
Construction activities causing disruption of existing water resources.	<ul style="list-style-type: none"> - Appropriate rain-stormwater channels will be construction. - Provision for cross drainage structures will be made. 	Proper planning and measures to be added in the relevant parts of contract documents. Regular monitoring of site conditions.	Design consultants & NPC. Contractor's Environment Engineer	NPC
Impacts due to waste from construction camps	<ul style="list-style-type: none"> - Construction camps provided with safe water and sanitation facilities will be properly arranged. - Local labours will be employed. - Design treatment systems for sewage and solid waste at construction camps. 	Regular monitoring of site conditions and implementation of contract conditions.	Contractor's Environment Engineer	SC and NPC prepare reports to DONRE
Air pollution due to emissions from	<ul style="list-style-type: none"> - Emission levels of all construction vehicles & equipment shall conform to Vietnamese emission standards. 	Regular monitoring of site conditions and	Contractor's Environment	SC and NPC prepare

Environmental Impacts	Remedial Measure	Means of Implementation	Responsibility	
			Implementation	Supervision
construction vehicles and equipment	<ul style="list-style-type: none"> - Pollution parameters will be monitored during construction. - Crushing & concrete mixing plants will be away from population centres to minimize dust and noise. 	implementation of contract conditions.	Engineer	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 emission from concrete mixing plants and mobile grinders at dams and powerhouse. - Regular water spraying at service roads and other areas will be undertaken. - All delivery vehicles will be covered with tarpaulin. 	Regular monitoring of site conditions and implementation of contract conditions.	Contractor's Environment Engineer	SC and NPC prepare reports to DONRE,
Construction activity noise from vehicles, plant & equipment causing noise pollution	<ul style="list-style-type: none"> - All construction equipment & plants will conform to Vietnamese standards. - All vehicles & equipment to be fitted with noise abatement devices. - Construction workers will be provided with personal protection devices. 	Regular monitoring of site conditions and implementation of contract conditions.	Contractor's Environment Engineer	SC and NPC prepare reports to DONRE
Noise, vibration and dust pollution from blasting activities Safety of workers at blasting sites	<ul style="list-style-type: none"> - Any blasting works will be in accordance with the applicable Vietnamese Regulations. - No blasting at dusk & dawn. - Residents will be informed well in advance of blasting schedule. - Workers associated with blasting sites will be provided with labour protection devices (such as earplugs, helmets) & other personal safety devices. 	Regular monitoring of site conditions and implementation of contract conditions.	Contractor's Environment Engineer	SC and NPC prepare reports to DONRE
Construction works causing loss of vegetation & tree cover.	<ul style="list-style-type: none"> - No trees to be removed without prior approval, - Compensation for lost trees. - Plantation programme implemented at dam area, channel, penstock, temporary construction areas, roads and other elements of the project. Indigenous tree species being accorded priority over exotic species. 	Regular monitoring of site conditions and implementation of contract conditions.	Contractor's Environment Engineer District People's Committee Sub-contractors	SC and NPC prepare reports to DONRE
Construction activities causing impacts to	<ul style="list-style-type: none"> - Construction workers to be educated for wildlife conservation with no hunting & poaching to be allowed 	Contractors to orient workers including	Environment Engineer	SC and NPC prepare

Environmental Impacts	Remedial Measure	Means of Implementation	Responsibility	
			Implementation	Supervision
wildlife	for workers.	signed commitment.		reports to DONRE
Construction activities causing accidents and risks to workers and community	<ul style="list-style-type: none"> - All blasting works shall be implemented in compliance with the regulations. - Labourers will be provided with helmets, masks & safety goggles, and other personal protective equipment. - Workers working at site shall be educated about labour safety. - Build medical stations at site to give first aid in case of accidents. 	Measures included in the contract and monitor measures during the construction	Environment Engineer	SC, NPC, EPA
Impacts on public utilities	<ul style="list-style-type: none"> - Any public utilities likely to be impacted, such as water supply pipeline system, electrical/telephone lines, etc. must be relocated to suitable places - Require consultations with local beneficiaries and competent authorities. 	To be added in the relevant parts in the contract documents.	Design consultants & NPC.	NPC
Historical relics and cultural values	<ul style="list-style-type: none"> - In the event of discoveries of any historic or cultural values, work will be suspended and such discovery shall be reported to the nearest office of the Department of Culture, Sport and Tourism and the Department of Culture and Information. 	To be added in the relevant parts of the contract documents.	Contractor's Environment Engineer	NPC
Operational Stage				
Reduced water flow in river affecting aquatic life and human uses	<ul style="list-style-type: none"> - Provide guaranteed flow in the dry season, and ensure environmental flow of 16 l/s to the river between dam and plant and 15 l/sec for existing irrigation channel on left bank - Regular monitoring of daily water flow below the dam intake, sluice outlet, and tailrace outlet to determine environmental flows to the river and to the irrigation channel. 	Measurements by CPC hydrology engineers	NPC Environment Engineer	NPC
Impacts of using the plant for peaking	<ul style="list-style-type: none"> - Provide the guaranteed environmental flow below the power plant to minimize downstream impacts on village 	Flow measurements, Notices and	Design consultants	SC and NPC prepare

Environmental Impacts	Remedial Measure	Means of Implementation	Responsibility	
			Implementation	Supervision
operations and changes in water regime	<p>and its activities and villagers' safety.</p> <ul style="list-style-type: none"> - Ensure villagers are fully informed of operation procedures and the changes in water regime. - Develop program to assist villagers in the design of irrigation regime below the plant to cope with changed flow regime. - Monitor discharge impacts in the village. - Implement a flood warning and evacuation system for villagers in case of dam break or other related occurrences. 	coordination with villagers		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's infrastructure. - Stilling basin was designed to reduce the scouring impacts for riverbed below the dam. 	Tree planting in coordination with competent Government agency; Constrution of stilling basin	NPC's Environment Engineer	NPC
Impacts on formation of sediment deposits at reservoir entrance and discharge of anoxic water from the dam	<ul style="list-style-type: none"> - Implement bank stabilization measures and a watershed management program that includes tree planting, maintenance of trees and vegetative cover around the watershed. - Design a sediment control to system to avoid sediment runoff into downstream areas. 	Provision of bank stabilization measures, conduct tree planting and watershed monitoring	NPC's Environment Engineer	NPC

Table 21. Environmental Monitoring Measures

Aspects/Parameters to be Monitored and Applicable Standard	Location	Means of Monitoring	Schedule/Frequency	Responsibilities for supervision and implementation.	Estimated Cost (VND)
<i>Construction stage</i>					
In construction phase: environmental mitigation measures specified in EMP Table	Locations and mitigation measures indicated in the EMP Table	Site visit, interviews with local residents, coordination with concerned agencies	Quarterly random checks and to confirm complaints	Communal Social-Environmental Monitoring Board (CMB)/NPC Environmental monitoring Consultant (EMC)	Included in Contracts
Removal and disturbance of vegetation at construction sites	Construction sites and quarry sites	Tree planting of 6ha and rehabilitation of landscapes of temporary construction areas.	Quarterly	CMB/NPC EMC	Included in Contracts
Material exploitation	Quarry sites	Monitor compliance with permits and licenses of quarry sites	Prior to contract signing	CMB/NPC EMC	Included in Contracts
Health and safety of workers and community	Construction sites, quarry sites	Monitor/record health status of workers – Lost time, accidents, etc., provision of PPEs for workers, community complaints	Daily	Contractor/EMC	Included in Contracts
Noise dB(A)	Communal	Noise measurement	Quarterly random	Contractor/EMC	40,000,000

compared to standards specified in TCVN5949-1998 ♣ Dust (mg/l) compared to Standards specified in Standard QCVN 05: 2009/BTNMT	Residential area		checks and to confirm complaints		
Surface water quality in accordance with Standard QCVN08: 2008: BTNMT Parameters to be sampled according to Vietnam Standards	Upstream, downstream of dam, Downstream of Hydro-power plant	Sampled fields	Quarterly random checks and to confirm complaints	Contractor/EMC	22,800,000
Fish monitoring	Upstream and downstream of dam and hydropower plant	Sampling, interviews/surveys	Semi-annual	EMC and NPC	Part of management cost
<i>Operation Stage</i>					
a. Reduced water flow/Minimum flow (m ³ /s) and the change in flow regime of the river & irrigation channels of local people behind	Downstream of dam and power house.	Flow measurement; retain environmental flow of about 16 l/s. With the irrigation channel: check and record the flow regularly, evaluate	Quarterly random checks and to confirm complaints	EMC and NPC	35,358,000

the power plant.		the impacts, upgrade the current channel according to new flow regime and compensate for local villagers who are affected.			
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Preconstruction costs from NPC budget

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 DEVELOPMENT AND NETWORK
EXPANSION AND REHABILITATION FOR REMOTE COMMUNES SECTOR
PROJECT

Sector Division:

Energy

A. Basic Project Design Data

1. Dam height, m
= 10
2. Surface area of reservoir, (ha)
= 1.21
3. Estimated number of people to be displaced = 0
4. Rated power output, (MW)
= 2.8

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

SCREENING QUESTIONS	Y e s	No	REMARKS
B. Project Location Is the dam and/or project facility adjacent to or within any of the following areas?			
<ul style="list-style-type: none"> Unregulated river 	x		The So Vin is a small stream. Water retention in the So Vin dam is a maximum of 46,490 m ³ which is discharged on a daily basis in the dry season.
<ul style="list-style-type: none"> Unique or aesthetically valuable land or water form 	x		An irrigation channel located at the left bank of the So Vin stream is immediately downstream of the proposed dam. Flow of 15 l/s will be ensured for the irrigation channel.
<ul style="list-style-type: none"> Special area for protecting biodiversity 		x	
<ul style="list-style-type: none"> Protected Area 		x	No protected areas are within the project area of environmental influence. The nearest protected area is located 25 km from the project site.
<ul style="list-style-type: none"> Buffer zone of protected area 		x	The project site is not located in the buffer zone of a protected area. The nearest protected area is located __25__ km from the site.
<ul style="list-style-type: none"> Primary forest 		x	All the forest land in the area is secondary growth or plantation forestry.
<ul style="list-style-type: none"> Range of endangered or threatened animals 		x	According to conversations with local people, there are no threatened species in the area but relatively small quantity of birds like bulbul and spotted doves were reported.
<ul style="list-style-type: none"> Area used by indigenous peoples 	x		Most of the area is used by indigenous people composed of Thai, Muong, Dao, H'Mong and Kinh for agriculture purposes. There is fewer than 5% of the total area which is used by Kinh people for living and services.
<ul style="list-style-type: none"> Cultural heritage site 		x	There are no known archaeological, cultural or religious heritage sites located within proximity of the project.
<ul style="list-style-type: none"> Wetland 		x	Not applicable
<ul style="list-style-type: none"> Mangrove 		x	Not applicable
<ul style="list-style-type: none"> Estuary 		x	Not applicable
C. Potential Environmental Impacts Will the Project causes.			

SCREENING QUESTIONS	Y e s	No	REMARKS
<ul style="list-style-type: none"> 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 causing soil erosion in steep terrain. Air quality impacts are expected from the construction activities, operating of batching plant, and movement of vehicles along village tracks. Noise and vibration impacts are expected from blasting, construction works, and movement of vehicles.
<ul style="list-style-type: none"> Disturbance of large areas due to material quarrying? 		x	Existing quarries are used and there is only a small quantity of borrow materials required for construction. The quarry site is located in Hoa Binh province and is about 500m from the project construction area.
<ul style="list-style-type: none"> Disposal of large quantities of construction spoils? 		x	Some disposal of construction spoil is required at designated sites close to the dam and powerhouse.
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Impounding of a long river stretch? 		x	Only a 141 m of the river is impounded by the reservoir.
<ul style="list-style-type: none"> Dryness (less than 50% of dry season mean flow) over a long downstream river stretch? 	x		There will be reduced flow in the river, but only over as short 1.4 km distance. A guaranteed flow of 16 l/s will be retained in the river.
<ul style="list-style-type: none"> Construction of permanent access road near or through forests? 		x	2km access road will be upgraded
<ul style="list-style-type: none"> Creation of barriers for migratory land animals 		x	There are no reported migratory animals in the area.
<ul style="list-style-type: none"> 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	The project is on the small So Vin stream which has a length of less than 6 km above the dam site. A small patch of Riceland will be affected upstream of the dam due to flooding.
<ul style="list-style-type: none"> Deterioration of downstream water quality due to anoxic water from the reservoir and sediments due to soil erosion? 		x	There will be regular release of water from the reservoir to prevent anoxic water with sediments.
<ul style="list-style-type: none"> Significant diversion of water from one basin to another? 		x	
<ul style="list-style-type: none"> Alternating dry and wet downstream conditions due to peaking operation of powerhouse? 	x		There will be peak operation use during the dry season months. Water release is relatively small - maximum of 1.18m ³ /s. There will be minimum flow retained in the river and immediately below the dam are side streams which augment flow. However, the flow of these side streams is too small. They only have water on the rainy season. Immediately downstream of the power house, there is a village, its fields, animals and irrigation channels.
<ul style="list-style-type: none"> Significant modification of annual flood cycle affecting downstream ecosystem, people's sustenance and livelihoods? 		x	Small water retention
<ul style="list-style-type: none"> Loss or destruction of unique or aesthetically valuable land or water forms? 		x	Small dam in steep valley

SCREENING QUESTIONS	Y e s	No	REMARKS
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Scouring of riverbed below dam? 		x	
<ul style="list-style-type: none"> Downstream erosion of recipient river in trans-basin diversion? 		x	Not applicable
<ul style="list-style-type: none"> Increased flooding risk of recipient river in trans-basin diversion? 		x	Not applicable
<ul style="list-style-type: none"> Decreased groundwater recharge of downstream areas? 		x	Project is small
<ul style="list-style-type: none"> Draining of downstream wetlands and riparian areas? 		x	Not applicable
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Loss of migratory fish species due to barrier imposed by the dam? 		x] Actually, there is no water fall at the downstream area of the dam site. It just a high slope (The distance between dam site and power plant is about 1.3 km but the difference in the elevation is quite high: nearly 200m).
<ul style="list-style-type: none"> Formation of sediment deposits at reservoir entrance, creating backwater effect and flooding and water logging upstream? 		x	
<ul style="list-style-type: none"> Significant disruption of river sediment transport downstream due to trapping in reservoir? 		x	The project was designed with a sluicing outlet to transfer sediment deposits through the dam to the downstream area and the spillway is free overflowed. This can have some small impacts to the downstream area. However, these impacts will be reduced by the designing of stilling basin.
<ul style="list-style-type: none"> Environmental risk due to potential toxicity of sediments trapped behind the dams? 		x	
<ul style="list-style-type: none"> Increased saltwater intrusion in estuary and low lands due to reduced river flows? 		x	Not applicable
<ul style="list-style-type: none"> Significant induced seismicity due to large reservoir size and potential environmental hazard from catastrophic failure of the dam? 		x	Not applicable – small dam
<ul style="list-style-type: none"> Cumulative effects due to its role as part of a cascade of dams/ reservoirs? 		x	Not applicable
<ul style="list-style-type: none"> 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 retention of water for more than 24 hours.
<ul style="list-style-type: none"> Risks and vulnerabilities related to occupational health & safety due to physical, chemical, biological, & radiological hazards during project construction & operation? 		x	
<ul style="list-style-type: none"> 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 dam and small project labour force only
<ul style="list-style-type: none"> Creation of community slums following construction of the hydropower plant and its facilities? 		x	Not applicable

SCREENING QUESTIONS	Y e s	No	REMARKS
<ul style="list-style-type: none"> Social conflicts if workers from other regions or countries are hired? 		x	Small camp during construction 108 workers – camps located as far away from villages as possible.
<ul style="list-style-type: none"> Uncontrolled human migration into the area, made possible by access roads and transmission lines? 		x	Not applicable – small scheme only
<ul style="list-style-type: none"> Disproportionate impacts on the poor, women, children or other vulnerable groups? 		x	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	Small downstream safety impact to village from peaking operations of plant.

Annex 2. 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.
- Coordinate with NPC and the design/supervision consultants relative to the site-specific environmental issues to ensure the least damage and disturbance 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 cross checking and examination of design/specification, tender, and contract documents, to meet environmental and sound engineering needs during site selection, construction, and post-completion operation and maintenance of the project.
- 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 flow measurements and water testing on regular basis, noting any changes and 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 with Peoples Committees and Government Departments, local/regional NGOs, local officials, and all other concerned stakeholders related to 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, hold a Bachelor's degree and five years work experience in road engineering or as an environmental engineer on construction projects

Annex 3. Photos of So Vin Project Site



Dam site area



Reservoir bed



Penstock area



Hydropower plan area



Access road to construction site



Hao hamlet (downstream of power plant)

Annex 4. Memorandum of the public meeting in January 12, 2011

**CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc**

.....Tô Múa....., ngày ..11.. tháng ..01.. năm 2011..

**BIÊN BẢN HỌP THAM VẤN CỘNG ĐỒNG
VỀ ĐÁNH GIÁ TÁC ĐỘNG MÔI TRƯỜNG,
TÁI ĐỊNH CƯ VÀ PHÁT TRIỂN DÂN TỘC THIỂU SỐ**

Dự án: Nhà máy thủy điện Sơ Vin
Xã Tô Múa, huyện Mộc Châu, tỉnh Sơn La.

I. Thành phần tham dự:

1. Ông/Bà: ...*Lương Văn Hưng*... Chức vụ: ...*Chủ tịch UBND xã*...
2. Ông/Bà: ...*Lương Văn Sơn*... Chức vụ: ...*Chủ tịch UBND thị trấn*...
3. Ông/Bà: ...*Đỗ Văn Tiến*... Chức vụ: ...*Chủ tịch HĐND xã*...
4. Ông/Bà: ...*Lê Văn Thanh Lương*... Chức vụ: ...*Chủ tịch Hội nông dân xã*...
5. Ông/Bà: ...*Đỗ Thị Chấn*... Chức vụ: ...*Chủ tịch Hội phụ nữ xã*...
6. Ông/Bà: ...*Lương Văn Thuận*... Chức vụ: ...*Biên tập viên xã*...
7. Ông/Bà: ...*Phạm Văn Long*... Chức vụ: ...*Phó Trưởng ban điều tra Sơn La*...
8. Ông/Bà: ...*Ngô Văn Hùng*... Chức vụ: ...*T.P. K.D. C.T. Điều tra Sơn La*...
9. Ông/Bà: ...*Nguyễn Anh Minh*... Chức vụ: ...*C.N. Phòng K.D. C.T. DT Sơn La*...
10. Ông/Bà: ...*Đỗ Tiến Trung*... Chức vụ: ...*C.N. Văn phòng huyện*...

II. Nội dung tham vấn:

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 những biện pháp giảm thiểu các tác động tiêu cực.

Chuyên gia tái định cư trình bày những tác động khi thu hồi đất và các tài sản trên đất, những chính sách của Chính phủ nước Cộng hòa xã hội chủ nghĩa 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.

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 với cộng đồng về những chính sách của Chính phủ nước Cộng hòa xã hội chủ nghĩa Việt Nam và địa phương về dân tộc thiểu số.

III. Ý kiến thảo luận

III.1 Tác động môi trường tiêu cực và biện pháp giảm thiểu:

- Việc xây dựng công trình sẽ phát sinh các chất thải từ vật liệu xây dựng và đất đá trong quá trình thi công. Chủ đầu tư đã tính toán bố trí các bãi thải ở các vị trí hợp lý để thu gom.

III.2. Các vấn đề về thu hồi đất và tái sản trên đất, các chính sách:

- Trong quá trình xây dựng nhà máy thủy điện Sơ Vờ là thu hồi đất của một số hộ dân nằm trong khu vực dự án. Chủ đầu tư, các đại biểu đại diện cho các ban ngành trong địa phương và các hộ dân bị thu hồi đất đã thống nhất việc đền bù sẽ theo đơn giá của UBND Tỉnh Sơn La để ra và theo đúng chính sách của nhà nước.

III.3. Các vấn đề về dân tộc thiểu số:

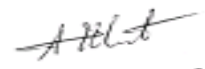
- Tôn trọng phong tục tập quán của bà con nhân dân địa phương, phối hợp tốt với chính quyền địa phương trong việc quản lý công nhân tham gia xây dựng, tránh để mâu thuẫn giữa công nhân với người dân địa phương
- Người dân địa phương muốn được tham gia làm việc khi xây dựng nhà máy và vận hành nhà máy

IV. Kết luận:


- Tất cả các đại biểu tham gia cuộc họp đều nhất trí việc xây dựng công trình nhà máy thủy điện Sơ Vờ

Cuộc họp kết thúc vào hồi giờ ngày ..12.. tháng ..11... năm 2011...
Biên bản cuộc họp được lập và được tất cả các đại biểu tham dự nhất trí thông qua.

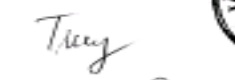
ĐẠI DIỆN
CHỦ ĐẦU TƯ


Ngô Anh Nhì

ĐẠI DIỆN
CỘNG ĐỒNG


Trần Văn Dân

ĐẠI DIỆN
TƯ VẤN


Trần Văn Trung



Lương Văn Uông

Socialist Republic of Vietnam
Independence- Liberty – Happiness

To Mua, January 12, 2011

Public meeting report about initial environmental examination, resettlement and ethnic minority development plan

I. Main participants:

1. Mr Luong Van Uong	Head of To Mua people's committee
2. Mr Luong Van Su	Head of To Mua fatherland front
3. Mr Ha Van Tan	Head of To Mua people's council
4. Mr Lam Manh Cuong	Head of To Mua farmers' association
5. Mrs Ha Thi Chuc	Head of To Mua women's association
6. Mr Luong Van Thuong	Head of To Mua Youth's association
7. Mr Pham Van Long	Vice-director of Son La power company
8. Mr Ngo Tan Hung	Construction manager of Son La power Company.
9. Mr Nguyen Anh Minh	Project management unit staff
10. Mr Bui Tien Trung	Vice-director of consultant company

II. Contents of meeting

Environmental expert presented the environmental impacts which include natural and social influences of the project area and the methods to minimize the negative impacts.

Resettlement expert presented the impacts when the land and properties on land are revoked, policies of local and Vietnamese government about compensation when the State revokes land and properties on land.

Expert of community and ethnic minority presented the policy framework about ethnic minority of the project, social impacts when the project is constructed; introduced local and Vietnamese government policies about ethnic minority issues.

III. Comments

III.1. Negative impacts on environment and mitigation measures:

The construction of the project will create waste from construction materials and soil in construction phase. The investor calculated and arranged dumping grounds at suitable site for collection.

III.2. Compensation of land loss and policies

In construction period of So Vin hydropower plant, some HHs in the project area will lose their land. Investor, representatives of all the sectors in the local community along with the affected people agreed that the compensation will obey the regulations and policies of Son La people's committee and Vietnamese government.

III.3. Ethnic minority issues:

- Respect to traditional customs and norms of the local people, well management of the construction workers, avoid contradictions between them.

- Local people want to participate in the construction and operational phase of the project.

IV. Conclusion

All the participants in the meeting agreed to the construction of the So Vin hydropower project.

Signed and seal

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM

Độc lập- Tự do- Hạnh phúc

Tô...Mùa..., ngày 12 tháng 01 năm 2011

DANH SÁCH THAM DỰ CUỘC HỌP

THAM VẤN CỘNG ĐỒNG VỀ ĐÁNH GIÁ TÁC ĐỘNG MÔI TRƯỜNG

DỰ ÁN THUỶ ĐIỆN SƠ VIN

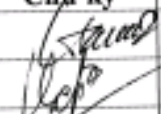



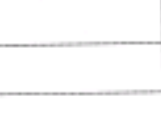
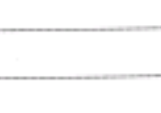
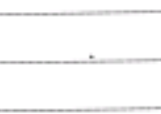
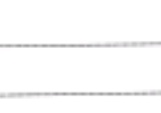

STT	Họ và tên	Địa chỉ	Chữ ký
1	Liông Văn Sung	Bản Bó Mông, Xã Tô Múa, Mộc Châu	S
2	Liông Văn Toàn	Bản Bó Mông, Xã Tô Múa, Mộc Châu	Xb
3	Liông Văn Liên	Bản Bó Mông, Xã Tô Múa, Mộc Châu	Tân
4	Liông Văn Tuấn	Bản Bó Mông, Xã Tô Múa, Mộc Châu	Jun
5	Liông Văn Thảo	Bản Hào, Xã Mường Tè, Mộc Châu	Thao
6	Liông Văn Hoàng	Bản Hào, Xã Mường Tè, Mộc Châu	Hoang
7	Nhà Văn Thiết	Bản Hào, Xã Mường Tè, Mộc Châu	Thiet
8	Nhà Thúy	Bản Hào, Xã Mường Tè, Mộc Châu	Thuy
9	Nhà Văn Thanh	Bản Hào, Xã Mường Tè, Mộc Châu	Thanh
10	Liông Văn Hùng	Bản Hào, Xã Mường Tè, Mộc Châu	Hung
11	Nhà Văn Chiến	Bản Hào, Xã Mường Tè, Mộc Châu	Chien
12			
13			
14			
15			

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

....., ngày 12 tháng 01 năm 2011..

DANH SÁCH ĐẠI BIỂU THAM DỰ CUỘC HỌP
THAM VẤN CỘNG ĐỒNG VỀ ĐÁNH GIÁ TÁC ĐỘNG MÔI TRƯỜNG, TÀI
ĐỊNH CƯ VÀ PHÁT TRIỂN DÂN TỘC THIỂU SỐ

Dự án: Thủy điện Sơ Vin

Stt	Họ và tên	Địa chỉ	Chữ ký	Ghi chú
1	Lê Văn Tươi	Tổ 1 - Mỏ Chấu - Sơn La		
2	Lương Văn Sứ	Tổ 1 - Mỏ Chấu - Sơn La		
3	Hà Văn Thuận	Tổ 1 - Mỏ Chấu - Sơn La		
4	Lâm Mạnh Lương	Tổ 1 - Mỏ Chấu - Sơn La		
5	Hà Thị Huệ	Tổ 1 - Mỏ Chấu - Sơn La		
6	Lương Văn Thuận	Tổ 1 - Mỏ Chấu - Sơn La		
7	Lương Văn Ưng	Tổ 1 - Mỏ Chấu - Sơn La		
8	Phạm Văn Long	Phường CT Điện lực Sơn La		
9	Ngô Văn Hùng	T.P. ĐHXD CT Điện lực SL		
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XÁC NHẬN CỦA CHỖ NƠI QUẢN LÝ ĐỊA PHƯƠNG



Lương Văn Ưng

Socialist Republic of Vietnam
Independence- Liberty – Happiness

To Mua, January 12, 2011

List of representatives of affected people in the public meeting about environmental impacts of the So Vin hydropower project.

No	Name	Address	Sign	Note
1	Ha Van Tan	To Mua commune, Moc Chau		
2	Luong Van Su	To Mua commune, Moc Chau		
3	Ha Van Thuan	To Mua commune, Moc Chau		
4	Lam Manh Cuong	To Mua commune, Moc Chau		
5	Ha Thi Chuc	To Mua commune, Moc Chau		
6	Luong Van Thuong	To Mua commune, Moc Chau		
7	Luong Van Uong	To Mua commune, Moc Chau		
8	Pham Van Long	Vice-director of Son La power Co.		
9	Ngo Tan Hung	Vice-manager of Son La power Co.		
10	Luong Van Sung	Bo Mong hamlet, To Mua commune		
11	Luong Van Toan	Bo Mong hamlet, To Mua commune		
12	Luong Van Tien	Bo Mong hamlet, To Mua commune		
13	Luong Van Tun	Bo Mong hamlet, To Mua commune		
14	Luong Van Thao	Hao hamlet, Muong Te commune		
15	Luong Van Hoang	Hao hamlet, Muong Te commune		
16	Ha Van Thiet	Hao hamlet, Muong Te commune		
17	Ha Thuy	Hao hamlet, Muong Te commune		
18	Ha Van Thanh	Hao hamlet, Muong Te commune		
19	Luong Van Hung	Hao hamlet, Muong Te commune		
20	Ha Van Chien	Hao hamlet, Muong Te commune		

Annex 5. Memorandum of Commitment to Environmental Protection

ỦY BAN NHÂN DÂN
HUYỆN MỘC CHÂU

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

Số: 06/GXNBS-UBND

Mộc Châu, ngày 13 tháng 4 năm 2010

GIẤY XÁC NHẬN ĐĂNG KÝ
BẢN CAM KẾT BẢO VỆ MÔI TRƯỜNG BỔ SUNG
của Dự án “Thủy điện Sơ Vin” do Công ty Điện lực 1 làm chủ đầu tư
tại xã Tô Múa và xã Mường Tè, huyện Mộc Châu, tỉnh Sơn La

- Căn cứ Luật Tổ chức HĐND và UBND ngày 26 tháng 11 năm 2003;
- Căn cứ Luật Bảo vệ môi trường ngày 29 tháng 11 năm 2005;
- Căn cứ Nghị định số 80/2006/NĐ-CP ngày 09 tháng 8 năm 2006 của Chính phủ về việc quy định chi tiết và hướng dẫn thi hành một số điều của Luật Bảo vệ môi trường;
- Căn cứ Nghị định số 21/2008/NĐ-CP ngày 28 tháng 02 năm 2008 của Chính phủ về sửa đổi, bổ sung một số điều của Nghị định số 80/2006/NĐ-CP ngày 09 tháng 8 năm 2006 của Chính phủ về việc quy định chi tiết và hướng dẫn thi hành một số điều của Luật Bảo vệ môi trường;
- Căn cứ Thông tư số 05/2008/TT-BTNMT ngày 08 tháng 12 năm 2008 của Bộ Tài nguyên và Môi trường hướng dẫn về đánh giá môi trường chiến lược, đánh giá tác động môi trường và cam kết bảo vệ môi trường;
- Theo đề nghị của Phòng Tài nguyên và Môi trường huyện Mộc Châu tại Tờ trình số 60/TTr-TNMT ngày 12 tháng 4 năm 2010,

ỦY BAN NHÂN DÂN HUYỆN MỘC CHÂU
XÁC NHẬN

Điều 1. Chủ dự án là Công ty Điện lực 1 đã có Văn bản số 206/ĐSL-QLXD ngày 11 tháng 3 năm 2010 đăng ký bản cam kết bảo vệ môi trường bổ sung của Dự án “Thủy điện Sơ Vin” tại xã Tô Múa và xã Mường Tè, huyện Mộc Châu, tỉnh Sơn La.

Điều 2. Chủ dự án có trách nhiệm thực hiện đúng và đầy đủ những nội dung về bảo vệ môi trường nêu trong bản cam kết bảo vệ môi trường bổ sung và những yêu cầu bắt buộc sau đây:

1. Thực hiện nghiêm chỉnh công tác quản lý và xử lý khí thải, bụi phát sinh, chất thải rắn, nước thải đảm bảo các tiêu chuẩn, quy chuẩn Việt Nam hiện hành.

2. Tuân thủ nghiêm ngặt các tiêu chuẩn, quy phạm kỹ thuật và các quy định của pháp luật hiện hành trong quá trình xây dựng, thẩm định về phê duyệt thiết kế các hạng mục công trình của Dự án. Tổ chức xây dựng theo đúng thiết kế các hạng

mục công trình của Dự án, khai thác sử dụng tiết kiệm nguồn tài nguyên nước, tuân thủ chế độ báo cáo tình hình khai thác, sử dụng tài nguyên nước theo quy định.

3. Phối hợp chặt chẽ với chính quyền địa phương thực hiện tốt công tác bồi thường, giải phóng mặt bằng, đảm bảo tình hình an ninh trật tự, tuyên truyền nâng cao nhận thức về bảo vệ môi trường cho cán bộ, công nhân tham gia thi công và vận hành Dự án.

4. Thực hiện chương trình giám sát môi trường theo nội dung bản cam kết đã được xác nhận, tần suất giám sát tối thiểu 06 (sáu) tháng một lần. Các điểm giám sát phải được thể hiện cụ thể trên sơ đồ với chú giải rõ ràng và áp dụng theo tiêu chuẩn, quy chuẩn Việt Nam hiện hành.

5. Trong quá trình xây dựng và vận hành Dự án khi có sự cố xấu ảnh hưởng tới môi trường hoặc có phản ánh của nhân dân về tình trạng ô nhiễm môi trường do dự án gây ra, chủ dự án phải có biện pháp xử lý kịp thời. Trường hợp chủ dự án không thực hiện các biện pháp xử lý, gây ô nhiễm môi trường, làm ảnh hưởng đến môi trường chung trong khu vực, sẽ bị xử phạt vi phạm hành chính, khắc phục ô nhiễm, đình chỉ, cấm hoạt động hoặc buộc di dời sản xuất đến địa điểm khác theo quy định pháp luật.

6. Chủ dự án phải kịp thời báo cáo khi có sự cố ảnh hưởng tới môi trường. Thực hiện báo cáo kết quả thực hiện bản cam kết bảo vệ môi trường được xác nhận tại Giấy xác nhận số 14/GXN-UBND ngày 21/11/2007 của UBND huyện Mộc Châu và bản cam kết bảo vệ môi trường bổ sung trong năm, gửi về UBND huyện Mộc Châu qua Phòng Tài nguyên và Môi trường vào ngày 20 tháng 12 hàng năm để giám sát, kiểm tra, theo dõi.

Điều 3. Bản cam kết bảo vệ môi trường bổ sung của Dự án, những yêu cầu bắt buộc tại Điều 2 của Giấy xác nhận này và bản cam kết bảo vệ môi trường được xác nhận tại Giấy xác nhận số 14/GXN-UBND ngày 21/11/2007 của UBND huyện Mộc Châu của Dự án là cơ sở để các cơ quan quản lý nhà nước về bảo vệ môi trường giám sát, kiểm tra, thanh tra việc thực hiện hoạt động bảo vệ môi trường trong suốt quá trình thi công xây dựng và vận hành Dự án.

Điều 4. Giấy xác nhận này có giá trị kể từ ngày ký và đi kèm Giấy xác nhận đăng ký bản cam kết bảo vệ môi trường số 14/GXN-UBND ngày 21/11/2007 của UBND huyện Mộc Châu./.

Nơi nhận:

- Sở Tài nguyên và Môi trường Sơn La;
- TT UBND huyện;
- UBND xã Tô Múa;
- UBND xã Mường Tè;
- Công ty Điện Lực 1;
- Lưu PTNMT, (D)7b.

TM. ỦY BAN NHÂN DÂN

KT. CHỦ TỊCH

PHÓ CHỦ TỊCH



Ngô Văn Phan

Moc Chau, April 13, 2010

Confirm paper of environmental protection commitment

- Based on people's committee arrangement law November 26, 2003
- Based on environment protection law November 29, 2005
- Based on Decree No 80/2006/ND-CP August 09, 2006
- Based on Circular No 05/2008/TT-BTNMT December 08, 2008
- Based on propose of Moc Chau department of Resource and Environment April 12, 2010.

Moc Chau People's committee confirms:

Article 1: Power Company No 1, the investor of the So Vin hydropower project, had written on March 11, 2010 to register environmental protection commitment of So Vin hydropower project at To Mua commune, Moc Chau district, Son La province.

Article 2: The investor of the project has the responsibility to implement correctly and comprehensively all the contents which were given out in the environmental protection commitment and to obey compulsory requirements as follows:

1. Implement strictly the management and treatment of emitted smoke, dust, solid waste, and discharged water according to current Vietnamese law and regulations.
2. Obey the standard, technical guides and regulations of current law during the construction period, and conduct assessment of the project's components. Organize to construct in accordance with the design, using water resource economically, and obeying the regime of report about exploiting and using water resource.
3. Cooperate closely with the local authorities to implement the compensation, clearance, ensure order and security, propaganda to raising people's awareness of environmental protection for staff and workers who participate in the construction and operation of the project.
4. Implement the environmental supervision program according to the contents of the approved written commitment; and conduct sampling at least 6 months a time. The sampling points have to present on the map with clear legends and apply in accordance with the current standards and regulations of Vietnam.
5. In the construction and operational phases, if any problem occurs or the locals complain about the polluted environment because of the project, investor must have immediate mitigation method. In case the investor has no methods, he will be punished drastically according to Vietnam law.

Article 3: The environmental protection commitment of the project, the compulsory requirements at Article 2 and the environmental protection commitment confirmation No 14/GXN-UBND dated December 21, 2007 of Moc Chau people's committee is the ground for the governmental management organizations on environmental protection to supervise, inspect the implement environmental protection activities during the construction and operation phase of the project.

Article 4: This writing is valid from the signed day and attached with the confirm writing of environmental protection commitment No 14/GXN-UBND on December 21, 2007 of Moc Chau people's committee.

<p>Sent to:</p> <ul style="list-style-type: none"> - Son La Environment and Resource - Department - Moc Chau People's committee - Muong Te commune's people's committee - Power Company No 1 	<p>Vice president of Moc Chau District</p> <p>Ngo Van Phan</p>
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