

# **Initial Environmental Examination**

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**August 2013**

## **VIE: Renewable Energy Development and Network Expansion and Rehabilitation for Remote Communes Sector Project (Dak Pring Hydropower Project)**

**Prepared by Central Power Corporation for the Electricity Vietnam and the Asian  
Development Bank.**

## CURRENCY EQUIVALENTS

(as of 30 June 2013)

Currency unit	–	Vietnamese Dong (VND)
VND1.00	=	\$0.0000471
\$1.00	=	VND21,200

## ABBREVIATIONS

VIE	-	Viet Nam
ADB	-	Asian Development Bank
CPC	-	Central Power Company
EVN	-	Electricity Vietnam
CREB	-	Central Rural Electricity Project Management Board
ESDC	-	Environment and Social Development Cell
DONRE	-	Department of Natural Resources and Environment
IEE	-	Initial Environmental Examination
SONRE	-	Section on Natural Resources and Environment

## { WEIGHTS AND MEASURES }

MW	–	Megawatt
Km	–	Kilometer
km <sup>2</sup>	–	square kilometers
l/s	–	litres per second
m	–	metre
m <sup>3</sup>	–	cubic metre
m <sup>2</sup>	–	square metre
mm	–	millimeter
s	–	seconds
mg/l	–	milligram/litre

## NOTE

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### **ABBREVIATION**

ADB	Asian Development Bank
EIA	Environmental Impact Assessment
EMP	Environment Management Plan
EPC	Environment Protection Commitment
IEE	Initial Environmental Examination
PECC1	Power Engineering Consulting JS Company 1
CPC	Central Power Company
FSL	Full Supply Level
MOL	Minimum Operating Level
FS	Feasibility Study
HPP	Hydropower project
RP	Resettlement plan
SoNRE/DoNRE	Section/Department of Natural Resources and Environment
MoNRE/BTNMT	Ministry of Natural Resources and Environment
QCVN	Vietnamese Standards
PC	People's Committee
CFF	Commune Fatherland Front
VND	Viet Nam Dong
HHs	Households
AHs	Affected households
Ninst.	Install capacity
Nfirm	Firm capacity
CMB	Commune monitoring board
EMC	External Monitoring Consultant
SC	Supervision Consultant
TA	Technical Assistance

## **Currency equivalents**

(As of June 21, 2012)

Currency Unit: Viet Nam Dong (VND)

USD1.00 = 20,800 VND

VND1.00 = 0.000048 USD

## **Weights and measures**

Ha	hectare
km	kilometre
km <sup>2</sup>	square kilometres
m	metre
m <sup>3</sup>	cubic metre
m <sup>2</sup>	square metre
s	seconds
sao	500 m <sup>2</sup>
l	litre

## **EXECUTIVE SUMMARY**

### **1. OBJECTIVES AND APPROACH**

The Central Power Company had studied DakPring hydropower project in the planning phase through a pre-feasibility study and a feasibility study since 2003. The previous project owner approved the feasibility study of DakPring HPP on 12 September 2005 and the Quang Nam People's Committee also approved the Environmental Impact Assessment (EIA) report in October 2004.

The current project owner -Central Power Company (CPC), formerly known as Power Company No. 3 (PC3) - assigned PECC1 to update the feasibility study of the hydropower project (HPP), including preparation of a new EIA report to meet the requirements of the Vietnamese government's regulations and an Initial Environmental Examination (IEE) to meet ADB's safeguards requirements.

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 Viet Nam. The planning for individual hydropower projects is carried out in two stages. The first of these stages consists of identification of projects and development of feasibility studies and the second involves the construction of these projects. DakPring project has been identified for consideration under the programme.

The project is a small (7.5MW) hydropower plant designed to provide electricity to the rural electricity system. Under ADB guidelines DakPring is a Category B project, and, as such, an IEE is required. According to the new regulations of Vietnam, the size of DakPring (more than 300,000 m<sup>3</sup>) requires that an EIA be made when the plans for the project are submitted to the Quang Nam Province People's Committee for review and approval.

The project consists of a 22.3 m high spillway dam and intake works, a tunnel to pipe water to the penstock, a powerhouse and tail race. Water is taken from the DakPring river at the dam site and delivered to the powerhouse and returned to the river some 2 km downstream.

DakPring hydropower plant generates a power base from the main flow of the river as well as the differences of topography. In the flood season, when the general water flow is greater than the normal water flow, the power plant will generate power with a maximum capacity of 7.5 MW. The excess water flow will be discharged back downstream. In the dry season, when the daily flow through the turbine ( $Q_{db} + 4.65 \text{ m}^3/\text{s}$ ) is less than the minimum flow, the power plant will only produce

small amounts of electricity in certain hours, as required on the daily basis, based on the level of reserve water in the reservoir.

## **2. ENVIRONMENTAL CONCERNS AND IMPACTS**

Both benefits and impacts will occur during the construction and operation phase of DakPring hydropower plant project.

Construction of the DakPring Hydropower Project does not effect any houses, however, there is loss of upland swidden-type crop land and forest areas. Areas of fruit trees and forest land have also been appropriated for the creation of the reservoir and damsite and other plant auxiliaries. The main potential environmental impacts of the project relate to:

- Human impacts due to the loss of 67.5 ha of swidden agricultural land in the mountain. The agricultural land is traditionally owned by 65 households (310 persons) in which 21 households (96 persons) will be affected temporarily during the construction phase which will last for 2.5 years and 44 households (214 persons) will be permanently affected because of loss of land<sup>1</sup>.
- There are no displaced people and the area occupied by agricultural land is about 10 percent of the average land area holding.
- Construction along some steep and hilly slopes for the tunnel, penstock, and access roads will cause landscape scarring, loss of trees, and result to landslides due to loss of vegetation cover. This could result to high sediment runoff to the downstream DakPring river bed.
- Solid and liquid wastes from worker camps and service areas will cause pollution of soil and water environment and increase risk of developing diseases.
- Vegetation and other materials submerged in the reservoir will cause water pollution or eutrophication phenomenon because of decomposition of vegetation and trees. This could cause changes in the water quality in the downstream river sections and could have an impact on people's health since the river water is also being used for water supply by the villagers.
- The project is about 2 km away from the core zone of the Song Thanh Nature Reserve area and is located within the buffer zone of the reserve. There are indirect impacts of the project to the nature reserve such as illegal hunting, trading or exploitation of plants and animal species in the reserve if CPC and its contractors do not strictly manage their workers and staff.

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<sup>1</sup>Source: Socio-economic survey of Cha Val Commune, May 2010



- The project has been originally designed to maximize water use with no environmental flow being retained in the river system below the dam site. This will result to a 2 km section of the river between dam and powerhouse to be denied water flow for approximately 9 months of the year. An environmental flow of 0.44 m<sup>3</sup>/s is proposed by the project.
- The operation regime of the plant to meet peak power loads means that the river flow in the section immediately after the plant (1 km) may also vary from 28.4 m<sup>3</sup>/s to 0.016 m<sup>3</sup>/s coming from the dam overflow and inflows from two small river tributaries. There is no water use for domestic or agricultural purposes in the river section but the flow changes and variation will cause impacts on aquatic life and on the sand extraction activity further downstream of the river.

The main socio-economic and environmental benefits of the proposed project are as follows:

- Provide additional electricity to the existing national power grid and enrich quality life to the locals, who still do not have enough electricity for their daily basic needs.
- Provide water for agricultural systems in the dry season and create better opportunities for fishery and tourism in the local area.
- Increase the work force in the service and industrial sectors in Cha Val and nearby communes.

### **3. MITIGATION MEASURES**

**Table 1: Summary impact mitigation measures**

<b>Potential impacts</b>	<b>Mitigation measures</b>	<b>Mitigation costs (10<sup>6</sup> VNĐ)</b>
Loss of 67.5 has widen agricultural land including some productive forest	Compensate for the impacts according to the compensation framework approved by provincial authorities.	15,192
Water and soil pollution in the site during construction time.	Wastewater collection and treatment Collect and manage construction wastes	Contractor's cost
Risk of spreading diseases due to high density of workers	Collect domestic wastes	240
	Spray mosquito-repellent chemicals	156.59
Water pollution of future reservoir due to decomposition of vegetation.	Clear vegetation in accordance with approved and detailed clearance plan. De-mine bombs and treat dioxin chemicals remaining.	91.31 (vegetation clearance only)

Erosion and landslide on the steep mountainous terrain in the site.	Reforest 4.6ha in agreed areas Restore vegetation cover And other mitigation measures.	200 Contractor's cost
Negative impacts to Song Thanh Nature Reserve since Dakpring HPP is located in buffer zone of the reserve (around 2km away from the core zone).	Implement training courses for workers, staff and local people on forest protection and animal hunting limitation. Manage workers and apply other mitigation measures in IEE in accordance with the management plan for Song Thanh Nature Reserve.	To be decided with the Song Thanh Nature Reserve and the Provincial Forest Protection Department
Two kilometers river section from dam to power house will become dry in almost half of the year and water flow from powerhouse will change in a few hours per day due to operation regime of the HPP.	Retain 0.44m <sup>3</sup> /s as environmental flow in the river to reduce impact on fish and aquatic life.	Project cost

#### **4. CONCLUSION**

DakPring HPP will bring both benefits and adverse impacts to the natural environment and the society.

The project will provide additional electricity source for the national grid and will contribute to socio-economic development of Nam Giang district and Cha Val commune by providing electricity, supplying water in the dry season, and creating jobs and infrastructure.

Potential impacts of DakPring HPP are defined in detail in this IEE. These impacts will originate mostly from construction activities, land occupation, and the removal of water flow from the 2 km river section for more than half of the year causing effects to aquatic species.

The proposed measures suggested in the Environmental Management Plan (EMP attached in this IEE) will mitigate most impacts during the construction phase.

Damages to crops, agricultural and forest products will be compensated according to the compensation framework approved by local authorities.

The proposed retention of 0.44m<sup>3</sup>/s environmental flow in the river will help reduce impacts on aquatic life. More detailed assessment of impacts on aquatic life and other mitigation measures may be determined if there is further study and monitoring on aquatic life in the river system.

It is important for CPC to develop its capacity to implement and monitor the measures set out in the EMP. CPC will set-up an Environmental Unit composed of specialists on environmental management and social compensation, who will coordinate with contractor's environmental staff and the Commune People's Committee during both construction and operation phases of the project.

## **CHAPTER 1: INTRODUCTION**

### **1.1 OVERVIEW**

The DakPring Hydropower project is a sub-project of the Renewable Energy Development and Network Expansion and Rehabilitation for Remote Communes Sector Project of ADB which entails the construction of 5-10 small hydropower plants (each with a capacity equal to or less than 7.5 MW) to improve and expand the distribution networks in 10 provinces in northern and central provinces of Viet Nam.

DakPring Hydropower project was studied in the planning phase, Pre-Feasibility Study and Feasibility Study since 2003. The Feasibility Study of DakPring HPP was approved in 12 September 2005 by the previous project owner and an EIA report was approved in October 2004 by Quang Nam People's Committee.

The present project owner-Central Power Company (CPC), formerly known as Power Company No 3 (PC3) commissioned PECC1 to update the Feasibility Study of the DakPring HPP including preparing both an EIA to meet the requirements of the Vietnamese government regulations and an IEE to meet ADB's environment safeguards requirements.

Under ADB guidelines DakPring HPP is a Category B project, and, as such, an IEE is required. According to the new regulations of Vietnam, the size of DakPring (more than 300,000 m<sup>3</sup>) requires that a Environmental Impact Assessment (EIA) be made when the plans for the project are submitted to the Quang Nam Province People's Committee for review and approval.

The DakPring HPP small reservoir is operated with the daily regulation of flow regime. The reservoir effective storage regulates the daily flow to the reservoir and to the downstream section of the river.

### **1.2 PROJECT COST**

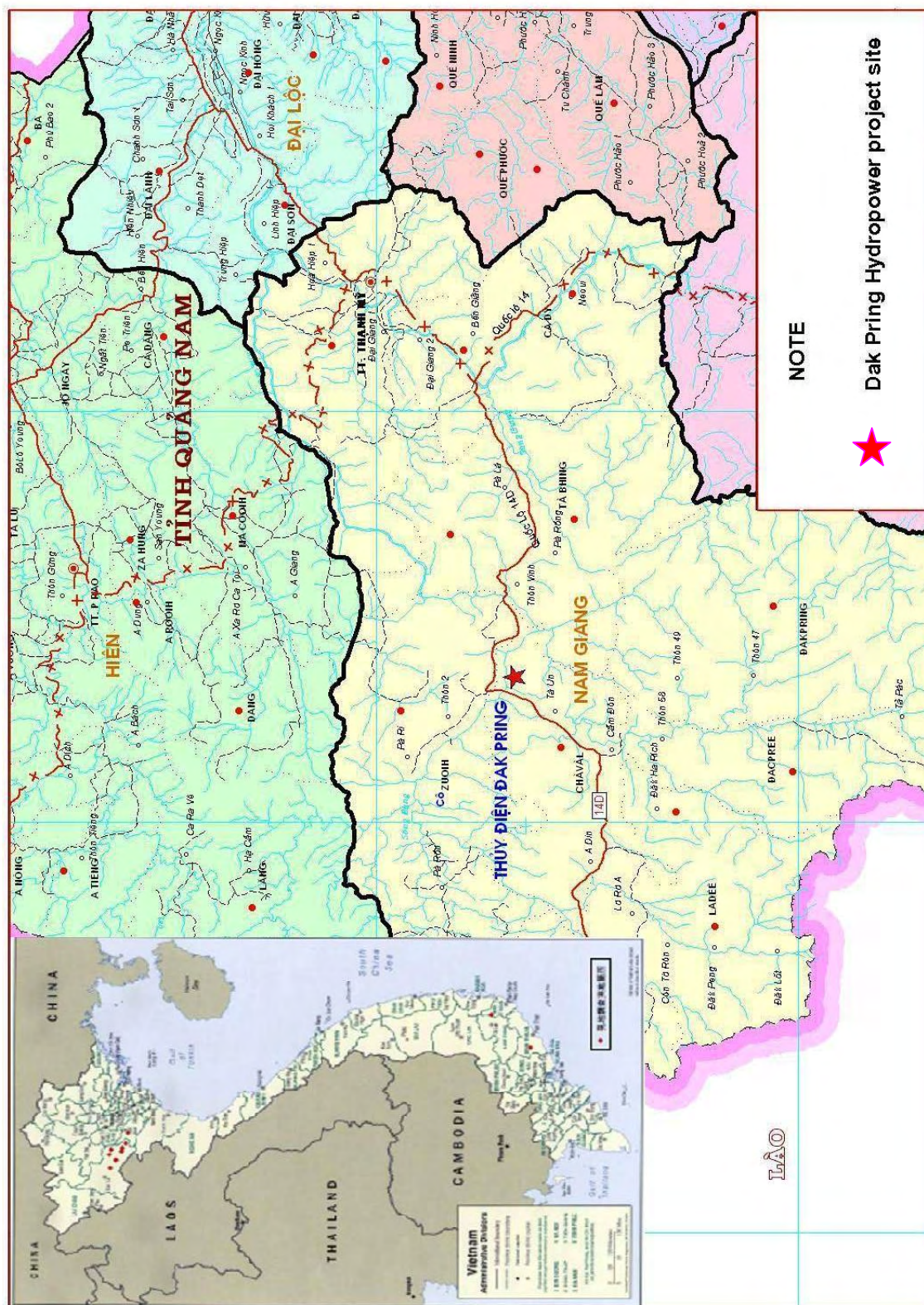
The total cost of DakPring HPP is 213.612 billion VND.

### **1.3 LOCATION OF THE PROJECT**

DakPring River is a tributary on the right bank of Bung River and a second class tributary of the Vu Gia river system- Thu Bon, Nam Giang district - Quang Nam province. DakPring River originates from Ngoc Linh mountain at an elevation of 2,598m, flows in the south-north direction and enters the right side of Bung river at 107°35'05"East longitude and 15°42'30" North latitude. Its boundary is between the two provinces of Quang Nam and Kon Tum. The river catchment area controlled by DakPring hydroelectric dam is 310 km<sup>2</sup>, and the length of the main river is about 45km.



Figure 1. Location Map of DakPring Hydropower Project



The project site is located in Cha Val commune of Nam Giang district of Quang Nam province, about 40km west of Thach My town of Nam Giang district, 160km northwest of Tam Ky town of Quang Nam province. DakPring HPP is a diversion type HPP, whereby the water flows from a reservoir through a tunnel to a powerhouse and re-enters DakPring river at about 2km downstream from the dam site.

The DakPring HPP construction site and vicinity (Figure 1) is a remote area of Nam Giang district in a mountainous and hilly region. The population is mainly composed of ethnic groups belonging to the Ktu, Gie Chieng and a very small number of Kinh people living in difficult economic conditions. The income of local people is mainly derived from agriculture, forestry and a very small portion from small-scale trading activities.

There are no valuable archaeological or cultural artifacts found during the survey or are reported in the area.

#### **1.4 PURPOSE AND METHODOLOGY OF THE IEE**

DakPring HPP, with installed capacity of 7.5 MW, is a relatively small hydropower project. Using ADB's Rapid Environmental Assessment Checklist for hydropower (see Annex), the project is classified as Category "B", in accordance with ADB Guidelines for Environmental Assessment (2003) and the ADB Safeguard Policy Statement (2009). An IEE is required to determine if there are significant impacts and if a more detailed impact assessment is necessary.

The following methodologies have been implemented in the preparation of the IEE:

- (i) Review of project-related documents and literature related to the project area
- (ii) Site visits to view conditions in the project area and the location of the project
- (iii) Implementation and documentation of public consultation with local residents, local government officials on project area characteristics, and potential project impacts
- (iv) Identification of existing environmental and socio-economic characteristics of the project area
- (v) Screening of environmental impacts
- (vi) Development of environmental mitigation and monitoring measures.

#### **1.5 REPORT STRUCTURE**

The IEE will screen environmental and social impacts and proposes mitigation measures for negative impacts during preparation, construction, and operation of the project.

The IEE report comprises of:

Chapter 1: Introduction including general information, background, stages of project preparation, scope of report, and consulting agency.

Chapter 2: Project description, studied alternatives, components and proposed selected alternative.

Chapter 3: Description of environment, the physical, ecological and socio-economic condition of the project area.

Chapter 4: Screening of potential environmental impacts and negative impacts mitigation measures.

Chapter 5: Institutional requirements and environmental monitoring plan.

Chapter 6: Community consultation and information disclosure

Chapter 7: Conclusion.



## **CHAPTER 2: DESCRIPTION OF THE PROJECT**

### **A. TYPE OF AND CATEGORY OF THE PROJECT**

#### **2.1. ADB CATEGORIZATION**

DakPring HPP is a 7.5 MW hydropower project. Using ADB's Rapid Environmental Assessment Checklist for hydropower (see Annex), the project is classified as Category "B", in accordance with ADB *Guidelines for Environmental Assessment (2003)* and the *ADB Safeguard Policy Statement (2009)*. An IEE is required to determine if there are significant impacts and if a more detailed impact assessment is necessary.

#### **2.2. VIET NAM REQUIREMENTS AND REGULATIONS**

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 impacts to national reserves, national parks, historical-cultural relics, natural heritage and on water resources of river basins, coastal areas and protected ecosystems areas are subject to environmental assessment.

A Circular issued by the Ministry of Natural Resources and Environment (MONRE) Number 05/2008/TT-BTNMT dated December, 08, 2008 entitled "Guiding Strategic Environmental Assessment, Environmental Impact Assessment and Environmental Protection Commitment"<sup>2</sup> gives detailed guidelines for Strategic Environmental Assessment (SEA), Environmental Impact Assessment (EIA) and Commitment to Environmental Protection (CEP) including SEA, EIA and CEP report preparation, review and appraisal, monitoring, and confirmation of implementation of the mitigation measures.

The regulations<sup>3</sup> published in 2008 categorize 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 m<sup>3</sup> or above and for high voltage transmission lines with a length of over 100 km.

Reservoirs with volume less than 300,000m<sup>3</sup> have to prepare a report "Environmental Protection Commitment". Projects with reservoir capacity more than 300,000m<sup>3</sup> and less than 100,000,000m<sup>3</sup> have to prepare an "Environmental impact assessment (EIA)" report and submit to Provincial People's Committee (PPC) for approval. Where a project reservoir is more than 100,000,000 m<sup>3</sup> or the scope of the project is within two or more provinces, an EIA report must be submitted to MONRE for review and approval.

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<sup>2</sup> GOV's Circular No.05/2008/TT-BTNMT dated 08 December 2008

<sup>3</sup> GOV's Circular No. 21/2008/ND-CP dated 28 February 2008 and Article 24 of the LEP



## **2.3 OTHER RELATED REGULATIONS IN VIET NAM**

**Approval of Environmental Assessment Report.** Depending on the size of the project, MONRE is responsible for approving the Environmental Impact Assessment (EIA) while the Department of Natural Resources and Environment (DoNRE) at provincial level is responsible for certifying the report. Therefore, in the case of DakPring HPP, Quang Nam province People's Committee is responsible for approving the report. DakPring EIA and the Section on Natural Resources and Environment (SONRE) at District level is also responsible for conducting environmental monitoring during project implementation.

**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 Resources<sup>4</sup> 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.

Article 64 of the Act entitled "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).

Decree No 149/2004<sup>5</sup>, Article 4 defines permit issuance principles. Permits are granted initially for 20 years (Article 7). Permits for smaller projects are usually granted at Provincial People's Committee level (Article 14). The permitting authority will also manage the permit and the dossiers of required information for the project.

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

Article 21 "Order and procedures for issuance of surface water exploitation and use permits" defines what is required for a permit application i.e. what should be in the dossier accompanying the permit application. 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. This agreement must be certified by the competent People's Committee.

**Environmental Flow.** Decree No 112/2008<sup>6</sup> 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 eco-system's normal development and the minimum level

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<sup>4</sup> Law on Water Resources No. 8/1998/QH10 May 20, 1998

<sup>5</sup> 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.

<sup>6</sup> 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.

for the exploitation and use of water resources by water users according to the priority level set in the river basin planning.”

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).

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).

MONRE, according to Article 12.2, is to assume responsibility for and coordinate the concerned ministries, branches and localities in specifying minimum flow requirements for reservoirs.

Despite attempts by MONRE to establish standards for determination of "Minimum Flow" for reservoirs through a Danida project<sup>7</sup>, no standards have up to this time been agreed for adoption by MONRE.

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

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

1. Cultural Heritage Law Jun 2001
2. Decree No.92/2002/ND-CP November 11, 2002 relating to the implementation of the article of the Law on Cultural Heritage.
3. Regulation on Exploration of Archaeological Excavations Decision No. 86/2008/QD-BVHTDL December 30, 2008 of the Minister of Culture, Sport and Tourism.

Chapter II of the 2008 regulation-86/2008/QD-BVHTDL (Responsibilities of organization and individuals when detecting archaeological sites) state that if an organization and individual(s) find archaeological sites and/or artifacts, they have the responsibility to protect, maintain the status quo at the location and promptly notify and hand over the archaeological relics to the closest office of the Department Culture, Sport and Tourism or the Department of Culture and Information.

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<sup>7</sup>Intergrated River Basin Management Project, Danida 2008 -2009

## **B. DESCRIPTION OF THE PROJECT**

### **2.4 THE NEED OF THE PROJECT**

DakPring hydropower project is designed to meet rapidly increasing energy demand in Nam Giang district, Quang Nam province, and central provinces of Viet Nam. In addition to expanding access to power and improving power supply to remote communes, DakPring HPP also contributes to the enhancement of the social and economic development in the project area by improving the living standard of some ethnic people in the province by helping to form fish ponds, supplying water for irrigation, and creating additional jobs.

### **2.5 OVERVIEW OF THE PROJECT**

According to the updated feasibility study report by the Power Engineering & Consulting Joint Stock Company No 1 (PECC1) issued June 2010 and March 2012, DakPring HPP is a diversion type hydropower project (Figure 2). The daily regulation reservoir created in the DakPring river diverts water through tunnels to the powerhouse, and then re-enters DakPring river by a tailrace canal. The project site has the following components:

- Reservoir: Inundation area at F.S.L is 36ha, full storage capacity is 3.22 million m<sup>3</sup>
- Dam: Proposed dam is a concrete gravity dam with rock-core; crest width of 3m; crest length of 92.12 m. Maximum height of the dam is 21.7 m, crest elevation of 292.12 m and constructed on hard rock layers.
- Spillway: Free practical profile; sill elevation is 287 m; after spill slope is a jet; energy dissipation by water fall/free jump; sand sluice's dimensions are 2mx2m; elevation of sill of sluice is 276m.
- Waterway is on the left bank comprising:
  - Intake: Open type, reinforced concrete, 1 bay, 3 m wide with sill elevation of 279 m equipped with repairing gate. Dimensions 15.9x18.7m.
  - Tunnel: Horseshoe shape with inner dimensions 4.3x4.3 m, length Lh = 521.88 m and slope of 6.2%, steel mesh reinforced.
- Powerhouse dimensions are 8.5x17.4 m including 2 Francis generating unit and installed capacity of 7.5 MW.
- Tailrace canal: width of 8 m, length of 105m.
- Outdoor switchyard: 35kV switchyard dimensions 20mx30m is located close to powerhouse for better management and operation process. The

switchyard is composed of 35kV distribution equipment, support piers, fire fighting equipment, cable trench system and internal road system.

The transmission line is planned as a 35 kV single circuit transmission line, electric conductor AC150, with 10km length connecting the outdoor switchyard to the national grid at transformer substation 110kV in Nam Giang, in conformity with the “Mini Powerhouse Development Plan to the National Grid (from Quang Nam province to southern regions)” which was approved by Viet Nam Ministry of Industry and Trade under decision No. 1864/QĐ-BCT dated April, 14, 2009).

**Table 2-1: Main parameters of the DakPring Hydropower Project**

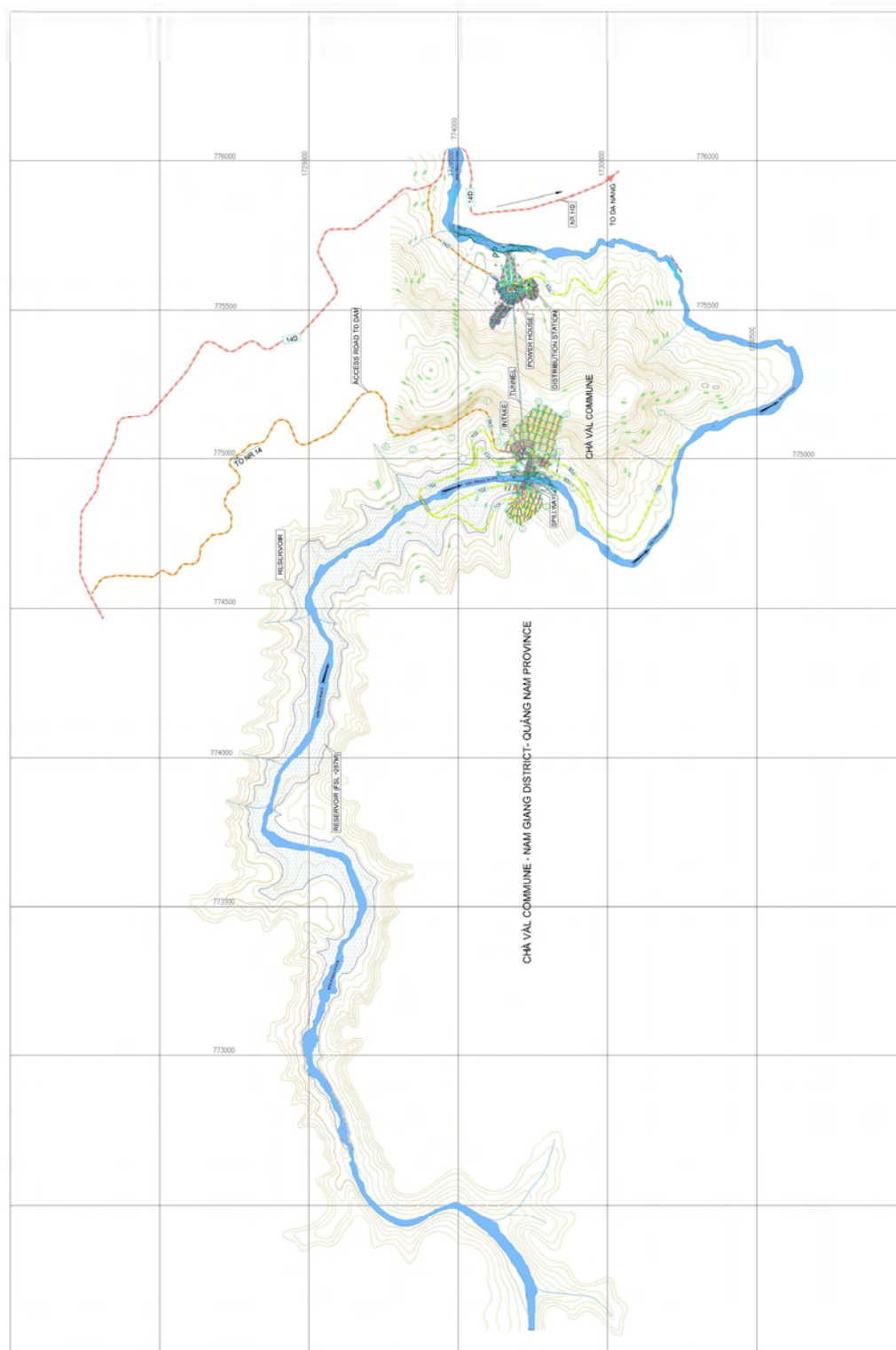
Main parameter		Unit	Value	Note
Project		DakPring HPP		
River		DakPring		
Location		Cha Val commune	Nam Giang district	Quang Nam province
Catchments	Catchment area $F_{LV}$	km <sup>2</sup>	310	
	Mean annual flow $Q_0$	m <sup>3</sup> /s	18.35	
Reservoir	F.S.L/M.O.L	m	287/286	
	Surface area at F.S.L	ha	36	
	Total storage/ Effective storage	10 <sup>6</sup> m <sup>3</sup>	3.22/0.36	
Head works	Dam: Crest elevation / Maximum height	m	296.2/21.7	Gravity Concrete
	Spillway (Height / Length)	m	27/ 90	
Water way	Tunnel: Diameter / Length	m	4.3/496.9	
	Powerhouse (2 units)	MW	7.5	
	Tailrace canal	m	105	
	Rated head	m	29.84	
Transmission system	Switchyard (Width x Length)	m	20x30	2-35kV
	Line	km	10	35kV
Road	Road outside construction site (existing)	km	2.65	Asphalt cover
	Road inside site (new)	km	3.14	Gravel laying

Source: Updated feasibility study report of “DakPring hydropower project”, PECC1, March 2012.

## **2.6 CONSTRUCTION SCHEDULE**

The project is planned to be constructed in a period of 2 and a half years. Details of the project construction are discussed in the succeeding sections.

Figure 2. DakPring Hydropower Project and its components



(1) Preparation time is estimated to be 6 months, which includes site clearing, construction of service roads and auxiliary areas.

(2) Period 1 (one year) for excavation of dam foundation, construction of dam base (including grouting curtains on the right and left bank), excavation of powerhouse and substation's foundation, excavation of tunnel, completion of intake, construction of diversion culvert, coffer dams and sand sluice.

(3) Period 2 (one year): Construction and completion of dam and spillway including excavation of the rest of the spillway foundation, concreting spillway, building and testing intake gates.

The final phase of the project involves the assembly of power units, installation of equipment of power house and of substation.

## **2.7 PROJECT ACTIVITIES**

### **Construction area**

The construction area is designed on the basis of the general layout of the main components, material supply sources, work quantity, construction schedule and transportation system. Two auxiliary areas are arranged for head works sites and powerhouse site.

Each auxiliary area has a camp or working office, production bases, car parking area, disposal area, storage area, power and water supply, communication system, and a service station for the construction work. The power supply for the construction camp and activities is designed on the basis of the requirement in the construction site and will be supplied from a 2km line from the grid. The water supply for the construction camp and construction activities is planned to be taken from DakPring river.

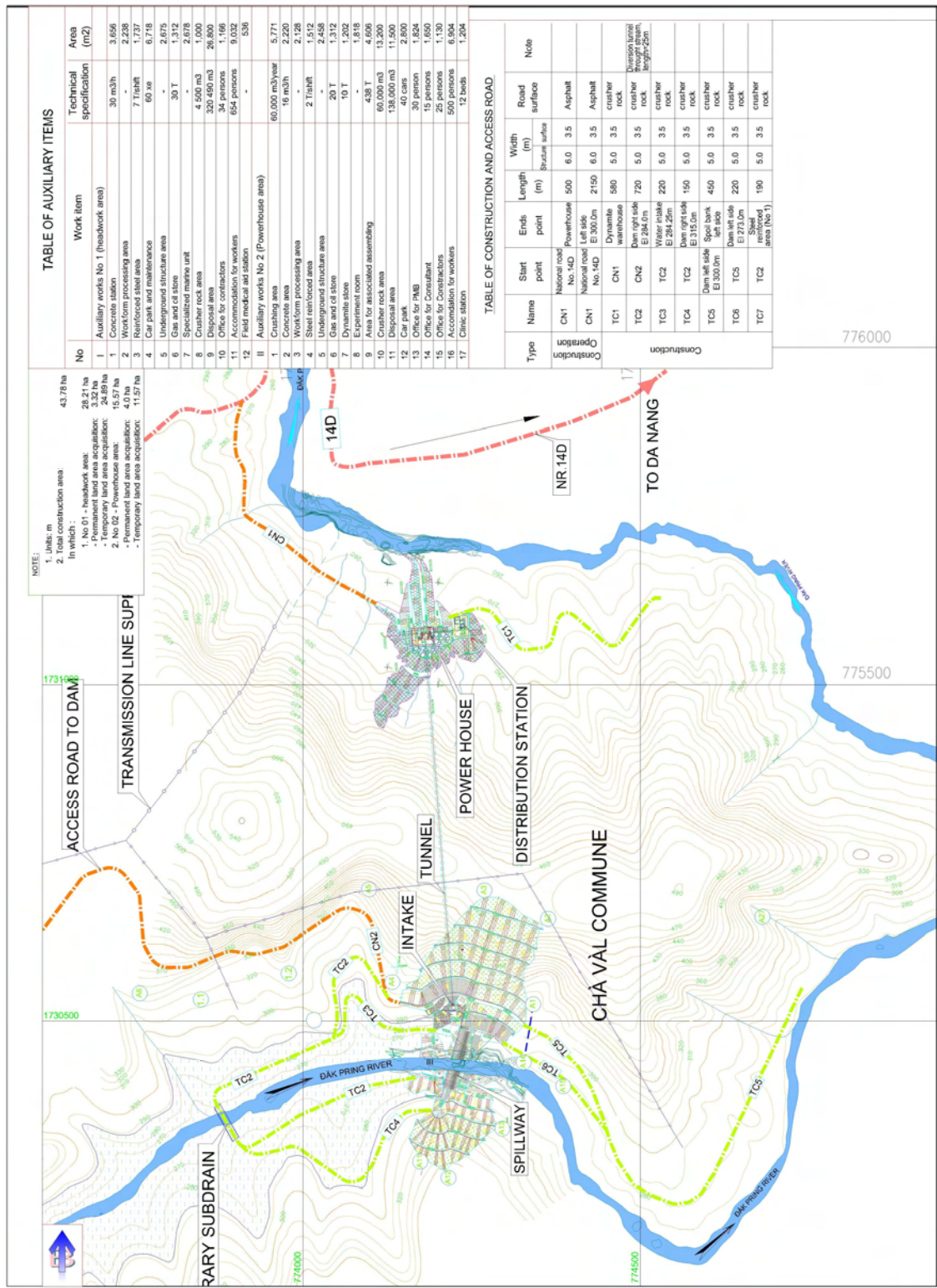
The total area for the auxiliary areas is 39.43ha, in which 9.1ha is for permanent use and 30.33ha is for temporary use for construction roads and auxiliary areas (Figure 3).

### **Construction quantity**

The major materials and total construction amount of the project is described in Table 2-2.



Figure 3.Location of the HPP project and auxiliaries areas



**Table 2-2: Quantity of main construction works of the project**

No.	Item	Unit	Quantity
1	Open soil and rock excavation	$10^3 \text{ m}^3$	442.18
2	Underground rock excavation	$10^3 \text{ m}^3$	10.02
3	Open fill	$10^3 \text{ m}^3$	33.25
4	Concrete	$10^3 \text{ m}^3$	52.79
5	Steel	ton	550.46
6	The maximum number of worker on construction site: - Construction - Operation	Persons	1000 30

Source: Updated FS report of “DakPring hydropower project”, PECC1 – March 2012.

### **Main Materials**

**Table 2-3: Requirement of main materials**

No.	Material	Unit	Quantity	Source	Distance (km)
1	Cement	ton	7,929	Danang	130
2	Steel	ton	550.46	Danang	130
3	Gravel	$10^3 \text{ m}^3$	51.78	Local	<5
4	Sand	$10^3 \text{ m}^3$	24.12	Local	<50

Source: Updated FS report of “DakPring hydropower project”, PECC1 – March 2012.

### **Material sources and access road**

According to the geological report of PECC1, sand and stone are available in the project area for project construction. Reserves of sandbank in the area of Giang and Cai is a good and stable source of sand. The source is located about 40- 50 km away from the project area.

DakPring HPP requires a large volume of soil and rock excavation for the foundation of the powerhouse, tailrace canal and tunnel. The soil and rock excavated at the foundation is utilized for cofferdam backfill ( $33,250 \text{ m}^3$ ) and for refill to the foundation ( $33,250 \text{ m}^3$ ). The rock excavated from the tunnel and plant is selected for aggregate use ( $24,310 \text{ m}^3$ ) for concreting of the dam and other project auxiliaries.

High quality granite is widely available in the project area, which can be used for construction in the project. The extra rock needed can be obtained for the project at the local granite mine, located about 3km distance from the project site.



There is also a small-scale stone quarry along the QL14 Road between Cam Don village and the bridge crossing over the DakPring.

The imported heavy equipment is transported by sea to Danang port and from there, along QL14B- Ho Chi Minh road and National Road 14D to the construction site (about 130 km).

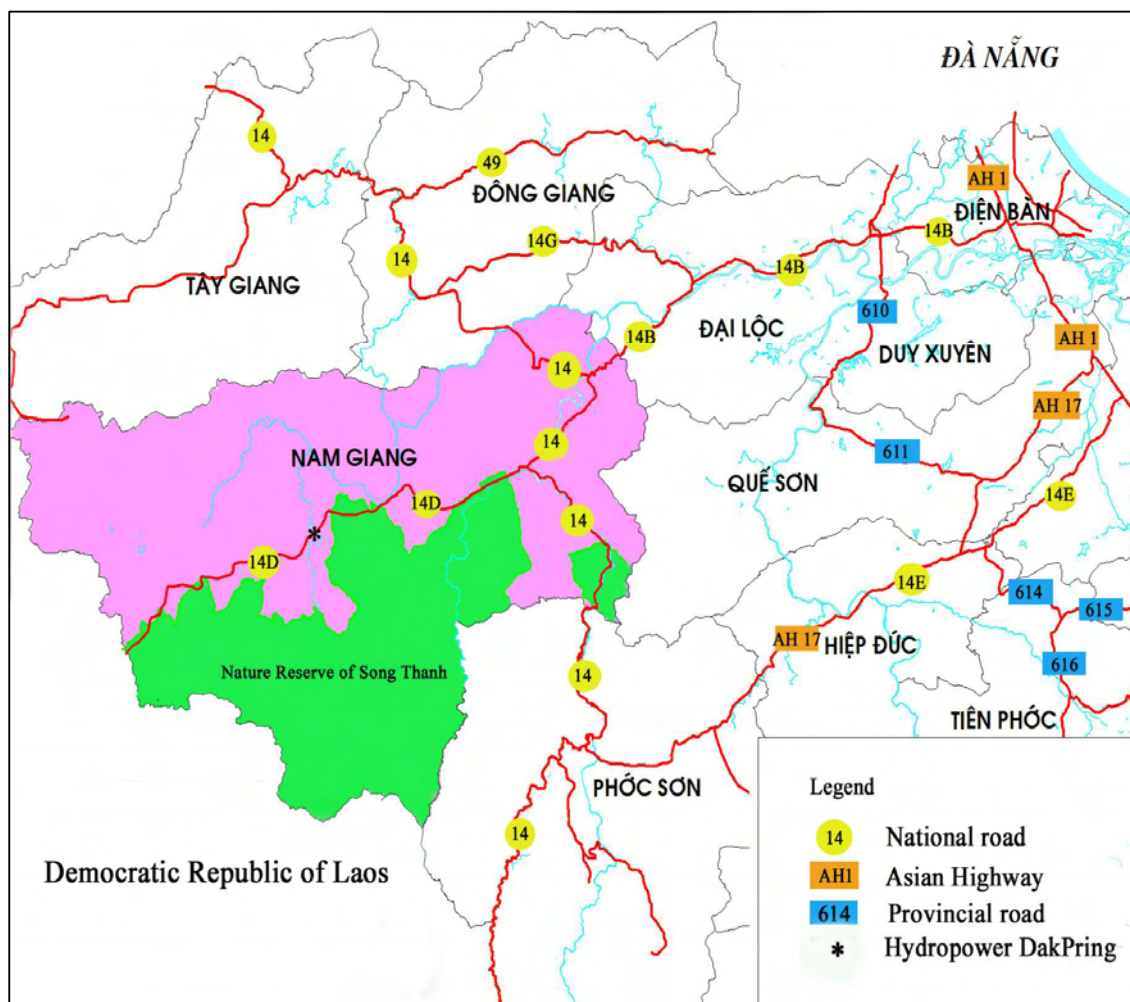
The other materials such as sand, cement and steel are planned to be transported from Thach My to Cha Val at a distance of about 47 km ( Ho Chi Minh road and QL14D or National Road 14D), then along the route CN1 to headwork's site (2.65 km) and CN2 to powerhouse (0.50 km).

### **Internal road in construction site**

Apart from using existing good quality roads such as QL14D road, QL14B road and Ho Chi Minh road, several short routes for construction and operation will be built within the construction site. These routes include (1) Operation road routes CN1 to headwork's site (2.65 km) and CN2 to powerhouse (0.50 km); (2) Construction routes with a total length of 3.14 km include. These internal roads (Figure 4) are:

- TC1 road: connected from CN1 road to the tunnel mouth and then through the plant and to disposal site and mine warehouses of the plant auxiliary areas; length of TC1 road is about 580m;
- TC2 road: connected from CN2 road to culvert diversion channel on the right bank of constructed dam site, diversion culvert and dam site on the right bank of spillway. The length of TC2 road is about 800m;
- TC3 road: connected from TC2 road to diversion channel and intake with a length of about 220m;
- TC4 road: connected from TC3 road to upstream dam site on the right bank with a length of about 370m;
- TC5 road: connected from the left bank of the dam crest road to auxiliary facilities on left bank in the downstream with a length of about 700m;
- TC6: connected from TC5 to coffer-dam on the right bank with a length of approximately 220m; and
- TC7: connected from TC2 road to reinforcing facilities of auxiliary areas of head works with a length of approximately 205m.

Figure 4. Plan of Access Roads



## CHAPTER 3: DESCRIPTION OF EXISTING ENVIRONMENTAL CONDITIONS

### 3.1. NATURAL CONDITIONS

#### 3.1.1 Climate

The catchment of Bung river, in general, and of DakPring, in particular, is an integral part of Vu Gia – Thu Bon river system, located on the hill side to the east of Truong Son mountain range and in the west of Quang Nam province. The west of Quang Nam Province is characterized by tropical monsoon features. Under impact by Truong Son range, the west side has different rain regime and hydrological characteristics from the delta area next to the sea in the East. According to report on Meteorological established by PECC1(2010) some typical parameters on climate are as follows:

**Ambient temperature:** Mean annual air temperature varies between 20°C and 28°C; the average minimum temperature is 12°C - 15°C; and the absolute minimum is 8.7°C. The coldest months are December, January, and February. The hottest months are May, June, and July with average temperature 26°C -29°C, and the absolute maximum temperature rises up to 41°C.

**Wind:** Predominant wind directions in the region vary by season: from May to August are West (W) and Southwest (SW); from September to February the following year is East(E) and South (S). The mean annual wind velocity is 2-3 m/s; the absolute maximum up to 41 m/s.

**Rain:** The rain is distributed in two distinguished seasons of a year. Rainy season starts in September and ends in December, with rainfall in four months contributing up to 70% - 75% of total annual rainfall. High intensity rainfall in the wet season causes many floods that leads to damages of crops and lives of local residents. Results gained from the study show that the average rainfall in the project damsite area is 2,636mm.

Mean annual rainfall of some typical stations in and out of studied catchment is presented in the following table, in which Kham Duc station was chosen in the calculation because this station is the closest to DakPring HPP catchment.

**Table 3-1: Annual rainfall in some stations in the area**

Month	Kham Duc	Hien	Thanh My	Nong Son	Nam Dong	Son Tan	Tra My	SB4 (actual gauging)	Da Nang
$X_{year}$ (mm)	2884	2172	2217	2892	3602.3	2874	4092	2301	2152.2

Month	Kham Duc	Hien	Thanh My	Nong Son	Nam Dong	Son Tan	Tra My	SB4 (actual gauging)	Da Nang
Observation	78-06	79-06	76-06	76-06	74-06	76-06	77-06	03-06	64-06

**Humidity:** The humidity is quite high and stable. The mean annual humidity varies between 82-87%. The maximum humidity occurs in October, November, and December. The absolute maximum recorded is 100% while the minimum humidity is in April – July, with the recorded absolute minimum of 11%.

In general, climate features are suitable for crops and domestic animal raising. However, annually because of drought and floods happening quite regularly, difficulties to production and life of local residents are encountered.

### 3.1.2 Air and Acoustic Environment

The annual environmental report of Nam Giang district and test results by PECC1 and Quang Nam Analysis, Appraisal and Consulting Center on Science Technology, 2010, revealed that the air quality in the project area is good with exceptions of some monitoring points in the project area where air quality is deteriorating due to movement of transport vehicles along the roads QL14D and QL14B as well as other construction activities. However, all parameters are within permitted levels. The test results of samples in March 2010 can be seen in Table 3-2.

**Table 3-2: Test report on air quality in the project area**

Parameter	Location			QCVN 05:2009/BTNMT
	Damsite	Powerhouse	QL14D (Road)	
CO (mg/m <sup>3</sup> )	1.08	1.22	2.09	
TSP (mg/m <sup>3</sup> )	0.15	0.12	0.16	0.2
NO <sub>2</sub> (mg/m <sup>3</sup> )	0.05	0.04	0.04	0.2
SO <sub>2</sub> (mg/m <sup>3</sup> )	0.09	0.09	0.10	0.35
Noise(dBA)	60	55	65	70

Noise levels monitored by CPC are low due to low population density and production activities. The highest noise level of 55-65 dBA is in QL14D due to transportation activities. The level is under applicable standards for public and residential areas (QCVN 26:2010/BTNMT) (See details in Annex of Air, Water and Land quality sampling).

### **3.1.3 Topography and geology**

According to the topographical report issued by PECC1, the Truong Son range in Nam Giang district has complicated mountainous topography with high slopes, strongly divided and sloping from West to East. The area is characterized with the following features.

Topography develops on intrusive magmatic rock of Que Son – Ben Giang complex forming a long lasting arc-shape surrounding the DakPring river valley with the characters of narrow, long watershed line, strongly dividing topography, and thick vegetation cover.

DakPring hydropower project is located in the secondary forest area, which ethnic minority residents using slash and burn cultivation and reforestation. Mountains on both river banks are as high as 300-400m, moderately sloping with rather dense vegetation cover.

The project area including the main dam, spillway, channels, tunnel, surge tank, plant, and tailrace canal has been surveyed and assessed by PECC1 geological team.

At the dam site, there is rock and soil of Ben Giang – Que Son complex. There is a V-4 fault (According to Vietnamese standard No 4253-86, there are 5 types of fault varying from grade I –biggest to grade V) crossing the DakPring dam site area. This small fault that may need some conventional treating measures for the dam's foundation such as concrete filling, etc. The measures applied in other dams are carving and clearing the fault with the dimension of 1.5\*width for both width and depth then replacing and flattening by concrete.

The tunnel alignment is completely made of granite. Weathering process of bedrock is strongly developed, creating unevenly soft soil and weathered soil layers with thicknesses varying from 5-10m and increasing up to 35-40m in tectonic failure zones in the top. The result of this will be an increase in the volume of excavation, requirements for foundation consolidation and support to foundation slopes. The phenomenon of erosion and land slides is common in the top layers, particularly in rainy season, along the penstock and in powerhouse areas.

The reservoir runs along the DakPring steep river valley with 2km long and 200m wide on average. Soil and rock in the reservoir area have low permeability, therefore, there is low possibility of water leakage from the reservoir to another basin.

**Seismicity:** DakPring HPP is located in an area having maximum potential seismic grade I max = 7. In case of the maximum value, it may cause considerable damages.

However, this risk has been considered and included during dam engineering design. This should be review in dam safety periodically during the operational phase.

**Minerals:** There are some small-scale gold mining areas along the DakPring stream but they will not be submerged by the future reservoir nor are they within the construction site.

### **3.1.4 Flooding condition and hydrological regime**

Bung river is a large left branch of Vu Gia- Thu Bon river originating from the high mountain with elevation of 2,598m in the Laos – Vietnam boundary. The river flows from North-West to South-East in Nam Giang district and joins the Vu Gia- Thu Bon river in Hoi Khach. The main branches of Bung river are Tam APout, Tam Paete and DakPring.

Due to topographical features, most rivers are steep and short. In the rainy season the water rises very fast, with strong flow, causing flash floods. In the dry season, the rivers dry up causing drought that influence the agriculture and life of the people.

The flow regime on Vu Gia – Thu Bon river system is divided into two seasons. Flood season starts from September and ends in December with flows comprising from 65% to 75% of the total annual flow. Maximum flood during the year occurs usually in November. Dry season lasts from January until September with dry flow corresponding to 25%- 35% of total annual flow. The minimum flow normally occurs in March, April, July and August depending on the variation of rainfall intensity. Hydrological calculation on annual flow and flood flow is in the following tables.

**Table 3-3: Monthly average flow at DakPring station** Unit : m<sup>3</sup>/s

Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual
1977	9.48	7.31	5.92	4.08	3.28	3.03	2.74	3.59	6.04	9.49	37.26	9.51	8.48
1978	11.02	6.04	6.53	4.71	6.98	5.24	7.05	6.99	23.77	22.05	33.16	32.90	13.9
1979	11.71	6.54	4.29	3.38	5.05	21.66	7.81	7.84	6.77	25.50	35.21	18.39	12.8
1980	10.73	7.51	4.59	3.75	6.12	13.57	8.35	7.13	19.08	47.75	88.04	24.03	20.1
1981	15.14	10.60	6.56	6.20	8.46	10.03	7.10	5.43	6.19	78.18	86.82	44.90	23.8
1982	13.13	7.68	4.87	4.80	3.29	4.11	3.33	2.73	14.24	6.65	9.06	4.67	6.55
1983	5.46	3.56	2.67	2.15	2.86	5.32	4.16	7.09	6.73	47.28	47.24	16.22	12.6
1984	11.48	8.70	5.78	5.69	6.30	9.50	4.76	5.76	6.69	37.57	52.41	28.82	15.3
1985	13.75	8.40	5.57	5.63	7.34	13.19	6.15	4.81	12.04	22.00	45.48	39.77	15.3
1986	14.68	8.39	5.83	4.57	8.58	5.40	4.72	5.70	4.22	43.33	27.15	48.17	15.1
1987	13.38	8.72	6.47	4.45	3.86	4.64	3.14	6.57	14.53	6.54	31.14	15.31	9.90
1988	12.01	8.62	6.52	4.91	6.65	6.78	7.69	4.96	8.01	63.51	40.51	26.22	16.4

1989	19.69	8.79	6.50	4.32	11.73	7.97	7.74	6.99	8.54	10.22	16.31	12.66	10.1
1990	7.50	5.87	4.87	3.82	8.65	5.55	4.74	6.81	10.49	102.72	86.58	29.84	23.1
1991	11.81	8.43	6.94	6.87	6.68	5.82	5.80	6.93	7.22	31.41	21.06	27.70	12.2
1992	13.48	7.56	5.46	3.99	5.36	6.53	4.79	12.88	12.03	70.25	52.67	25.22	18.4
1993	13.08	7.87	5.85	4.78	5.18	4.60	4.99	3.94	7.06	23.75	26.48	58.84	13.9
1994	14.87	7.96	6.42	5.95	6.00	5.26	5.90	6.20	20.39	19.28	29.28	28.01	13.0
1995	12.80	9.74	6.00	4.17	4.69	3.98	5.31	6.30	12.52	73.10	81.54	45.05	22.1
1996	20.64	15.05	8.41	7.28	12.54	13.31	9.45	8.08	22.83	96.98	142.70	91.78	37.4
1997	24.16	13.71	9.23	9.12	9.84	5.95	5.69	5.24	32.27	20.12	31.54	14.54	15.1
1998	8.00	5.82	4.13	3.53	4.31	3.10	3.25	4.19	11.16	24.53	128.86	58.85	21.6
1999	33.84	19.84	15.27	13.40	21.67	22.83	13.48	12.43	10.33	43.37	123.20	88.07	34.8
2000	26.76	20.59	10.22	14.20	18.57	16.03	16.56	27.23	17.54	68.76	103.75	68.02	34.0
2001	24.43	14.28	12.27	8.30	13.01	8.20	5.66	11.05	10.20	28.66	23.00	23.11	15.2
2002	16.29	11.31	9.49	9.00	10.34	9.97	7.50	14.95	46.30	40.25	30.82	20.42	18.9
2003	12.59	10.83	8.64	8.43	10.13	13.55	15.52	17.49	27.52	29.23	23.04	31.41	17.4
2004	14.00	7.95	6.25	6.11	5.73	13.00	7.28	11.24	12.46	16.75	44.02	23.00	14.0
2005	9.02	6.20	5.32	4.32	4.18	3.45	4.80	6.47	25.98	49.13	41.79	49.05	17.5
2006	21.41	13.98	9.90	7.98	8.12	5.87	7.83	9.55	20.96	45.10	19.83	42.33	17.7
2007	22.35	10.66	7.55	5.90	10.13	7.90	5.96	8.60	8.11	60.16	123.70	58.53	27.5
2008	15.62	11.55	10.33	9.25	11.20	6.55	6.58	8.67	13.85	48.63	63.50	32.21	19.8
2009	28.87	11.42	8.91	10.35	15.66	8.86	7.30	7.00	65.90	45.07	55.56	23.69	24.0
Average	15.6	9.74	7.08	6.22	8.26	8.51	6.76	8.21	16.1	41.1	54.6	35.2	18.1

Source: Appendix 1B of Adjusted FS report of “Dak Pring HPP”, PECC1 – 1/2013

**Table 3-3: Mean annual flow at design frequency**

Study site	Average values			Design annual discharge (m <sup>3</sup> /s)		
	Q (m <sup>3</sup> /s)	Cv	Cs	10%	50%	90%
Dam site	18.1	0.436	3.0Cv	28.7	16.5	9.80

Source: Updated FS report of “DakPring hydropower project”, PECC1 – 2010.

**Table 3-4: Design flood discharge to DakPring (Unit: m<sup>3</sup>/s)**

Frequency (%)	0.2	0.5	1.0	2.0	5.0	10.0
(year)	500	200	100	50	20	10
Dam site	5245	4412	3801	3239	2542	2063
Powerhouse site	5261	4426	3812	3248	2550	2069

Source: Updated FS report of “DakPring hydropower project”, PECC1 – 2010.

### 3.1.5 Silt flow and reservoir sedimentation



The results of load measurements at the hydrological gauging stations found that the mean annual suspended load in the long-term on Vu Gia – Thu Bon river system varies between 59 and 242 g/m<sup>3</sup>, and mean annual in the long-term  $\rho = 150 \text{ g/m}^3$ . The calculated load turbidity at dam site is 150g/m<sup>3</sup>.

According to estimates of PECC1, with FSL 287.00m, the deposited sediment volume in reservoir as estimated using the Brune method will be  $0.795 \times 10^6 \text{ m}^3$  at elevation of 276m after 30 years and the volume will be  $1.99 \times 10^6 \text{ m}^3$  at elevation of 282.7m after the 75 years.

### 3.1.6 Surface water

Nam Giang has abundant water resources with densely distributed rivers and streams. Average discharge of some streams such as Bung river is 60 m<sup>3</sup>/s; Thanh river is 30 m<sup>3</sup>/s; Cai river is 80 m<sup>3</sup>/s; and A Mo river is 35 m<sup>3</sup>/s. The DakPring river has an average discharge of 30 m<sup>3</sup>/s.

Water quality of DakPring river in the project area has no sign of pollution by physical-mechanical components and heavy metal, although has been polluted by micro organism such as Coliform, E coli (within allowable limits) and high turbidity in some locations (see details in Table 3-4).

**Table 3-4: Surface water quality**

Parameter	Location			QCVN 08:2008 (A2) (mg/l)
	At a stream in the middle of dam and powerhouse	At river dam downstream	At river dam upstream	
pH	7.1	7.0	6.5	6-8.5
Temperature	21	21	22	
TSS	33.0	53.8	51.9	<30
DO	6.8	6.3	6.5	$\geq 5$
BOD5	1.2	4.21	1.5	<5
COD	2.0	5.8	2.4	<15
NO <sub>3</sub> - - N	1.0	1.89	1.22	5
Phosphate -	0.02	0.08	0.05	0.2
Hg	KPH	0.028	KPH	0.001
Pb	KPH	KPH	KPH	0.02
Total N	2.3	3.1	2.6	-
Total P	0.06	0.11	0.10	-



Total Coli form	460	1300	1100	-
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Note: Sample results tested by Quang Nam Analysis, Appraisal and Consult Center on Science Technology, 2010.

### 3.1.7 Groundwater

Groundwater level in the area is high during the rainy season. As observed from the wells of local residents, the water table in the region varies between 5-10m (depth of well 7-12 m). Some wells which are domestic wells of local residents have been polluted with arsenic from 0.0005-0.0015mg/l but still under allowable limit (0.05mg/l) (Source: DoNRE of Quang Nam province).

Two groundwater samples have been taken at houses in Ta Un and Can Don villages near the project site. The results show good quality of groundwater in these sampling stations as in the table under.

**Table 3-5: Groundwater quality**

Parameter	Location		QCVN 09:2008/BTNMT (mg/l)
	NN1 At Ta Ul village	NN2 At Can Don village	
pH	6.37	6.53	5.5-8.5
Temperature	21.5	21	
TDS	122	156	1500
DO	6.7	5.9	
BOD5	1.10	0.9	
COD	1.61	1.58	
NO <sub>3</sub> - - N	1.23	0.98	15
Phosphate - P	0.08	0.05	
Hg	NA	NA	0.001
Pb	0.003	0.002	0.1
Total N	1.58	1.98	
Total P	0.1	1.1	
Total Coliform(MNP/100ml)	1	NA	3

Note: Sample results tested by Quang Nam Analysis, Appraisal and Consult Center on Science Technology, 2010.

## 3.2 ECOLOGICAL RESOURCES

### 3.2.1 Protected Area

The Song Thanh Nature Reserve was established by Quang Nam Provincial Forestry Protection Department (FPD) and approved by MARD in 1999. The core zone of the nature reserve is located about 2km away from DakPring HPP(**Figure 5**). The DakPring HPP is located within an area classified as buffer zone of the Song Thanh Nature Reserve. The total area of the Reserve is 93,249 ha and a buffer zone of 108,398 ha is defined.

The Reserve has high biodiversity value with 95.3% of the core zone (88.897 ha) considered as natural evergreen broad leaves forest. The Reserve recorded 931 high plant species, including 23 endemic species and 49 species listed in Vietnamese Red Book or IUCN Red Book. The Song Thanh Nature Reserve is contiguous with Ngoc Linh (Kon Tum) Nature Reserve to the south, and the Lao border to the west. It is part of one of the largest areas of contiguous conservation coverage in Vietnam (Le Nho Nam 2001). From a regional conservation perspective, Song Thanh Nature Reserve is an important link in a chain of natural habitat in the central Annamite mountains.

**Table 3-6: Structure of wildlife species in Song Thanh Natural Reserve**

<b>Species</b>	<b>Natural reserve</b>	<b>Investigated results</b>	<b>Vietnamese Red Book</b>	<b>IUCN Red Book 2002</b>
Mammal	53	25*	14	10
Bird	183	108	12	2
Reptile	44	25	11	2
Amphibian	21	12	4	
Fish	-	10		
Butterfly	-	106		

Source : VESDEC– March 2005

Even if the Reserve has high biodiversity, the uncontrolled exploitation of forest to meet a variety of purpose such as burning forest for cultivation, timber logging, collecting forest product and firewood cause adverse impacts to the Reserve's biodiversity with reduction of the faunal species and number of individuals.

An operational management plan was prepared for Song Thanh in 2003 by the Nature Reserve Management Board, with technical assistance from the World Wildlife Fund (WWF), Quang Nam Provincial FDP MOSAIC Project. Following the development of the management plan, a series of activities were implemented in the buffer zone including conservation education, land allocation to local communities with co-management agreements.

### **3.2.2 Flora**

The following vegetation types are present in DakPring river basin: (1) Natural vegetation; (2) Secondary vegetation; (3) Grass land and shrub (4); Bush mixed with bamboo- poor secondary forest; (5) Slash and burn area and crops on slash and burn field.

Natural forest is characterized as evergreen tropical forest with many rare species. Timber consists of peck-wood and parashorea. There are also many herbal species with economic value such as ginseng, amomum, aloe wood, araliaceous bark and other forestry product such as rattan.

The Nam Giang district has forest land rate of 49.16% with a continuously reducing trend due to deforestation for cultivation of pineapple and industrial trees. The rich forest area occupies about 45% of the land, of which the remaining percentage is medium and poor forests. Cha Val commune remains a forested area of 3311ha, making up only 25.7% of the natural land area in which there is 3260 ha of natural forest and 51ha of plantation forest.

### **3.2.3 Fauna**

Natural forest is characterized as evergreen tropical forest with some rare wildlife species such as elephants, tigers, bears, and monkeys. But in the buffer zone of the Song Thanh Nature Reserve and the project area, these big animals could not be found based on interviews with local residents conducted in May 2010. Small wild animal species identified by the resident include muntjacs, civets, wild pigs, weasels and some reptiles and insect species.

### **3.2.4 Aquatic life**

According to VESDEC, there are 10 species of fish in Song Thanh Nature Reserve, but none are considered rare species. In the river section of Cha Val commune, from interview results, there are popular kinds of fish which can be found in nearby tributaries. 50% of local people catch fish as a food source in this river, but few people rely mainly on this as a protein source due to low productivity. There are some fish farms (ponds) in the area.

There is no information on migrating fish in the river passage of the project site. However, the dam will prevent migrating aquatic species (if any) from downstream to upstream.

### **3.3. SOCIAL ECONOMIC CONDITIONS**

#### **3.3.1. Nam Giang district**

##### **Population and Labour**

Nam Giang is a high and mountainous district of Quang Nam province, some 120km NW of Tam Ky town, and 70km SW of Da Nang city.

Nam Giang district had a population of 22,990 people in 2010, with a natural growth rate of 1.85%. (2009). The population density is low, at around 12.2 people per km<sup>2</sup>, but unevenly distributed in the area. The communes that have high population density are Thach My town, Cha Val and Ca Dy. On the other hand, DakPring and Zuoi are the communes with low population density, of only 3.0 to 6.2 people per km<sup>2</sup>.

The majority of the people are the ethnic minority group of Co Tu. There are also some people belonging to the Gie Trieng or Kinh group. Ethnic minority people who are familiar with shifting cultivation still have difficult living conditions. Even with extra help from the 'hilly and productive forest farm' models, many still struggle. Until now, most shifting cultivation have largely been stopped, although some slash and burn cultivation still occur on a small scale.

Population and labor force in the district is abundant, and local residents are generally hard working. However, health condition is poor due to low living standards and poor sanitation. The level of professional and technical skill is also low.

53.3% of the population who were in the working age constitute 11,977 people in 2009, in which most common work is in agriculture and forestry (89.54% in 2006), with some small percentage in industry (3.61%) and service (6.85%).

##### **Infrastructure**

Besides the QL 14D which connects Thanh My town to the Viet-Laos border, there are good quality roads accessible to most commune centers (7/9) in the rainy season. The other communes use temporary hanging bridges over the river which are only accessible by pedestrian and small vehicles.

Only 20% of the total cultivated land area is irrigated by weir and canal system in the district. Water is not used for irrigation in the dam section of DakPring river between the dam and powerhouse.

In 2009, there are 5 out of 9 communes and towns in the district connected to the power grid. In some isolated communes, small hydro systems are used to provide power to small groups of 3-5 households with a capacity of 0.5-1KVA. Post offices are available at all communes.

The percentage of people using potable water connections is a low with 60%. The remaining percentage acquire water directly from small streams for domestic use. This causes poor health conditions and increasing risks of acquiring diseases.

### **Housing**

Traditional house of Co Tu ethnic minority people is stilt houses made of bamboo, straw and leaves which protect them from dangerous wild animals. Presently, Co Tu people started to build conventional houses on ground with different materials, such as cement ground (very few), compacted soil, bamboo, timber or brick wall or tin roof depending on a household's wealth.

Living standards as well as house quality in Thanh My town is better than in the rural areas. Kinh people normally build houses with timber, a cement ground, and iron roofing.

### **Poor Families**

Percentage of poor families in the district is high with 2,642 households, making up 55.23% (under standard of stage 2006-2010). Ethnic minority people make up half (50.4%) of total poor households.

#### **3.3.2 Cha Val commune**

### **Population and labor**

Cha Val commune has 6 villages: Ta Ul, Can Don, Abat, Adinh, Labo A and Labo B.

As of December 2009, Cha Val has 562 households 2,359 people (female population constitutes 49%), in which the Kinh households takes 7.5%, Co Tu 87%, Gie Trieng 4.6% and others 1.1%. The natural growth rate of Cha Val commune is 2.04 (2009). The number of population in the working age takes up a total of 53.3% of the commune's population.

### **Economy**

The number of poor households decreased in the period of 2005-2010. This is because of a strong change in the socio-economic condition in Cha Val commune, although the number of struggling households are still high because new methods and technologies have not been applied in agricultural cultivation. The main income of most households mainly come from forestry and crop cultivation.

In terms of culture and communication, there is limited telephone connection and newspaper circulation in the commune, especially in the area without electricity.

Equipment for healthcare services and education are poor.

### **Agriculture**

Cha Val is the second largest annually cultivated land among other communes/town in the district. The agricultural crop such as rice, corn, cassava, and beans, comprises more than 99%. Other plants such as sugarcane is limited.

Villages develop subsidiary crop by alternately cultivating corn and beans. Many families earn from 15,000,000 to 20,000,000 VND/crop.

### **Animal Production**

Based on statistical records (August 2009), Cha Val has 19 buffaloes, 589 cows, 731 pigs, 2700 chicken. Cha Val commune established some animal husbandry area in Abat, Can Don, Ta Un villages and others. In some villages fish farms are developed.

### **Forest**

In the last 5 years, the forestry land area has increased to 10ha/year with tea, rubber, and fruit plantations in both villages and hilly gardens.

### **Service and Trading**

Even though there is no market in the area, some simple services are available for the local people such as knitting and forging. Weaving businesses are developing, in which the products are mainly exported to Dong Giang, Phuoc Son districts. Few households started using electricity for their small knitting production.

Trading does not develop in the commune except for some small home-furniture shops owned only by Kinh people. Co Tu's culture do not allow credit purchase, therefore, trading is not strongly developed.

### **Fishing and Hunting Activities**

There are only a few households fishing along DakPring river, Bung river and Thanh river due to limited natural fish source. Local people are still relying on wild animal hunting as a food source such as wild pig and deer hunting.

### **Transportation, power, water and sanitation**

The NR14D is a good road and affected villages located along NR14D find convenience for the transportation and exchange of products. In the downstream area, roads connecting villages are more accessible.

Only Can Don village is accessible by car from the center of Cha Val commune. Further down stream, only the Kinh people use boats for fishing and travelling.

Most villages in Cha Val commune have electricity except for 27 households in Bo Dy village.

The people at Ta Un collect their drinking water from piped water connected to side streams above the main DakPring river. The people of Can Don village use wells as a drinking water source. Rice, corn and vegetables are planted in upland hill gardens, using rain water for irrigation. In the area between the dam and power plant, there is no use of river water by local people for any purpose.

Hygiene sanitation in the commune is still poor, with nearby waste dumps and unqualified latrines.

### **Education, health care, communication**

Education levels of affected villagers are still low. In the villages, most heads of household are men, with education level ranging from none to secondary education level. There are 3 levels of schools in the commune (kindergarten, primary school and secondary school), which provide accessible education to children in the area. The number of children dropping out of school and repeating their classes still remain high.

Health care service for poor families face difficulties because of insufficient staff with only 1 doctor, 3 physicians and 1 pharmacist. Recent years show an increasing number of villagers coming to the commune health center, which is 10km from Can Don and 15km from Ta Un, for healthcare assistance. Diseases and sicknesses commonly reported include diarrhea, enteritis, and colitis which are due to unsanitary habits of local people. Infant mortality rate is high at 0.9%, primarily because mothers seek late medical assistance in the clinic.

A telephone using a satellite receiver operated by solar power is available in the commune post office to communicate within the commune and with nearby areas. Some households have their own televisions. Only few Vietnamese newspapers are available for Kinh people. However, most Co Tu villagers cannot use telephones or read the newspapers due to language barriers, education level as well as their financial situation.

### **Characteristics of household**

The living standard of local people is low, with a high proportion of poor households.

Results of surveys and interviews with the villages (especially Ta Un) found that, there are only a few families living above the living standard, but most of the households are currently living below the living standard, which is 56.56% of the village, which is classified as poor. Cha Val commune has total number of 567 households, in which 315 households are poor.

Each household has 3-6 people, in which mainly the husband is the head of household. Working labor comprises 2.64 person in average.

Most households own semi-permanent houses and few own temporary. About half of the households are using grid electricity for domestic use such as TV, fans, and cassette sand the remaining for lighting only. Two thirds of households have motor bikes for traveling and transportation. Only few households apply new technique in agricultural production; most still use slash and burn cultivation.

Income sources are mainly engaged with agriculture and forestry. Table 3-7 shows the occupations of local people who contribute to household income. Each households has 1.78 sao rice cultivated land(1 sao = 500m<sup>2</sup>) on average. Most households have about 1-3 ha of planted forest. The smallest forest area is 0.5 ha and the largest is 6 ha.

**Table 3-7: Income source of families**

Income sources	Number of households	Percentage % to total number of interviewed households
Husbandry	47	27.5%
Cultivation	55	32.2%
Handicraft	1	0.6%
Hired labor	28	46.7%
Service, trading	4	2.3%
Fishing	1	0.6%
Forest exploiting	43	71.1%
Employee	6	3.5%

Agriculture-forestry-aquatic products are used for needs of local household such as rice, chicken, or for selling as cow, buffaloes, and pig. Local people cultivate 1 crop per year. The cultivation and planting of forest products depends much on (78.4% of surveyed households) natural water sources, resulting in their income to be low and unstable.

Hygiene sanitation condition is still limited due to traditional habit of livestock breeding in the same living area with human. Poor and unsanitary toilet systems cause polluted water and spread disease.



## **CHAPTER4: ENVIRONMENTAL IMPACT ASSESSMENT & MITIGATION MEASURES**

### **4.1.SCOPE OF STUDY**

The scope of this study includes the upstream area of the entire reservoir's catchments to the proposed damsite on DakPring River; construction sites consisting of head work's area and waterway; river section from downstream of damsite to the hydropower plant; and in the downstream of the power plant on DakPring River.

### **4.2.SCREENING OF ENVIRONMENTAL IMPACTS**

As described in Chapter 2, the project will occupy an area of 75.5 ha and will be constructed on DakPring River within Cha Val commune, NamGiang district, Quang Nam province.

Hydropower is a clean, renewable source of energy and reduces pollution, which replaces the alternative use of thermal electricity generation in Vietnam. Therefore, it is considered environmentally friendly. Currently, gas is the main source of energy in Viet Nam (43.7%) with coal also responsible for 14.6% and hydropower comprises 35.3%. Increased hydropower generation will also reduce dependence on importation, in which Viet Nam currently imports fuel sources from China.

Thermal power generation plants are known for a large variety of toxic emissions i.e. carbon dioxide (CO<sub>2</sub>), particulate matter (PM), sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO), and nitrogen oxides (NO<sub>x</sub>).

The following table provides a comparative analysis of estimated emissions of CO<sub>2</sub> from a power station generating the same amount of energy over a 30-year period using gas & coal as a fuel source. Discharges of between 0.36 and 0.70 million metric tons of carbon dioxide are saved over a 30-year project life by using hydropower rather than fossil fuels. The DakPring HPP project will therefore contribute to reduction in carbon emissions by avoiding the alternative burning of fossil fuels.

**Table 4-1 : Comparative Analysis of CO<sub>2</sub> Emission using Gas & Coal Generation over 30 Years**

	<b>Gas</b>	<b>Coal</b>
Metric tons CO <sub>2</sub> /Gwh discharge	385	755
Total Discharge (million metric tons CO <sub>2</sub> ) generating 923.1Gwh	0.36	0.70

Note: 1) Assumes generation of 30.77 GWh per year over a 30 year project life = 923.1 Gwh. 2) CO<sub>2</sub> discharge factors from Oxford Resource Group figures.

Construction of DakPring hydropower project will cause some positive and negative impacts to the natural environment as well as society. Benefits of the project construction are to electricity generation, and indirectly, increased water resource supply for agriculture, fishery development, and local travel. However, apart from the benefits, shows that the formation of reservoir also will cause adverse effects such as land submersion, resettlement for affected people, and ecosystem changes.

Initial assessment of potential environmental impacts as well as proposal for the mitigation measures of the project are carried out for the three stages of the project: Pre-Construction stage, Construction stage, and Operation stage. The environment impacts of the project are based on consideration, analysis and assessment of project's information, current natural environmental and socio-economic status of Nam Giang district, as well as Cha Val Commune.

The potential environmental impacts created by the project are screened using the ADB Rapid Environmental Assessment (REA) checklist attached in the Annex (see Annex).

#### **4.3. CLASSIFICATION OF IMPACTS**

From the technical aspects and location of the project, the impacts of DakPring HPP project on the environment may not be complicated. Therefore, the methods applied in this study are mainly based on assessment, checklist, matrices and network. No environmental model is necessary for quantifying. After the screening of the potential impacts, these impacts will be assessed and classified.

During the construction stage of DakPring HPP project, the major sources of impacts originate from (1) clearance, grading and leveling activities of the construction site, (2) Construction of the camps and concentration of workers in the area, (3) Establishment of the site for construction and waste dumps, (4) Activities relative to exploitation and transportation of construction materials, and (5) Filling, excavation and construction activities of major and temporary works.

During the operation of the power plant, the impacts are mainly caused by (1) formation of a dam and reservoir, (2) changes in the flow regime of the power plant operation; and (3) presence of operation worker in the watershed.

The anticipated negative environment impacts are classified into five categories, as follows: (1) a major impact can change an element of the environment or create a strong environmental modification. Those impacts can strongly affect an environmental component and/or large group of the population. (2) an intermediate or

medium impact can significantly change the various elements of the environment and intermediately affect an environmental component and/or a group of the population (3) a minor impact can slightly change value use of an environmental component and slightly affect on a small group of the population. (4) Some activities of the project may not cause evident impacts. In such cases, the assessment will not be detailed but some commentaries will be given. This type of impact is identified as “not significant” or “no impact”; (5) some activities of the project may cause some impacts but the magnitude of the impacts can not be predicted. This type of impacts is identified as “unknown impact”.

Beside the impact classification, each type of impact may be assessed as “mitigable”, “controllable” or “uncontrollable” or “local” “temporary” “short-term” depending on the intensity and scale of the impacts.

Based on the impact classification in the impact assessment, different measures will be recommended to mitigate the negative impacts, including:

- No impact and no significant impacts: These impacts do not need to have measures for mitigation.
- Minor and medium impacts: For this type of impacts, the appropriate measures for mitigation should be developed.
- Major impacts: It is necessary to have a more detailed information and quantification of impacts, and measures for mitigation have to be designed more carefully during project preparation and construction.
- Unknown impacts: It is necessary to have further study to know the nature and scale of the impact.

**Table 4-2: Chart of environmental impacts**

	<b>Direct impacts</b>	<b>Indirect impact</b>	<b>Impacts</b>
Pre-construction	Relocation of areas of cultivated and forest land; clearance of construction site with some loss of habitat: Negative, medium	Social problem: Negative, medium, mitigable Ecology problem: medium	Impacts on local socio-economic problems: minor, mitigable
Construction stage	Air, noise, vibration pollution: Negative, medium, mitigable	Health problem: Negative, minor, mitigable	
	Soil and surface and ground water pollution: Negative, minor, mitigable	Health problem: Minor, mitigable Aquatic ecosystem: Minor, mitigable.	
	Influence to movements of people: Negative or positive, minor		
	Relation between worker and local people: Negative/positive, minor	Social conflict: No impact Disease transmission: Minor, mitigation	
	Labor accidents: Negative, medium, mitigable	Health problem: Negative, minor, mitigable	
	Impacts on biological resources plants and animals: Negative, medium, mitigable	Loss of wildlife due to constructive activities: Medium	
Operation stage	Pollution created by vibration, waste, soil erosion: Minor/medium, mitigable Water-related diseases: Minor, mitigable	Health problem of worker: Negative, minor, mitigable Public health and safety: Minor, mitigable	
	Incorrect operation may cause flooding in the downstream: minor, mitigable	Threat to life and economy: Negative, minor, mitigable	
	Loss of flow to DakPring river between damsite and powerhouse; Medium, mitigable.	Social and ecological problem: Minor, mitigable	
	Loss of sand taking business down stream;	Loss of local business activity.	
	Potential for more pressure on the Song Thanh Nature Reserve with access roads to area and some loss of habitat for wildlife. Availability of more regular supply of electricity to saw mills in the project area and taking of timber from core area of reserve	Threat to endangered species and wildlife: Medium, mitigable	

#### **4.4. ENVIRONMENTAL IMPACTS DURING CONSTRUCTION PHASE**

##### **4.4.1 Impact on the natural environment by project construction site**

The project will occupy an area about 67.5 hectares, in which land area is used mainly for secondary forest, shrub and grassland with some area for agricultural crops (maize and rice).

Cha Val commune, where the project will be constructed, has a number of wildlife species (wild boar, monkey, etc), some reptiles, amphibians and birds. DakPring Reservoir with an area of 36ha at Cha Val commune will be flooded permanently, in which 9% of area is secondary forest and restoration forest after slash and burn activities. This could cause damage to habitats of various wildlife species. Such negative impacts on biodiversity is assessed as medium because the forest area of the entire project to be cleared is small (4.6 ha) compared to total forest cover all DakPring River catchment of about 8100ha.

##### **4.4.2 Impact on project affected households (PAHs) and land use**

At the proposed dam and plant construction areas of DakPring HPP project, some households will be affected with loss of land, but no households have any damage to houses. No public infrastructure facilities (school, office, temple, electrical tower, postage, well, and telephone line) are found in this area and no graves are affected by the construction site and reservoir.

According to the report of investigation, damage assessment and plan done by PECC1 in March 2010, the total permanent and temporary land area (temporary use land area is about 30 ha) used for reservoir and construction layout is 75.5(ha) in which 67.5 (ha) is for land and rivers and streams; and 8 (ha) is for other land to be occupied by the project facilities. There are 65 households who will be affected due to acquisition of this land area, of which 44 households will lose land permanently and 21 households will only lose land temporarily. The households affected by land acquisition covers about 30% of the total area. Land acquisition will affect the income of these households.

**Table 4-3: Affected land area by the DakPring HPP Project**

Chaval commune	Occupied land area (ha)				Number of households affected on land
	Total	Swidden land	River and others	% compared with total land (%)	
Ta Un village	12,5	12,5		0,1	28
Can Don village	63,0	55,0	8,0	0,47	37

Total	75.5	67.5	8.0		65
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A transmission line with 10 km in length connected from DakPring hydropower plant to 110kV substation will affect approximately 9ha of land area which will be used for constructing the foundation and corridor of electricity transmission lines. There are no local households in the areas needing resettlement. (Source: Updated FS report of “DakPring hydropower project”).

The project owner will implement the compensation plans for crops and income loss of affected people based on the regulations for compensation, allowance and resettlement to ensure living standard and production activities of local people in the project area.

#### **4.5. ENVIRONMENTAL IMPACTS DURING THE CONSTRUCTION STAGE**

##### **4.5.1 Increased air pollution**

Air pollution during the construction stage may be generated by the following factors:

(1) Dust from earthwork of main headwork work site, headrace channel, access road and construction road, mining materials and installation of transmission and distribution lines, (2) Dust from transportation of construction materials such as: sand, stone, and cement, (3) Exhaust emission containing dust, SO<sub>2</sub>, NO<sub>x</sub>, CO, and other gaseous emission from construction machines/equipment.

Earthwork and transport of materials in the construction layout site will generate dust. However, DakPring project’s layout is located rather far (from 1 to 3km) from the residential site, so the main affected people should be machinery/vehicle drivers and workers participating in the activities on site. Increasing dust levels are not expected to affect to closest residential area of Ta Un village.

Transportation of materials such as sand, steel, iron, cement and equipment for the project will use existing National Road No. 14 which is about 47 km in length from Nam Giang to the project site. Exhaust emission from vehicles and dust from material will affect some households living near traffic road (at a distance of less than 30m) such as Vinh village in Ta Binh commune and Ta Un village in Cha Val commune. In case of dry and hot weather, these impacts of dust and exhaust emission will be more significant.

Exhaust emission from construction equipment (concrete mixer, compactors, generators, etc.) and construction trucks generate CO, SO<sub>2</sub>, and other gaseous exhausts. However, the concentration of pollutant will be within the permitted level sata distance of more than 100m. Pollution by waste gas will affect workers on site.

However, those impacts are expected as not significant since the construction site is wide and open and the generated exhaust emissions from these equipment can be easily dispersed. From monitoring data of many construction sites in Viet Nam in normal weather conditions, the impacts on air quality is considered to be localized (only within construction site) and temporary (within construction period) and mitigable through management and technology measures.

#### **4.5.2 Impacts from noise and vibration**

The level of noise and vibration may increase during the construction time by using explosives and operation machineries and from heavy trucks transporting construction material and equipment.

##### Noise and vibration sources due to use of explosives

Quarries, drilling and digging areas have to use explosives in the construction process. The type of explosives to be used is explosive of Amonit AD1 (Rock – Blasting Ammonite) or emulsion explosives (NT13 and NT31). Noise and vibration will be created by using explosive materials that may directly affect workers and the nearby residential areas. However, the project will utilize rock resource from earthwork, excavation pit, and chamber, so the amount of quarry excavation is not large. The tunnel is located far away from densely populated areas. The impacts of noise and vibration to residential areas are expected to be minor but could affect wildlife.

##### Noise from transportation road

The major transport vehicles to be used during construction include heavy trucks, cranes vehicle, shovels, and bulldozer. Since the construction site is located about 1 – 3km from residential areas, the significant impacts of noise from movement of transport vehicles will be received by the vehicle controllers and construction workers on site.

During the construction time, vehicles transporting sand and cement, steel and iron from Thach My to the work sites will create noise for residents living along the National Road No. 14D, with a distance about 30m from the edge of the road on both sides.

The impacts of noise and vibration from construction vehicles are expected to be minor and mitigable.

#### **4.5.3 Surface water pollution**

Sources of surface water pollution during construction phase are: (1) Domestic waste from worker camps; (2) Wastewater from the construction and production areas:



concrete, car repair station/motor pool; (3) Soil erosion; and (4) haphazard disposal of excess soil/excavation spoils.

The estimated number of labor force present in the construction phase averages 500 people during the peak period (about 4 months) and will gradually reduce to about 300 workers on average. The daily volume of domestic wastewater generated from the workers camp may reach 1.2l/s. Wastewater contains high concentration of organic matter, suspended solids, nutrients, bacteria and other pollutants which can contaminate water surface of DakPring river and groundwater in this area.

Solid wastes will also be generated by workers in the camp site. The average amount of solid waste is 150kg/day. Solid waste that is not properly collected and disposed can contribute to soil and water pollution, uncomfortable odors, and loss of aesthetic.

This impact is assessed as negative but it is local, temporary and mitigable.

Runoff water flowing through the construction site will bring with it soil, sand, oil, garbage and other materials which often has high turbidity, suspended solids (SS) content and possibly small amount of oil and grease, hence, it may contaminate the surrounding land and soil of DakPring river. This impact is expected as medium, temporary and mitigable.

Soil erosion generated during the construction phase from earthwork activities, vegetation clearing of construction areas and access routes to the construction site will impair rich soil and increase turbidity in the river and streams basin in the rainy season. Therefore, the impact of soil erosion may be assessed as negative and at medium level but it is mitigable.

#### **4.5.4 Impacts on biological resource**

##### Loss of terrestrial habitat

At present, about 23% of the DakPring River catchment area is covered by medium evergreen forest. Secondary forest area behind slash and burn culture activities cover approximately 34%. Shrub and grassland area accounts for 21.36% of catchment area. A flooded forest area by the reservoir will reduce the natural habitat of wild animals like monkeys, deer, boar, etc. Loss of the forest biomass may contribute to soil erosion, water pollution and the other cumulative impacts. It is estimated that DakPring's reservoir will flood about 4.6ha area of the secondary forest (about 0.05% of secondary forest area in the catchment's area) and 23.4 ha of grassland, and land area mainly of bamboo (accounting for 0.4% of shrub and grassland area in the catchment). The remaining flooded area of 8 ha is water surface. The impacts on the

ecological environment are forecasted as follows:

The negative impacts due to vegetation clearing are considered to be minor because the area to be cleared is small (4.6 hectares) compared with the total forest cover in whole district (8,100 hectares) of secondary forest in whole catchments of DakPring River.

The secondary forest that will be affected by the project is a small part of the large forest extending some tens of kilometers from the project site to another site. These areas are the buffer zone of the Song Thanh River Natural Conservation area. Land is used temporarily for the construction of the dam and power house. Most of the land required is already cleared and used for agriculture, downstream of dam and upstream of the power house site has some natural forest and forest gardens of villages (fruit trees and plantation trees). There will be impacts on animals in the buffer zone of the park.

#### Hunting of fauna

Increased hunting of wildlife will occur in the surrounding forest area due to presence of construction workers at the construction site. However, the relatively small area that the project will cover, short construction period along with mitigation measures that will be implemented and due to the mobility of animals in the wild, the anticipated impacts to such resources are considered to be minor and mitigable.

#### Impact on aquatic resources

Turbidity and pollution runoff may cause adverse impacts on the aquatic resources. According to experience in other projects, implementation of good construction camp management measures will not result to the runoff of wastewater to water sources and these are not expected to contain hazardous substances significantly. The main impacts on the aquatic resources is normally due to high turbidity. The impacts on aquatic resources are expected as minor due to small local fishery resources and temporary only during the construction stage.

#### **4.5.5 Damage to existing roads and traffic congestion**

Trucks that will be used in transporting materials will travel the existing National Road No.14D, with length of 47 km connecting Thach My to the project site. Increased vehicle traffic during construction phase may damage to existing road or increase local congestions, and traffic accidents. This impact is considered as medium, temporary and mitigable.

#### **4.5.6 Relation between construction worker and local people**

During the construction time, conflicts between the workers and local people may

arise due to cultural misunderstandings and differences. Almost all the population in Cha Val commune are K'tu minority ethnic group. The construction workers should be instructed to respect the culture of the K'tu and to avoid conflicts with the local people.

#### **4.5.7 Risk to the construction workers**

Accidents may happen to workers during the construction stage (e.g., electrical shock, falling, blasting, knocking and combustion). The level and frequency of these occupational accidents will increase if the regulations on labor safety is not implemented well, the construction machines are not regularly maintained, or workers are not trained about work safety. Because the project is small scale, there is expected limited number of vehicles and workers. This impact is expected to be minor and mitigable.

### **4.6. IMPACTS DURING OPERATION PHASE**

#### **4.6.1 Increased surface and ground water pollution**

During the operational phase, there will be workers and operators that will work at the power plant. The presence of the operators and workers will generate waste matter that includes wastewater and solid waste.

The wastewater will be generated mostly from the office, dining room, and housing of 30 staff (maximum of about 16 people/shift) and lavatory with the discharge of about 1.5m<sup>3</sup>/day, containing high concentration of organic matter, suspended solids, and bacteria that could contaminate surface and groundwater. This impact is assessed as minor and mitigable.

Runoff water may pollute DakPring River from solid wastes such as soil, sand and rubbish, organic matter, and petrol. These wastes can pollute surrounding land area of the hydropower plant. This impact is assessed to be minor and mitigable.

Solid wastes is created from living activities of operation staff (about 10kg/day) and may reduce aesthetic value of the area and create unpleasant odor in the plant area if not properly managed. The impact is assessed as minor and mitigable.

Although solid waste volume are small, these may contain petrol and hazardous substances. Normally, with good management of used oil, this impact is assessed as minor and mitigable.

#### **4.6.2 Changes on hydrological flow regime**

Power generation of DakPring hydropower plant will be based on natural water flow to the dam site and differences of topography (about 14 meters). During the dry season when in flow are smaller than the minimum discharge through the turbine, the power plant will cease generation and store water in the reservoir during off-peak hours and generate power during peak hours.

In the flood season, when daily average inflow is greater than the design discharge ( $28.4 \text{ m}^3/\text{s}$ ), the plant will work at the maximum capacity ( $7.5\text{MW}$ ), and if the reservoir is full, excess water volume will spill over dam continuously downstream. DakPring's reservoir covers an area about  $360,000\text{m}^2$  with storage capacity of approximately  $3.27$  million  $\text{m}^3$ . Average depth would be about  $10\text{-}12\text{m}$ , and the deepest would be around  $22\text{m}$  at the dam site. If the powerhouse is not operating, it will take about  $48$  hours for the reservoir to be filled up with water. In case an annual mean flow is used about ( $Q_0 = 18.35\text{m}^3/\text{s}$ ), it will take about  $20$  hours for the reservoir to be filled up during the rainy season ( $Q_{\text{ave. month 11, 12, 13}} = 44.9\text{m}^3/\text{s}$ ).

In the dry season or when inflows are less than  $29 \text{ m}^3/\text{s}$ , there will be less or no water on the  $2\text{km}$  section of DakPring River between damsite and the power plant. This issue has a very small effect on local livelihood due to their practice of using rain water for domestic purposes and irrigation.

For the environmental aspect, an environmental flow concept has been applied in several countries in the world and in some specific catchments in Viet Nam (based on several studies of JICA - Japan) applied to  $14$  catchments on Vietnam's rivers. However, regulation of discharge to maintain an environment flow varies in each country and in Vietnam currently there is no regulation on environmental flow.

In order to assess the effect of removing or using water from the environment in the river section behind the damsite, we use a Tennant method, assessed based on a discharge percentage of the river flow that remains after it has been regulated, which is necessary for maintaining living aquatic ecosystems. In absence of any specific Vietnamese guideline for the amount of water to be retained in a watercourse when water is extracted from for hydropower purposes, in fact the minimum flows vary from case to case. Some frequency of average flow are proposed or used for minimum flow in Vietnam but average annual flow originally of the method.

**Table 4-4: Flow necessary to maintain the river conditions based on Tennant method**

River maintain objectives	Percentage of average flow (%)		Discharge levels of DR River in dry season( $\text{m}^3/\text{s}$ )		
	Dry season	Rainy season	Min daily flow 90%	3 dryest monthly flow 90%	Average monthly flow
Prominent	40	60	0.88	1.32	3.84
Excellent	30	50	0.66	0.99	2.88
Good	20	40	<b>0.44</b>	0.66	1.92
Moderation or reduction	10	30	0.22	0.33	0.96
Poor or minimum	10	10	0.22	0.33	0.96
Serious reduction	0-10	0-10	<b>0-0.22</b>	<b>0-0.33</b>	<b>0-0.96</b>

According to hydrological calculation- PECC1, the average discharge in low flow season (I-IX) of the Dak Pring River is  $9.6\text{m}^3/\text{s}$ ; The average flow corresponding to a frequency of  $90\%$  of  $3$  dryest months is  $3.3 \text{ m}^3/\text{s}$  and of minimum

day is  $2.2\text{m}^3/\text{s}$ .

In the minutes of meeting to review EIA of Dakpring Hydropower project dated 11 Jun 2012, the Appraisal Board of DoNRE Quang Nam province has recommended the flow retained as 20% of min daily flow according to frequency of 90% ( $0.44\text{ m}^3/\text{s}$ ).

When dam site is constructed, the flow discharge in river a distance about 2km length behind dam site to the hydropower plant will be reduced. In addition to flow endosmosis over the dam is about  $0.006\text{ m}^3/\text{s}$ , and flow of two small stream tributaries enters the river with its discharge is  $0.01\text{ m}^3/\text{s}$ .

Therefore, the 2km of the exit river flow will have a speed varying from  $0.006\text{ m}^3/\text{s}$  (seepage discharge) to  $0.016\text{m}^3/\text{s}$ . Although, this flow will have no effect on the use of water for other purposes but will rather reduce the impacts on the ecological environment of the river after the construction of the dam, especially in the low flow season (according to Tennant method).

Flow at the downstream of the tailrace in DakPring River will also change when the power plant is operated. The discharge flow will change from 8.5 to  $28.4\text{m}^3/\text{s}$  and this figure is greater than the average figure in the low flow season. When the power plant is not operating (which could be up to 20 hours a day) in the dry season, the flow in the river will be equivalent to the environmental flow.

#### **4.6.3 Groundwater level**

The change in the hydrology regime will not cause significant change to water quality in the upstream and downstream portion of the damsite because the reservoir volume is relatively small and water will be recharged daily due to the very short retention period. Initially, there may be some effects such as increased levels of turbidity, nutrients and organic matter,  $\text{CO}_2$  and methane emission, but such conditions are expected to occur in short-term and will soon discontinue.

According to studies taken from existing Vietnamese hydropower plants, groundwater levels at the reservoir's surrounding and downstream will be affected by the creation of the reservoir. At the areas surrounding the reservoir, groundwater levels may rise, but these effects seem to be reduced downstream.

The expected impact is not great, as the volume and daily regulation of the reservoir is small.

#### **4.6.4 Water-borne diseases**

Even though the reservoirs volume is small and has a short retention period (V effect), the stagnant water (at MOL) creates a favorable condition for developing

disease vectors such as malaria and dengue fever. These impacts will be long-term but mitigable.

#### **4.6.5 Emergency cases**

There may be risks of dam failure such as dam cracks, leakage, and stuck gates due to operational errors or poor management. These will affect the infrastructure, agriculture and peoples' lives in the downstream area.

However, the risk is very low and no negative impacts are expected to occur because the storage capacity of the reservoir is small while the dam is well-designed, and safety checks is to be strictly applied. The dam will be regularly inspected during the operation phase.

## 4.7 MITIGATION MEASURES

Mitigation measures will be performed by the project owner and contractors in both construction and operation phases. CPC have the highest responsibility for the implementation of EMP including work done by contractor.

Issues	Mitigation measures and impact management
PRE-CONSTRUCTION STAGE: Implementation of measures to mitigate the environmental impact is a responsibility of the project owner and consultant agency / designer	
Presence of a fault line at the project site	<ul style="list-style-type: none"> <li>- Conduct further geological studies to check effects of the reported fault line to the dam.</li> <li>- Undertake structural analysis of the dam design in consideration of geological hazards like fault and ground movement, landslides, and other seismic hazards.</li> </ul>
Select the construction site and work items	<p>Location of dam site and auxiliary structure area must follow the following guidelines:</p> <ul style="list-style-type: none"> <li>- Minimize the impact on the forest areas and areas to be utilized by construction works such as camps and access road.</li> <li>- Minimize the acquisition of land, especially the agricultural land area.</li> <li>- Avoid areas having historical and cultural value.</li> <li>- Limit impacts on the social living conditions of local residents (minimize agricultural land and locate away from residential area)</li> <li>- Avoid the surface water sources (for auxiliary construction: camps, concrete stations, material storage areas)</li> <li>- Consult with local authorities and communities on the selected site.</li> <li>- Liaise with the Quang Nam Provincial Forestry Protection Board.</li> </ul>
Impact on affected people	<ul style="list-style-type: none"> <li>- Carefully study compensation plans for the affected people owning land, house and assets and those impacts related to the ethnic people; Coordinate with the local authorities and consult with affected people on compensation for damages; and conduct consultation activities with the affected people.</li> <li>- Coordinate with the affected people on damage, compensation period and process.</li> <li>- Provide appropriate compensation methods for the permanent and temporary damages.</li> </ul>



Issues	Mitigation measures and impact management
CONSTRUCTION STAGE: Implementation of measures to mitigate the environmental impact is a responsibility of the project owner and contractor	
Solid and domestic waste management during construction stage	<ul style="list-style-type: none"> <li>- The amount of soil and rock from construction site shall be disposed at locations approved by the local authorities.</li> <li>- The excavated rock and gravel digging shall be utilized for other construction items (30% of them shall be utilized for concrete, road traffic)</li> <li>- Excavated rock and soil shall not be discarded into river bed. They can only be disposed in permitted areas by local authorities.</li> <li>- The storage of solid waste and material (sand, rock) shall be arranged at a site that is at least 100m away from surface water.</li> <li>- Top soil layers that are displaced at the plant construction site, foundation pit, and supply tunnel is rich in organic matter and shall be stored in special areas and covered for planting and landscaping when the project is completed.</li> <li>- No direct discharge of excess concrete into surface water, or burying them in the ground. Maximize the utilization of mixed concrete.</li> </ul>
Impact on forest and vegetation cover	<ul style="list-style-type: none"> <li>- Project owner shall prepare the clearing plan for the reservoir area such as vegetation cover map, calculate slopes and measures of biomass and other substance to ensure the reservoir's water quality after water storage.</li> <li>- Accurate marking to separate forest areas from the construction site, strictly prohibit cutting of plants, trees and other vegetation outside the permitted site: reservoir bed (from altitude of 287m), the scope of construction area, road routes and the corridor for transmission line.</li> <li>- Replanting trees as soon as possible in the project site and auxiliary areas such as: along road routes, canals, camp site, and waste dump.</li> </ul>
Cleaning of biomass from reservoir area and clearance of construction layout area	<ul style="list-style-type: none"> <li>- Local people are allowed to plant within the construction area for their needs on non-construction days when there is no traffic on the site or any blasting activities (when there is no water storage and not in the flood season.)</li> </ul>

Issues	Mitigation measures and impact management
	<ul style="list-style-type: none"> <li>- Large trees should be used for construction in the project and smaller trees and twigs should be tied into piles and given to the locals for fuel.</li> <li>- Project owner shall cooperate with local authorities in cleaning the reservoir bed. Investor shall also examine safety conditions before allowing local people to gather left over cut trees from the reservoir clearing.</li> <li>- Burning of trees for site clearing shall not be allowed.</li> <li>- The remaining of trees after site clearance shall be kept at permitted places outside of the project area for clearance.</li> </ul>
Erosion and sedimentation	<ul style="list-style-type: none"> <li>- Give priority to carry out earthwork and construction activities in the dry season.</li> <li>- On the road routes should run along the contour line. Limit the location of electric post and structure in area with slopes <math>&gt; 30^{\circ}</math>. In unavoidable cases, the construction walls, embankments shall be built to reduce slope failure.</li> <li>- Take measures to reinforce the steep slope (reinforcing, grass planting) to prevent rocks and soil from being carried into the river, as the stream flows through this area which creates higher risk of erosion at the water tunnel and power plant areas.</li> <li>- Maximize usage of pre-fabricated concrete blocks in building the dam.</li> <li>- The waste dump wall and surface must be tightly compacted; form canal to collect the sediment matters into a settling pond; the waste dump backfilling design level shall be covered by soil.</li> </ul>
Traffic and construction vehicle/machineries operation management	<ul style="list-style-type: none"> <li>- Contractors are required to periodically check the technical condition of vehicles and machineries. Only vehicles with full technical certification are allowed to transport materials at the construction site.</li> <li>- The contractors shall use the routes with agreement of the project owner to transport materials to the construction site. Only those vehicles with the size and load consistent with permitted roads conditions in the project area are allowed to ensure no damage to roads and bridges in the project area.</li> <li>- The contractors must take responsibility for repairing all affected roads and bridges caused by transporting of the project's goods and equipment.</li> <li>- Contractors must have appropriate arrangement for traffic management during construction phase</li> </ul>

Issues	Mitigation measures and impact management
	<p>and report to investor for approval before implementation.</p> <ul style="list-style-type: none"> <li>- The vehicles using the construction site are not allowed to leave mud and rocks (fell) on the road. Transport contractors and vehicle owners shall be responsible for cleaning, if there is any trace of material on the road.</li> <li>- Installation of appropriate traffic signs on all routes that enter National Road No.14 from construction site, headwork site, and other related areas.</li> <li>- Provide sufficient information and road safety regulation for the drivers of the construction vehicles.</li> </ul>
Management of hazardous substances (fuel, lubricants, explosives, etc.)	<ul style="list-style-type: none"> <li>- Storage, transportation, and usage of hazardous substances must comply with state and industry regulations (QCVN 02/2008/BCT). The hazardous material must be placed away from water surface area at least 100m. The hazardous substances need to be kept on anti-absorbance surface with good ventilation and need to be blocked and fenced when not in use.</li> <li>- Users must have suitable safety equipment and training for handling hazardous materials and safety rules/guidelines need to be provided.</li> <li>- Ensure that all regular transportation of construction equipment and trucks are within registry period. Lubricant change and regular maintenance for all motorcycles should be done at stipulated place.</li> <li>- Collect and maximize usage of all waste oil in accordance with the process. Do not discard oils into land and water resources.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>- Construction work shall be done in daylight hours only (7h am to 6h pm); In special circumstances when it is necessary to construct at night, the project owner shall report to the authorities and inform the local villagers at least one week before implementation;</li> <li>- The transportation of materials and equipment must comply with laws on road and traffic safety. Limit vehicle speed when crossing residential areas and do not use sirens when passing through schools, clinics and hospitals.</li> <li>- In all activities generating noise with intensity exceeding 75dBA for residential areas (exception of blasting) should apply noise reduction measures following the standards of TCVN 5939:1998.</li> <li>- Workers in the camps are not allowed create excessive noise at night and during breaks.</li> </ul>

Issues	Mitigation measures and impact management
Dust	<ul style="list-style-type: none"><li>- Ensure all machinery, vehicle operators and drivers have valid license for project's activities</li><li>- Provide all appropriate vehicles for transportation of materials (soil, cement, and stones) to minimize dust emission. Ensure that all trucks transporting materials that cause dust from/to the project's area are well covered. Ensure there are no materials falling on the roads.</li><li>- Watering in dusty areas at least twice per day (construction areas and roads) during hot, dry, and windy weather. Especially, road site from Thach My to project site which is near residential areas and other regions with similar condition.</li></ul>
Local road traffic safety	<ul style="list-style-type: none"><li>- Project's owner shall adopt/comply with all traffic safety controlling measures that are undertaken by the investor during implementation of transport contract.</li><li>- Installation of adequate signage systems and compliance with their regulation; only use the roads that have been permitted; Minimize disruption of traffic, ensure safe transport, loading, and unloading of materials and equipment.</li><li>- The transportation of overloaded and oversized equipment shall comply with current regulation to ensure safety of people and existing infrastructure systems.</li><li>- In case of damage to roads and local public structures, the contractors shall be responsible for compensation and restoration to the same condition as initial state or better of the damaged structure.</li></ul>

Issues	Mitigation measures and impact management
Worker's camps	<ul style="list-style-type: none"> <li>- Ensure workers camp meet hygiene requirement and living standard conditions.</li> <li>- Water supply and quality for worker's camps must be permitted and controlled by local authority and must meet the standard requirements.</li> <li>- All types of waste must be disposed and handled according to regulations. Wastewater shall be discharged into ditches.</li> <li>- Wastewater shall be stored in septic tanks and must meet standards of QCVN 14:2008/BTNMT before it flows into the environment. Garbage shall be collected and disposed in permitted areas.</li> <li>- Solid waste shall be collected and buried in the areas permitted by the locality and complied with regulations on the burial of solid waste.</li> <li>- Educate and raise awareness of workers at camp sites to ensure there is no hunting of animals or birds in the buffer zone of the Song Thanh Nature Reserve.</li> <li>- After construction, camp site and facilities shall be cleaned and restored to the original state. Create a program for planting vegetation at the camp site areas with local species.</li> </ul>
Handling when artifacts suspected to have historical, cultural value are discovered.	<ul style="list-style-type: none"> <li>- During earthworks activities and construction, if precious artifacts, of cultural heritage are discovered, the building contractor and owner shall have responsibility to promptly report to the appropriate authorities (Service of local Culture &amp; Information) in order to have appropriate action measures.</li> <li>- Stop all work and activities when any historical objects are discovered. Only resume work when these areas are inspected and cleared by the responsible agency, or after receiving permission from the local authorities in writing.</li> </ul>
Source of materials for the project	<ul style="list-style-type: none"> <li>- The materials for construction works including sand, stone, and concrete shall be from the quarries that have appropriate production processes, approved environmental documents and an exploitation permit, or provided by the contractor with production licenses together with approved environmental documents.</li> </ul>
Animal, forest and vegetation protection	<ul style="list-style-type: none"> <li>- Workers are not allowed to cut trees, hunt or trap animals or fish and must respect regulation of the Song Thanh Nature Reserve Management Plan.</li> </ul>

Issues	Mitigation measures and impact management
	<ul style="list-style-type: none"> <li>- Hunting, selling or capturing rare animals are not allowed</li> <li>- Owner and contractors shall clean the construction area after completing their work, plant trees in the entire project area in order to return the initial landscape.</li> </ul>
Safety and health	<ul style="list-style-type: none"> <li>- Protection of workers and local people from construction accidents is contractor's responsibility. Contractor shall comply with all provisions of GOV (e.g: QCVN 01:2008/BTC, QCVN 02:2008/BTC, Decree no. 106/2005/ND-CP etc.) and locality. Contractor shall apply different methods to avoid accidents such as installation of warning signs, display the traffic safely guide (if necessary). Provide safety training for worker before starting construction work. Supply adequate safety and protective equipment. All workers are required to use safety and protective equipment at work site. Install warning signs at the place of danger. Workers are also required to read the safety rules as well as fully understand the risks. In case of bad weather all the construction work must be stopped and only resume when the weather is completely clear.</li> <li>- Ensure the construction site is cleared from mines and toxic chemicals including: the reservoir, construction layout, access road, auxiliary areas (camps, materials storage, material quarries).</li> <li>- Contractor shall provide medical services and appropriate emergency field team.</li> <li>- Conduct screening of workers who have sexually infectious diseases, especially, HIV/AIDS.</li> <li>- The contractor shall submit a health plan to the project owner two weeks before start of construction.</li> </ul>
Regulations for workers	<ul style="list-style-type: none"> <li>- Issue regulation for workers. This regulation must be consistent with the terms of its commitment to environmental and social safeguards of the project. Prohibition of hunting, fishing; cutting trees; purchasing and using of rare animals; Prohibition of using weapon; drinking alcohol at work; and respect the value of architecture, history and traditional culture of local people.</li> </ul>
Wildlife Protection	<ul style="list-style-type: none"> <li>- Coordinate with the Provincial Forestry Protection Board to assist in the implementation of the Song Thanh Nature Reserve Management Plan e.g. planting program and awareness raising for villages with regard to wildlife conservation.</li> </ul>
OPERATION PHASE- Implementation of measures to mitigate the environmental impact is a responsibility of the project owner	
Noise (from plant)	<ul style="list-style-type: none"> <li>- Turbine and other equipment shall be designed to meet international standards and comply with</li> </ul>

Issues	Mitigation measures and impact management
	<p>maintenance procedures that are approved.</p> <ul style="list-style-type: none"> <li>- Turbine and other equipment shall be located in the brick building and anti-noise glass walls.</li> <li>- Observation of noise level in the plant.</li> </ul>
Change in the downstream flow	<ul style="list-style-type: none"> <li>- Investor shall establish and submit a reservoir operation regime rules for approval and comply with approved rules.</li> <li>- Notify residents in the downstream of the reservoir operation regime.</li> <li>- Take measures to maintain environmental flows at 2km length of the river from dam site to plant site with proposed discharge of 0.44m<sup>3</sup>/s.</li> </ul>
Water quality reduction	<ul style="list-style-type: none"> <li>- Investor shall conduct the clearance of reservoir area before filling water in reservoir in order to meet water standard of QCVN 08: 2008/BTNMT. The works includes: (1) Clearing construction site (2) Clearing mine, bomb, and handling of toxic chemicals (3) Clearing vegetation cover.</li> <li>- Application of other water pollution control measures such as: wastewater treatment, solid waste management and erosion control by planting of grass and other fast-growing vegetation.</li> <li>- Regularly monitoring and reporting of water quality to maintain compliance of water quality with standards.</li> </ul>
Impact on fish and aquatic species	<ul style="list-style-type: none"> <li>- Comply with Decree No. 112/2008 ND-CP regulating management, protection, general exploitation of resources and environment for all reservoirs of hydropower and irrigation system.</li> <li>- Monitoring of water quality parameters related to fish and aquatic species.</li> <li>- In case of eutrophic phenomena occurrence, remove algae from the reservoir.</li> <li>- Herbicide and insecticides shall not be allowed to use.</li> </ul>
Reservoir sedimentation	<ul style="list-style-type: none"> <li>- Protect reservoir from sedimentation caused by erosion in the watershed by planting grass and trees in surrounding areas of reservoir.</li> <li>- Sediments shall be removed regularly through bed discharge or outlet system with stilling basin.</li> <li>- Good catchment management such as control of road construction, mining and other human activities can limit the amount of sedimentation in the reservoir.</li> </ul>
Animals and plants	<ul style="list-style-type: none"> <li>- Operating staff shall be not allowed to cut trees, use weapons, hunting, and fishing in the area.</li> </ul>



Issues	Mitigation measures and impact management
	<ul style="list-style-type: none"> <li>- At least 4.6 hectares of forest shall be reforested.</li> <li>- Liaison with Song Thanh Provincial Forestry Protection Board to assist in implementation of the Nature Reserve Management Plan.</li> </ul>
Health and safety of the operation staff	<ul style="list-style-type: none"> <li>- Operation agency must prepare a health and safety plan two weeks prior to the plant operation.</li> <li>- Staff's health shall be examined periodically and staff shall participate in safety training course.</li> <li>- Safety equipment and protection gear shall be provided and required to be used at work.</li> </ul>
Risk of dam break	<ul style="list-style-type: none"> <li>- Monitoring and maintenance of structure on a regular basis; and provide immediate repair for any damage on dam as well as any part of the construction.</li> <li>- Create a safe corridor for flood discharge.</li> <li>- Develop a flood warning system in coordination with the commune, district and province.</li> </ul>
Health and safety : Regulation for workers; Treatment, transportation, storage of hazardous materials (fuel, explosives, etc.)	<ul style="list-style-type: none"> <li>- Provide safety training for workers. Supply adequate safety and protective equipment. All workers are required to use safety and protective equipment at work site. Install warning signs at the place of danger. Workers are also required to read the safety rules as well as fully understand the risks.</li> <li>- Ensure the plant site is cleared from mines and toxic chemicals including: the reservoir, access road, auxiliary areas</li> <li>- Owner shall provide medical services and appropriate emergency field team.</li> <li>- Conduct screening of workers who have sexually infectious diseases, especially, HIV/AIDS.</li> <li>- Owner shall formulate a health plan during the operational phase.</li> </ul>

## **Chapter 5: INSTITUTIONAL REQUIREMENTS AND MONITORING PLAN**

CPC 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 the Provincial Forestry Protection Board and the Water Resources and Environment Departments at District level, for such activities as implementation of environmental monitoring programs.

The CPC uses its Central Rural Electricity Project Management Board (CREB) to manage projects in rural areas. This Board has a staff of 88 and will be responsible for implementation of ADB projects. It also has experience in undertaking World Bank funded projects but its engineering and support staff have no specific capacity or qualified personnel in the social, environment and resettlement fields. CPC will be responsible for 3 more hydropower schemes under the C1 component of the ADB Loan 2517 sector project and will need to expand its technical capacity. To handle its general environmental responsibilities, CPC and CREB will develop the necessary capacity and allocate manpower to specifically implement the DakPring HPP environmental management plan and monitoring programme.

CPC 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 coordination 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 the Annex.

As CPC 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 an additional part time national Environmental Implementation Consultant who will be directly hired by CPC, to provide technical assistance in the implementation of the environment program and the EMP.

The Implementation Consultant will carry out internal on-the-job training and institutional capacity building for the Environmental and Resettlement Development Cell, thus supporting CPC expertise to implement the EMPs and resettlement plans by itself in the future. The cost for the Implementation Consultant is indicated below along with the monitoring costs.

**Table 12 Annual Estimate for Environment Specialist and Monitoring**

Item No.	Description	Unit	Estimated Amount	
			VND	US \$
<b>A.</b>	<b>Creation of the ESDC</b>			
1	Environment Specialist (ESDC)	Year	195,000,000	10,000

Item No.	Description	Unit	Estimated Amount	
			VND	US \$
2	Environmental Monitoring & Evaluation (ESDC)	Year	250,000,000	12,820
<b>B.</b>	<b>Technical Support to ESDC</b>			
3	Environment Implementation Consultant (part time)	Year	195,000,000	10,000
4	Training, Information Capacity building for CPC/ESDC	Once	58,500,000	3,000
	<b>Total</b>		<b>698,500,000</b>	<b>35,820</b>

## 5.1 INSTITUTIONAL REQUIREMENT

Organization	Responsibilities
CPC / ESDC	<ul style="list-style-type: none"> <li>- The highest responsibility for project management including environmental management.</li> <li>- Responsible for coordinating and directing the implementation of Environmental Management Plan through the ESDC.</li> <li>- Ensure that environmental protection measures proposed in the IEE will be incorporated with the detailed design.</li> <li>- Monitoring of environmental issues and providing budget for environmental protection activities.</li> <li>- Monitor EMP implementation by the contractor and the operating agency.</li> <li>- Review environmental monitoring reports on EMP implementation as submitted by the PMU prior to submission to ADB.</li> <li>- Work closely with the Environment Implementation Consultant.</li> </ul>
PMU	<ul style="list-style-type: none"> <li>- Prepare contractual requirements with contractors in accordance with the environmental impact mitigation measures indicated in the IEE.</li> <li>- Prepare plan for implementation of environmental management activities during construction stage.</li> <li>- Conduct monitoring and supervision of Contractors and reporting of environmental protection issues and incidents to CPC Contract with independent environmental monitoring consultants</li> <li>- Reporting of environmental information to related parties including address, comments and complaints of the local residents.</li> <li>- Report to CPC on EMP implementation.</li> </ul>
Operating Agency	<ul style="list-style-type: none"> <li>- Operating hydropower plant, including management activities and environmental monitoring in operation phase according to IEE report.</li> <li>- Preparing Quarterly report for State management agency on environment</li> </ul>

<b>Organization</b>	<b>Responsibilities</b>
Environmental consultant	<ul style="list-style-type: none"><li>- Preparing IEE including environmental management plan</li><li>- Independent monitoring of the implementation of environmental management plan</li></ul>
Contractor	<ul style="list-style-type: none"><li>- Comply with the regulations for contractor in the IEE during the construction and operation phase</li><li>- Application of mitigation measure during construction</li><li>- Ensure safety for construction worker and local residents during construction phase</li><li>- Internal monitoring and reporting on environmental issues to PMU</li></ul>

## 5.2 ENVIRONMENTAL MANAGEMENT PLAN

Environmental Aspect & Potential Impact	Remedial Measure	Means of Implementation	Institutional Responsibility	
			Implementation	Supervision
Design /Pre-construction Components				
Geologic hazards due to presence of fault line and seismic intensity	<ul style="list-style-type: none"><li>- Conduct geologic hazard assessment and the effects of the fault line and seismic intensity on the dam and other project facilities.</li><li>- Ensure dam structural stability in the design.</li></ul>	Proper planning, measures to be added in the design	Design consultants & CPC	CPC
Project construction & potential loss of agriculture, forestry & grazing land	<ul style="list-style-type: none"><li>- Design to maximize ratio of waste cut and fill materials.</li><li>- Reservoir design and alignment of tunnel, penstock, power house and tail race to avoid existing productive land uses wherever possible</li><li>- Compensation at market rates, prior to commencement of work.</li><li>- Plan for a tree planting program in coordination with the Provincial Forestry Protection Board and the Song Thanh Nature Reserve including identification of indigenous plants for tree planting and areas requiring tree planting and conservation.</li></ul>	Proper planning Measures to be added in relevant parts of contracts.  Proper resettlement planning.  Planning for a tree planting and conservation program	Design consultants & CPC.	CPC
Excavation of construction materials and development of quarries & borrow areas causing loss of alternative land use	<ul style="list-style-type: none"><li>- Use of existing quarry &amp; borrow areas already in operation.</li><li>- Degraded, barren, riverbeds &amp;waste lands to be used for borrow materials.</li></ul>	Proper planning and measures to be added in the relevant parts of contract documents.	Design consultants & CPC.	CPC
Reduced water flows and reduction in water quality in the existing river course.	<ul style="list-style-type: none"><li>- Schedule construction by phase to ensure diversion of the river flow with coffer dams during separate construction of left &amp; right abutments</li><li>- Ensure construction activities avoid soil &amp; construction</li></ul>	Planning & add measure to relevant parts of contract documents.	Design consultants & design engineers.	CPC

Environmental Aspect & Potential Impact	Remedial Measure	Means of Implementation	Institutional Responsibility	
			Implementation	Supervision
	materials from entering river flow. - Ensure a minimum flow is retained in the river			
Water diverted from the river resulting to reduced water flow that cause impacts to aquatic life.	- Design to keep residual water flow in river to meet needs of aquatic life.	Design weir & intake facilities to allow residual flow to the river	Design consultants and CPC	CPC
<b>Construction stage</b>				
Earth works for new access roads and construction of penstock on steep slopes leading to erosion & encroachment	Slopes along access roads & penstock will be provided with: - Catchments/ cut-off drains & chutes to minimize soil erosion. - Masonry retaining structures to control landslides and runoff. - Formation of sediment basins & slope drains to collect runoff water. - Maximum usage of material in fill areas. - Spoils planning particularly on steep slopes with bench terracing for high cut areas & avoidance of any runoff of material on down slopes - Tree planting programme on penstock areas, roads and surrounding areas to rehabilitate the temporary construction areas at the dam and powerhouse sites.	Regular monitoring.	Contractor's Environment Engineer	ESDC, CPC reports to DONRE
Taking of Borrow Materials with potential for loss and degradation of land	- No earth will be borrowed from cultivable lands. - Borrowing to take place from barren, wastelands, & riverbeds. - For new borrow areas, all measures will be taken to avoid loss of any productive soil. - Any borrow areas will be refilled, re-vegetated & landscaped with tree planting.	Conditions included in contracts.  Regular monitoring	Contractor's Environment Engineer	ESDC, CPC reports to DONRE
Taking of Quarry Materials with loss and	- Quarry materials will be obtained from existing operating sites with proper licenses & environmental clearances.	Regular monitoring	Contractor's Environment	ESDC, CPC

Environmental Aspect & Potential Impact	Remedial Measure	Means of Implementation	Institutional Responsibility	
			Implementation	Supervision
degradation of land	- New quarries to be opened only with permission of respective authorities.		Engineer	reports to DONRE
Operation of construction equipment and construction activities and contamination of soils and water pollution	<ul style="list-style-type: none"> <li>- Fuel storage &amp; refueling will have adequate containment and away from water bodies/channel. Equipment will be properly maintained.</li> <li>- Precautions to be taken to prevent water pollution due to increased siltation &amp; turbidity at weir site &amp; road construction.</li> <li>- Designation of approved sites defined for storage &amp; disposal of wastes materials</li> <li>- Any waste petroleum products will be collected, stored, &amp; disposed of at approved sites.</li> </ul>	Regular monitoring of conditions included in contracts	Contractor's Environment Engineer and CPC	ESDC, CPC reports to DONRE
Construction activities causing disruption of existing surface drains.	<ul style="list-style-type: none"> <li>- Appropriate rain-storm-water channels will be constructed.</li> <li>- Provision for cross drainage structures will be made.</li> </ul>	Proper planning and measures to be added in the relevant parts of contract documents. Regular monitoring of site conditions	Design consultants & CPC. Contractor's Environment Engineer	ESDC, CPC
Construction camp & residential colony. Social impacts & pollution from wastewater & solid waste Damage to existing roads	<ul style="list-style-type: none"> <li>- Construction camps will be located adjoining the dam and powerhouse sites &amp; away from any settlement. Manual labor will be employed locally.</li> <li>- Camps &amp; residential colony will have properly designed sewage treatment system for wastewater effluent and a solid waste collection system.</li> <li>- Require contractors to rehabilitate areas or road sections damaged during hauling of materials.</li> <li>-</li> </ul>	Regular monitoring of site conditions and implementation of contract conditions.	Contractor's Environment Engineer	ESDC, CPC reports to DONRE
Emission from construction vehicles & equipment causing air	<ul style="list-style-type: none"> <li>- Emission levels of all construction vehicles &amp; equipment will conform to Vietnamese emission standards.</li> <li>- Pollutant parameters will be monitored during construction.</li> </ul>	Regular monitoring	Contractor's Environment Engineer	ESDC, CPC reports to



Environmental Aspect & Potential Impact	Remedial Measure	Means of Implementation	Institutional Responsibility	
			Implementation	Supervision
pollution	<ul style="list-style-type: none"> <li>- Crushing &amp; concrete batching plants will be away from population centers and located near the dam and power house sites.</li> <li>- Require drivers to slow down vehicle speed when passing through populated areas.</li> </ul>			DONRE
Dust particulate causing health impacts for workers and villagers	<ul style="list-style-type: none"> <li>- All precautions to be taken to reduce dust level emissions from batching plants &amp; portable crushers at dam and powerhouse sites.</li> <li>- Regular water spraying at all mixing sites &amp; temporary service roads will be undertaken.</li> <li>- All delivery vehicles will be covered with tarpaulin.</li> <li>- Require drivers to slow down when passing through populated areas.</li> </ul>	Regular monitoring	Contractor's Environment Engineer	ESDC, CPC reports to DONRE
Construction activities, vehicles, plant & equipment causing noise pollution	<ol style="list-style-type: none"> <li>1. All construction equipment &amp; plants will conform to Vietnamese noise standards.</li> <li>2. All vehicles &amp; equipment to be fitted with noise abatement devices.</li> <li>3. Construction workers will be provided with personal protection.</li> </ol>	Regular monitoring	Contractor's Environment Engineer	ESDC, CPC reports to DONRE
Noise pollution from any blasting activities at dam and power tunnel and penstock	<ol style="list-style-type: none"> <li>a. Any blasting works will be in accordance with Vietnamese Explosives Act.</li> <li>b. No blasting between dusk &amp; dawn.</li> <li>c. Residents close by will be informed well in advance of blasting schedules.</li> <li>d. Workers associated with blasting sites will be provided with earplugs, helmets &amp; other personal safety devices.</li> </ol>	Regular planning & monitoring	Contractor's Environment Engineer	ESDC, CPC reports to DONRE
Construction of dam, reservoir, tunnel, penstock with loss of vegetation & tree	<ul style="list-style-type: none"> <li>- No trees to be removed without prior approval</li> <li>- Compensation for lost trees on private land</li> <li>- Tree planting programme implemented at dam area, tunnel, penstock, temporary construction areas, roads and other</li> </ul>	Regular monitoring of measures to be implemented in coordination with	Contractor's Environment Engineer through District People's	ESDC, CPC reports to DONRE

Environmental Aspect & Potential Impact	Remedial Measure	Means of Implementation	Institutional Responsibility	
			Implementation	Supervision
cover.	elements of the project. Indigenous tree species being accorded priority over exotic species.	the Forestry Department.	Committee or sub-contractor	
Work force during construction causing impacts to wildlife	<ul style="list-style-type: none"> <li>Construction workers to be educated on wildlife conservation with no hunting &amp; poaching to be allowed for workers.</li> </ul>	Contractor to enforce measures included in contract	Contractor's Environment Engineer	ESDC, CPC reports to DONRE
Construction activities causing accident and safety risks	<ul style="list-style-type: none"> <li>All blasting sites will have warning &amp; clearance signals. Site will be inspected prior to and after blasting.</li> <li>Workers will be provided helmets, masks &amp; safety goggles etc.</li> <li>A readily available first aid unit will be available with medicines and dressing materials.</li> <li>Road safety education will be given to construction vehicle drivers.</li> <li>Traffic management will be ensured during road construction periods.</li> <li>Information dissemination will take place through the Commune's People's Committee regarding activities causing disruption.</li> </ul>	Inclusion of measures in contracts and follow up monitoring	Contractor's Environment Engineer	ESDC, CPC, reports to DONRE
Construction activities causing disruption to Public Utilities	<ul style="list-style-type: none"> <li>Any public utilities likely to be impacted, such as water supply pipe system, power/phone lines, etc. must be relocated to suitable places, in consultation with local beneficiaries.</li> </ul>	To be added in the relevant parts of contract documents.	Design consultants & CPC.	CPC
Any discovery of artifacts or articles of historic interest and importance	<ul style="list-style-type: none"> <li>For all finds of an historic or cultural value, work will be stopped and the find reported to the nearest office of the Department Culture, Sport and Tourism or the Department of Culture and Information</li> </ul>	To be added in the relevant parts of contract documents.	Contractor's Environment Engineer	CPC
<b>Operational Stage</b>				
Reduced water flow in river affecting aquatic	<ul style="list-style-type: none"> <li>Provide guaranteed minimum dry season flow of water in the river</li> </ul>	Measurements undertaken by CPC	CPC Environment	CPC, ESDC

Environmental Aspect & Potential Impact	Remedial Measure	Means of Implementation	Institutional Responsibility	
			Implementation	Supervision
life	<ul style="list-style-type: none"> <li>Regular monitoring of the quantity of daily water flows below the weir intake.</li> </ul>	hydrology engineers	Engineer	
Impacts to wildlife in the Song Thanh Nature Reserve Buffer Zone	<ul style="list-style-type: none"> <li>Provide support to the Provincial Forestry Protection Board Management Program on wildlife protection and nature reserve conservation.</li> </ul>	CPC/ESDC to liaise with PFPD	CPC	CPC, ESDC
Erosion in river bed from tail race discharge and changes in deposition of sand & loss of business extraction	<ul style="list-style-type: none"> <li>Repair and/or extend the reinforcement of the down stream river bed by providing a stilling basin</li> <li>Monitor the deposition of sand and of the sand extraction activity below the bridge</li> </ul>	CPC to monitor & undertake necessary action	CPC Environment Engineer	ESDC, CPC reports to DONRE
Soil erosion, land degradation & vegetation loss particularly on steep slopes	<ul style="list-style-type: none"> <li>Maintenance of trees and vegetative cover over initial five year period of project around the dam, tunnel, penstock, access road and at other project infrastructure.</li> <li>Coordinate with the Provincial Forestry Protection Board</li> </ul>	Regular coordination with sub-contractor, Provincial Forest Protection Board and Song Thanh Nature Reserve, and People's Committee of district/province.	CPC Environment Engineer	ESDC, CPC to DONRE
Emergency measures in case of dam break, flooding, etc.	<ul style="list-style-type: none"> <li>Develop a flood warning system and emergency evacuation plan in case of dam break, floods, and other natural hazards affecting project operation and the downstream area.</li> </ul>	Coordination and meeting with the People's Committee of district/province; Regular monitoring and reporting.	CPC Environment Engineer	ESDC, CPC reports to DONRE

### 5.3 ENVIRONMENTAL MONITORING

Aspects/Parameters to be Monitored and Applicable Standards	Location	Means of Monitoring	Schedule/Frequency	Responsible to Undertake Monitoring	Estimated Cost (VND)
<b>Pre-construction</b>					
1. Completion of detailed design in accordance with EMP requirements	CPC office	Review of detailed design documentation	Prior to approval of detailed design	CPC	Part of management cost
2. Implementation of all mitigation measures specified in IEE on the following:	CPC office	Review of detailed design documentation		ESDC, CPC	Part of management cost
- Proper resettlement planning.		Review of RP/due diligence report	Prior to start of site works	CPC	Part of management cost
- Siting of quarry and borrow areas consistent with EMP	Location of borrow area	Check contractor's construction Materials plans, site visit	Prior to establishment of quarry and borrow areas	CPC	Part of management cost
- Coordination with the Song Thanh Nature Reserve and Provincial Forest Protection Board on tree planting and nature reserve conservation program	Provincial Forest Protection Department	Meetings, site visit, materials, plans, Provincial Forestry Protection Management Program	Prior to finalization of project design, and tree planting activities	CPC, ESDC	Part of management cost
- Ensuring environmental flow/residual flow in project design	Downstream of damsite	Review of detailed design documentation	Prior to start of site works	CPC, ESDC	Part of management cost

Aspects/Parameters to be Monitored and Applicable Standards	Location	Means of Monitoring	Schedule/Frequency	Responsible to Undertake Monitoring	Estimated Cost (VND)
<b>Construction stage (2.5 years)</b>					
(i) Implementation of construction phase: environmental mitigation measures specified in EMP	Locations indicated in EMP for specific mitigation measures	Site visit, interviews with local residents, coordination with concerned agencies	Quarterly (on a regular basis) Random checks and validation of complaints	Natural resource and Environmental Unit Commune monitoring board (CMB), External monitoring Consultant (EMC)& CPC/ESDC	160,000,000  150,000,000
(ii) Noise in dB(A) compared to standards specified in TCVN5949-1998	Residential area in Cha Val commune	Noise measurement	Quarterly (on a regular basis) Random checks and Validation of complaints	Contractor& CPC	36,000,000
(iii) Dust in mg/l compared to standard specified in QCVN 05 : 2009/BTNMT					15,000,000
(iv) Flow rate	Upstream, downstream of dam, Downstream of Hydro-power plant	Field sampling	Quarterly (on a regular basis)  Random checks and Validation of complaints	Contractor & CPC	60,000,000
(v) Surface water quality (fecal coliform, dissolved oxygen, pH, TSP, oil and grease, BOD <sub>5</sub> ) in QCVN08: 2008:BTNMT				EMC& CPC	15,000,000
(vi) Other parameters to be sampled, as appropriate, to validate complaints and pollution event(s) due to project activities					
<b>Operation Stage (10 years)</b>					
Reduced water flow/minimum flow (m <sup>3</sup> /s).	Downstream of dam	Measurement of discharge/flowrate	Quarterly (on a regular basis) in the first year. Random	Project Owner Natural resource and Environmental Unit	In hydrological survey plan

Aspects/Parameters to be Monitored and Applicable Standards	Location	Means of Monitoring	Schedule/Frequency	Responsible to Undertake Monitoring	Estimated Cost (VND)
			checks and validation of complaints		
Implementation of all mitigation measures specified in IEE.	Location written in EMP of detailed mitigation measures.	Site visit, interviews with local residents, coordination with concerned agencies.	Quarterly (on a regular basis) Random checks and To validate complaints.	External monitoring Consultant (EMC), ESDC, & CPC	320,000,000  75,000,000
Sampling of other parameters if necessary to explain the values and pollution problems caused by the project activities.		Site visit, interviews with local residents, coordination with concerned agencies.	As necessary	External monitoring Consultant (EMC), ESDC & CPC	272,600,000  15,000,000
Monitoring of environmental flow and aquatic species	River	Flow meter Sampling/ interviews	Monthly Annually	External monitoring Consultant (EMC), ESDC & CPC	Part of management cost
Areas planted/ species planted	Watershed	Observation	Annually	External monitoring Consultant (EMC), ESDC & CPC	Part of management cost

## 5.4 REPORTING SYSTEM

No.	Reported Issues	First reporting	2 <sup>nd</sup> reporting (one copy sent to environmental office of district )
Construct ion stage	Local implementation all mitigation measures and environmental management.	Implementation Unit: Contractor Reported frequency: Monthly Submit a report for: PMU	Implementation Unit: CPC Reported frequency: 6 months/time Submit a report for: ADB
	Environmental monitoring	Implementation Unit: Environmental staff of PMU Reported frequency: Monthly Submit a report for: CPC/ESDC	
		Implementation Unit: Local Reported frequency: when there are complaints Submit a report for: PMU	
		Implementation Unit: Environment independent consultant – SIMC, ESDC Reported frequency: 6 months/time Submit a report for: PCP, ADB	
Operation phase	Environmental Monitoring and labor safety	Implementation Unit: - The environmental staff of the plant - Environment independent consultant - Local Reported frequency: 1 year /1 time for 20 years Submit a report for: DakPringHPP plant	Implementation Unit: DakPringHPP plant Reported frequency: 1 year/1time for 20 years Submit a report for: ADB



## CHAPTER 6: PUBLIC CONSULTATIONS AND INFORMATION DISCLOSURE

### 6.1 PUBLIC CONSULTATION

Community consultations was conducted by a survey team of PECC 1 on the environmental issues related to the construction and operation of the DakPring hydropower plant through meetings with local authorities of the affected communes and interviews with the local people

#### 6.1.1 Meeting with local authorities

A survey team of PECC1 conducted some meetings with authorities of affected communes that includes: Ca Dy, TaBhing and Cha Val communes in May 2010.

#### Location of meeting and participants

Commune	Ca Dy commune	TaBhing commune	Cha Val commune
Location	Commune People's committee office	Commune People's committee office	Commune People's committee office
Meeting time	May 20, 2010	May 21, 2010	May 24, 2010
Participants	<ul style="list-style-type: none"> <li>• BhanuochPhuoc- Chairman of Ca DyCPC;</li> <li>• AratChooch- ViceChairman of CFF;</li> <li>• BnuochCuong - Village leader of PaRong;</li> <li>• Đinh Van Nao- HoVillage leader;</li> <li>• Ka PhuKhuong- NgocVillage leader;</li> <li>• Doan Hon - Pa Dan Village leader;</li> <li>• A Lang Nghe-</li> </ul>	<ul style="list-style-type: none"> <li>• BhLing On; Vice-Chairman of Ta Bhing CPC</li> <li>• ZorâmĐĩa – Chairman of CFF;</li> <li>• BnướcDũng– Secretary of CPC,</li> <li>• Zo Ran Đom - eader of PaXuaVillage ;</li> <li>• To Ngo La Đan – Leader of Pa ToihVillage;</li> <li>• BriaTGhim - Leader of PaRongVillage;</li> <li>• BNenh Han - Leader</li> </ul>	<ul style="list-style-type: none"> <li>- BlupNghet - Chairman of Cha Val CPC;</li> <li>- ZorâmPoongChairman of CFF ;</li> <li>- BlúpDũng – head of commune security;</li> <li>- Pơ Long Dí ; Vice - Chairman of Cha val CPC;</li> <li>- BnuochĐenh Officer of the Commune</li> <li>- Bnuoch Bong – Forestry staff of the commune</li> <li>- Hien Van - Secretary of CPC;</li> <li>- Zo Ram Nghe- leader of</li> </ul>

	KaRung Village leader.	of Pa Ia Village; • Chu Rang Ban - Village leader of Ca Dang; Coor Mim- Leader of Vinh Village; • Coor Chu – leader of Pa Va Village; 10. Alang Mat - Chief of Pa Ting Village .	Tà UI Village; - Alang At (Dung) - Village leader of Can Đon village.
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### **Highlights of the meetings**

#### **1. Objectives of the Workshop:**

- To inform the stakeholders about the proposed DakPring Hydropower Project.
- Describe the general environmental status of the affected communes (Cha Val, Ca Dy, TaBhing) of Nam Giang district and the location which will be affected by the project.
- Summary of natural environmental impacts caused by the project are air, dust, noise, water quality, vegetation, reduction of flow in the low flow season, etc. The social environmental impacts include: loss of productive land, crops, and plants on land.

#### **2. General Comments from Participants of subproject's Public Consultation Meeting**

- Natural environment: Provide mitigation plans for dust, noise, water quality affected by wastewater, waste matter in the activities of construction workers, water quality in the reservoir (clearance, utilizing the submerged vegetation etc.)
- Social environment: provide compensation methods to all damages caused by the project on land and crops and plants on land.

#### **3. The comments from the participants can be summarized as follows:**

- Request for the investor, an adequate compensation for all affected households who lost land, crops and plants due to construction of the hydropower plant.
- Project owner should conduct safety measures to ensure safe traffic on the route transporting construction materials and machines.
- Ensure environmental hygiene on transported routes and the area near of

construction site

- The hydropower project shall be built in Nam Giang district in order to improve the power shortage situation in the country, as prerequisite for the rural electrification, poverty-alleviation movement and social and cultural development of local people, especially ethnic minorities group.
- To date, local authorities do not have detailed information of the hydropower project in Cha Val and requested that the project owner provide the provincial and district authorized agencies with the results of the feasibility study (FS). Ministry of Industry and Trade (MOIT) shall provide FS report for Quang Nam PC, following the technical design phase, as soon as available.
- If the plant shall be constructed in Cha Val commune, its negative impacts on the environment may not be serious. However, the project owner should properly conduct resettlement policies to support to local affected households, who lost land and livelihood, in order for them to improve their living conditions as well as resume their livelihood. An appropriate management plan in construction activities is needed to implement to protect the existing Song Thanh Nature Reserve area and prevent environmental pollution.

## **6.1.2 Interviews with local people**

### **Location, time and components**

1. In order to collect information on living conditions, socio-economic and environmental issues and ideals of local people during project construction, a survey team conducted interviews with 52 households in three communes about the environmental impacts of the project. Those interviewed included: 7 households in Ca Dy commune, 13 households in Ta Binh commune, 10 households in Ta Un village, 20 households in Can Don village within Cha Val commune, 58 households in the Cha Val commune (in which 14 households at Bo Dy village, 29 households at Ta Un village, 15 households at Can Don village). List of interviewed households is stated in the appendix.
2. At two communes: Ca Dy and Ta Binh where a survey team has conducted an interview in local with local households dated May, 20, 2010 and May, 21, 2010, which includes residents living along the national road No. 14D.
3. At Cha Val commune where the project will be constructed, a survey team has conducted meetings with local residents (including households affected by the project) dated May 22, 2010 at Ta Un village and May 23, 2010 at Can Don village.

### **Disclosed information**

- The survey team reported to all meeting participants:

- Introduction, objectives and items of DakPring HPP project.
- Describe the general environmental status of the affected communes caused by the project.
- Summary of natural and social environmental impacts caused by the project.

2. Discussed the environmental impact mitigation measures:

- Natural Environment.
- Social Environment.

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

Except for one respondent who is not aware of the environment and social issues related to the project, the interviewed residents consider that this project shall not cause significant environmental problems, the affected persons should be adequately compensated and the contractor should implement measures to mitigate impacts due to dust, noise, and road damage. Such impacts are identified in this IEE and the appropriate mitigation measures will be implemented during various project phases. The issue on land acquisition will be addressed through implementation of a resettlement plan.

The list of interviewed households are stated in the appendix

*Photo 1: Picture of the public consultation meetings*



Interviews with local people in Can Don village in May, 2010



*Photo 2: Interviews with local people in Ta Un village in May 2010*

## **6.2 INFORMATION DISCLOSURE**

A final report of the IEE shall be uploaded in the internet according to the ADB regulations. A copy of IEE will be sent to local authorities at the Natural Resources and Environmental Department of Nam Giang District.



## **CHAPTER 7: CONCLUSION**

Construction of DakPring hydropower plant may cause several positive and negative environmental impacts as follows:

- Provide electricity and improve the power quality used in the local commune.
- Create favourable opportunities for production activities, exchange and trade of goods as well as travel for local people and improve their living standard.
- About 67.5 hectares of land area will be lost in which cultivated land of local people will be acquired for project construction. It is unavoidable that there will be negative impacts for constructing any hydropower plant. To overcome these impacts, the project owner will coordinate closely with local authorities to provide an appropriate plan for compensation and assistance to affected people. Acquired forest area for the project will be recovered and re-vegetated by the project owner and contractor after completing the project. **Estimated at least about 4.6 ha land of forest will be recovered at areas of disposal area, auxiliary works and other area with calculated costs about 100,000,000 VND.**
- With the dam, there will be little or no water at about 2 km length of river below the dam site because of construction of the dam. There are no residents living in this area, hence, will not affect any domestic water needs. An environmental flow in the low flow season of  $Q = 0.44 \text{ m}^3/\text{s}$  will be maintained to ensure that the aquatic ecosystem is maintained.
- Other impacts that can occur in the construction stage are air pollution caused by dust in the process of soil and stone excavation, transport of materials, construction activities; effect on traffic in the local area; surface water pollution by construction and domestic waste of workers and staff of the project. These impacts are assessed to be temporary and minimal because the project is of small scale with a short construction period and mitigable measures.

Mitigation measures of environmental impacts and a monitoring plan is shown in both chapters 4 and chapter 5 is to mitigate the negative impacts during the construction and operation stage of DakPring Hydropower project.

This IEE is sufficient for environmental assessment of this project and a full EIA is not necessary.

## ANNEX 1 Rapid Environmental Assessment (REA) Checklist

Country/Project Title:	Loan 2517: DakPring Hydropower Project
Sector Division:	Energy
<b>A. Basic Project Design Data</b>	
1. Dam height, m	= <u>21.7</u>
2. Surface area of reservoir, (ha)	= <u>36</u>
3. Estimated number of people to be displaced	= <u>0</u>
4. Rated power output, (MW)	= <u>7.5</u>
<b>Other Considerations:</b>	
1. Water storage type:	<input checked="" type="checkbox"/> reservoir <input type="checkbox"/> run of river <input type="checkbox"/> pumped storage
2. River diversion scheme:	<input type="checkbox"/> trans-basin diversion <input type="checkbox"/> in-stream flow regulation <input type="checkbox"/> in-stream diversion
3. Type of power demand to address:	<input checked="" type="checkbox"/> peak load <input type="checkbox"/> base load

SCREENING QUESTIONS	Yes	No	REMARKS
<b>B. Project Location</b>			
<b>Is the dam and/or project facilities adjacent to or within any of the following areas?</b>			
<ul style="list-style-type: none"> <li>Unregulated river</li> </ul>	x		The river is a small stream. Water retention in the dam is 0.36 millionm <sup>3</sup> but there will be daily discharge to the river.
<ul style="list-style-type: none"> <li>Undammed river tributaries below the proposed dam</li> </ul>		x	There is a stream about 1 km below dam site. Further downstream of the river are dams on the Song Bung river .



SCREENING QUESTIONS	Yes	No	REMARKS
<ul style="list-style-type: none"> <li>Unique or aesthetically valuable land or water form</li> </ul>		x	The project will occupy an area of about 67.5ha which is mainly composed of secondary forest, shrub, and grassland, with some area planted with rice and corn.
<ul style="list-style-type: none"> <li>Special area for protecting biodiversity</li> </ul>		x	The project is located in the buffer zone of the Song Thanh Nature Reserve.
<ul style="list-style-type: none"> <li>Protected Area</li> </ul>		x	The project is about 2km away from the core zone of the Song Thanh Nature Reserve.
<ul style="list-style-type: none"> <li>Buffer zone of protected area</li> </ul>		x	The site is in the buffer zone of Nature Reserve of Song Thanh.
<ul style="list-style-type: none"> <li>Primary forest</li> </ul>		x	All the forest land in the area is secondary growth or plantation forest.
<ul style="list-style-type: none"> <li>Range of endangered or threatened animals</li> </ul>	x		There are endangered species known to exist in the adjoining Song Thanh Nature Reserve.
<ul style="list-style-type: none"> <li>Area used by indigenous peoples</li> </ul>	x		The population in the area are almost all ethnic minority Co Tu people.
<ul style="list-style-type: none"> <li>Cultural heritage site</li> </ul>		x	There are no known archaeological, cultural or religious heritage site located within close distance of the project.
<ul style="list-style-type: none"> <li>Wetland</li> </ul>		x	Not applicable
<ul style="list-style-type: none"> <li>Mangrove</li> </ul>		x	Not applicable
<ul style="list-style-type: none"> <li>Estuary</li> </ul>		x	Not applicable
<b>C. Potential Environmental Impacts Will the Project cause.</b>			
1. short-term construction impacts such as soil erosion, deterioration of water and air quality, noise and vibration from construction equipment?	x		Temporary impacts and mitigation measures will be provided and monitored.

SCREENING QUESTIONS		Yes	No	REMARKS
2.	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.
3.	disposal of large quantities of construction spoils?		x	Some disposal of construction spoil is required at designated sites close to the dam and powerhouse. Some alternatives is required to recover surface land of disposal after exploration.
4.	clearing of large forested area for ancillary facilities and access road?		x	Acquired land area is small, mainly slash and burn cultural area being either secondary growth or plantation forest.
5.	Impounding of a long river stretch?		x	Small reservoir
6.	Dryness (less than 50% of dry season flow) over a long downstream river stretch?		x	There will be reduced flow in the river over a short 2 km stretch. Water will be discharged downstream daily by ensuring an environmental flow in the river.
7.	Construction of permanent access road near or through forests?	x		3 km of access roads are required for the dam and plant; this route is mainly forest and slash and burn land.
8.	Creation of barriers for migratory land animals		x	There are no reports of migratory land animals in the project area.
9.	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 section of DakPring river: the land to be flooded has been largely cleared and used for agriculture.
10.	Deterioration of downstream water quality due to anoxic water from the reservoir and sediments due to soil erosion?		x	The reservoir is small therefore will cause only temporary loss of water quality during the construction stage.
11.	Significant diversion of water from one basin to another?		x	Not applicable

SCREENING QUESTIONS	Yes	No	REMARKS
12. 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 8.25-28.4 m <sup>3</sup> /s. There will be minimum flow retained in the river and immediately below the dam and there are numerous side streams which augment flows.
13. Significant modification of annual flood cycle affecting downstream ecosystem, people's sustenance and livelihoods?		x	Reservoir is small, therefore only small amount of water will be retained. Water regulation daily.
14. Loss or destruction of unique or aesthetically valuable land or water forms?		x	
15. Proliferation of aquatic weeds in reservoir and downstream impairing dam discharge, irrigation systems, navigation & fisheries, & increasing water loss through transpiration?		x	Regular maintenance of the reservoir.
16. erosion of riverbed below dam?		x	To be monitored to check at erosion and change in deposition of sediments. Stilling basin will be provided.
17. Downstream erosion of recipient river in trans-basin diversion?		x	Not applicable
18. Increased flooding risk of recipient river in trans-basin diversion?		x	Not applicable
19. Decreased groundwater recharge of downstream areas?		x	Small dam operation only and no impact
20. Draining of downstream wetlands and riparian areas?		x	Not applicable
21. 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
22. Loss of migratory fish species due to barrier imposed by the dam?	x		The dam will form a barrier to fish movements but there are no migratory fishes reported in the river above the dam site.
23. Formation of sediment deposits at reservoir entrance, creating backwater effect and flooding and waterlogging upstream?		x	Insignificant

SCREENING QUESTIONS	Yes	No	REMARKS
24. Significant disruption of river sediment transport downstream due to trapping in reservoir?		x	Sediment deposits will be flushed through the system in periods of high flow when the dam gates are opened. Provide stilling basin.
25. Environmental risk due to potential toxicity of sediments trapped behind the dams?		x	
26. increased saltwater intrusion in estuary and low lands due to reduced river flows?		x	Not applicable
27. Significant induced seismicity due to large reservoir size and potential environmental hazard from catastrophic failure of the dam?		x	Not applicable – small dam and reservoir but flood warning and emergency system will be established.
28. Cumulative effects due to its role as part of a cascade of dams/ reservoirs?		x	Not applicable
29. 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. CPC will implement some methods mass clearance then reserve water in reservoir
30. Risks and vulnerabilities related to occupational health & safety due to physical, chemical, biological, & radiological hazards during project construction & operation?	x		In short time, local and mitigation measures
31. 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 number of worker depend on different construction phases of the project. Camp site and service sites are separate.
32. Creation of community slums following construction of the hydropower plant and its facilities?		x	Small labor force only required. Temporary camps will be removed and land will be rehabilitated.
33. Social conflicts if workers from other regions or countries are hired?	x		Camp site is far from village and will only be set up for a short period of time- minor impact.
34. Uncontrolled human migration into the area, made possible by access roads and transmission lines?		x	
35. Disproportionate impacts on the poor, women, children or other vulnerable groups?		x	

SCREENING QUESTIONS		Yes	No	REMARKS
36.	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	Explosives are required for blasting for tunnel and site preparation. Storage site is placed far away from villages.
37.	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	The elements or components of the project hasbeen designed based on national standard to ensure safety.

## **ANNEX 2: Some Pictures of Project area status**



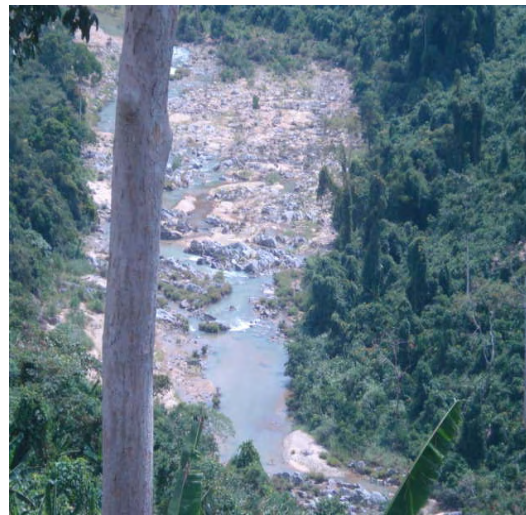
Powerhouse site



Dam site



Location of reservoir tail



DakPring River in dry season



## **ANNEX 3: Consulting Agency**

### **CONSULTING AGENCY**

Power Engineering Consulting JS Company 1 (PECC1)

Address: Km 9 Nguyen Trai Road, Thanh Xuan, Hanoi

General Director: Mr. Le Van Luc

Phone: + 84 4 3854 2720

Fax: + 84 4 3854 1208

### **PREPARERS:**

1. Cao Thi Thu Yen - Master on Environment- Chief Engineer of IEE
2. Le Kim Anh - Bachelor on Environment
3. Luu Quoc Viet - Bachelor on Environment
4. Ha Quy Quynh - Master on Ecology and Landscape and GIS
5. Le Thai Thi Bang Tam - Master on Sociology
6. Truong Ngoc Thang - Master on Sociology
7. Nguyen Manh Dong - Hydrologist
8. Cu Thu Dung - Specialist in Losses
9. Vu Thi Doan Trang - Translator



## ANNEX 4: Approval of previous EIA

ỦY BAN NHÂN DÂN  
TỈNH QUẢNG NAM

SỞ TÀI NGUYÊN VÀ MÔI TRƯỜNG  
Số: 48/QĐ - TNMT

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

Tam Kỳ, ngày 25 tháng 10 năm 2004

**BAN SAO**

**QUYẾT ĐỊNH CỦA GIÁM ĐỐC  
SỞ TÀI NGUYÊN VÀ MÔI TRƯỜNG TỈNH QUẢNG NAM**  
Về việc phê chuẩn Báo cáo Đánh giá tác động môi trường của công trình  
thủy điện Đắc Pring, huyện Nam Giang, tỉnh Quảng Nam

**GIÁM ĐỐC SỞ TÀI NGUYÊN VÀ MÔI TRƯỜNG  
TỈNH QUẢNG NAM**

Căn cứ Luật Bảo vệ môi trường được Quốc hội Nước Cộng hòa Xã hội Chủ nghĩa Việt Nam thông qua ngày 27 tháng 12 năm 1993;

Căn cứ Nghị định số 175/CP ngày 18 tháng 10 năm 1994 của Chính phủ về hướng dẫn thi hành Luật Bảo vệ môi trường;

Căn cứ Quyết định số 95/2003/QĐ-UB ngày 27 tháng 8 năm 2003 của UBND tỉnh Quảng Nam V/v thành lập Sở Tài nguyên và Môi trường tỉnh Quảng Nam;

Căn cứ Quyết định số 4106/QĐ-UB ngày 23 tháng 9 năm 2003 của UBND tỉnh Quảng Nam V/v ủy quyền Giám đốc Sở Tài nguyên và Môi trường thành lập Hội đồng thẩm định Báo cáo đánh giá tác động môi trường (ĐTM) và thiết kế kỹ thuật xử lý môi trường;

Căn cứ Đơn xin thẩm định Báo cáo ĐTM ngày 12 tháng 10 năm 2004 của Công ty Tư vấn Xây dựng điện I;

Xét đề nghị của Trưởng phòng Môi trường.

**QUYẾT ĐỊNH**

Điều 1. Phê chuẩn nội dung Báo cáo đánh giá tác động môi trường công trình thủy điện Đắc Pring, huyện Nam Giang, tỉnh Quảng Nam đã được các thành viên Hội đồng thẩm định theo phương pháp chuyên gia thống nhất.

Điều 2. Công ty Tư vấn Xây dựng điện I thực hiện các yêu cầu sau đây:

2.1. Công ty Tư vấn Xây dựng điện I có trách nhiệm thực hiện đúng những nội dung nêu trong Báo cáo đánh giá tác động môi trường đã được Hội đồng thẩm định thống nhất.

2.2. Phối hợp với Chính quyền địa phương tổ chức thông báo cho nhân dân tại khu vực khai thác biết về quy mô, hoạt động, các tác động ảnh hưởng đến môi trường của công trình cũng như các biện pháp bảo vệ môi trường trong quá trình xây dựng và hoạt động của công trình.

Điều 3. Báo cáo đánh giá tác động môi trường của công trình thủy điện Dắc Pring và những nội dung bổ sung đã được phê chuẩn cùng những yêu cầu đối với Công ty là cơ sở để các cơ quan quản lý Nhà nước về bảo vệ môi trường kiểm tra việc thực hiện bảo vệ môi trường của công trình.

Điều 4. Sau khi hoàn thành các hạng mục công trình về môi trường, Công ty Tư vấn Xây dựng điện I phải có báo cáo bằng văn bản gửi Sở Tài nguyên và Môi trường tỉnh Quảng Nam để kiểm tra và theo dõi.

Điều 5. Ủy nhiệm cho Phòng Môi trường theo dõi, kiểm tra, giám sát việc thực hiện bảo vệ môi trường của công trình thủy điện Dắc Pring, huyện Nam Giang, tỉnh Quảng Nam.

Điều 6. Quyết định này có hiệu lực thi hành kể từ ngày ký.

Nơi nhận:

- Chủ đầu tư,
- UBND tỉnh (b/cáo),
- UBND huyện Nam Giang (p/hợp);
- Lưu VT, p. ME

GIÁM ĐỐC



DƯNG CHẾ LONG

**CHỨNG THỰC**  
BẢN SAO ĐÚNG VỚI BẢN CHÍNH  
Ngày 21-12-2007  
Số 4430... Quyển số 04  
TM. UBND Phường NAM DƯƠNG  
Quận HẢI CHÂU - TP. Đà Nẵng  
CHỦ TỊCH



Nguyễn Văn Sơn

**Certificate of Registration of Environmental Protection Commitment for A Roang  
Hydropower Project**

**Quang Nam Commune's  
People Committee**

**Socialist Republic of Vietnam  
Independence - Freedom - Happiness**

DONRE  
Ref No 48/QĐ-TNMT

*Tam Ky, 25/10/2004*

**DECISION  
of QUANG NAM COMMUNE'S DEPARTMENT OF NATURAL RESOURCES AND  
ENVIRONMENT  
for approval of the Environmental Impact Assessment (EIA) Report of Dak  
Pring hydropower project, Nam Giang district, Quang Nam commune**

-----  
**DIRECTOR OF QUANG NAM COMMUNE'S DEPARTMENT OF NATURAL  
RESOURCES AND ENVIRONMENT  
DECISION**

**Article 1:** Approval of the content of EIA of Dak Pring hydropower project, Nam Giang district, Quang Nam commune has been agreed by all of members of Evaluation Board.

**Article 2:** The Project Owner has responsibilities to fully implement the content of the stated environmental protection commitments and requirements follows as:

- 2.1. The Project Owner has responsibilities to fully implement the content of approved EIA.
- 2.2. Coordinate with the local administration to inform to local people about the scale, activities, the impacts to environment and the protection measures during the building and operating of this project.

**Article 3:** The EIA of the project and additional contents has been approved are the basis for environmental state management agencies to supervise, control and inspect the implementation of environmental protection content of the Project.

**Article 4:** After finishing the construction of environment, the Owner Project has to officially report to DONRE of Quang Nam Commune.

**Article 5:** Entrust to Environment Department to supervise, control the implement of environment protection of Dak Pring hydropower project, Nam Giang district, Quang Nam commune.

**Article 4:** This Certificate is effective from the date of issuance.

**Recipients:**

- Project Owner;
- Commune People Committee;
- District People Committee;
- DONRE;
- Archival:VT;

**DIRECTOR**

(signature and stamp)

**Duong Chi Cong**





M.T.T.Q xã Chà Val đồng ý với các giải pháp, biện pháp giảm thiểu các tác động xấu đến môi trường và kinh tế - xã hội của dự án thủy điện Dak Pring

3. – Kiến nghị đối với Chủ dự án: (nêu cụ thể các yêu cầu, kiến nghị của cộng đồng đối với Chủ dự án liên quan đến việc cam kết thực hiện các biện pháp, giải pháp giảm thiểu các tác động xấu về môi trường của Dự án và các kiến nghị khác có liên quan đến Dự án nếu có)

M.T.T.Q xã Chà Val yêu cầu Chủ đầu tư thực hiện đúng và đầy đủ các biện pháp, giải pháp giảm thiểu tác động xấu đã được đưa ra trong báo cáo đánh giá tác động môi trường

Biên bản đã được thông qua và nhất trí của các đại biểu tham dự  
Cuộc hội thảo tham vấn ý kiến kết thúc và hồi ..... giờ ..... phút ..... cùng ngày.

ĐẠI DIỆN ĐOÀN CÔNG TÁC

TM. MẠT TRẬN TỎ QUỐC XÃ  
(Ký, ghi họ tên, chức danh, đóng dấu)

CHỦ TỊCH



TRẦN VĂN ĐO



HUYỆN Nam Giang  
UBND XÃ Chà Val

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM  
Độc lập - tự do - hạnh phúc

Chà Val, ngày 24 tháng 5 năm 2010

### BIÊN BẢN THAM VẤN Ý KIẾN CỘNG ĐỒNG

Giữa đoàn công tác khảo sát môi trường công trình thủy điện ĐắkPring với  
UBND xã Chà Val - huyện Nam Giang - tỉnh Quảng Nam

Hôm nay, ngày 24 tháng 5 năm 2010 tại UBND xã Chà Val huyện .....  
Nam Giang, tỉnh Quảng Nam. Đoàn khảo sát môi trường công trình thủy  
điện ĐắkPring thuộc C. ty. C.á. ph.ã. n. Tư. v.ã. n. X.ã. y. đ. u. g. Đ. i. n. 1 đã tổ chức  
cuộc họp tham vấn ý kiến cộng đồng với UBND xã Chà Val để lấy ý kiến  
đại diện cộng đồng dân cư nơi thực hiện dự án thủy điện ĐắkPring về vấn đề  
ảnh hưởng tới môi trường khu vực khi xây dựng dự án.

UBND xã Chà Val đã nhận được công văn số ..... ngày ..... tháng .....  
năm ..... của ..... Sau khi nghe đoàn công tác tóm tắt quy  
mô, các hạng mục chính công trình, những thiệt hại về môi trường trong khu vực  
thực hiện dự án cùng biện pháp giảm nhẹ các tác động bất lợi và sau khi tổng  
hợp ý kiến đối thoại giữa Đ. o. n. c. o. n. g. t. a. c. và các bên liên quan trên địa bàn  
xã Chà Val chúng tôi có ý kiến sau :

1. - Ý kiến về các tác động xấu của Dự án đến môi trường tự nhiên và kinh tế -  
xã hội: (nếu rõ ý kiến đồng ý hay không đồng ý với các nội dung tương ứng được  
trình bày của Chủ dự án; trường hợp không đồng ý thì chỉ rõ các nội dung, vấn  
đề cụ thể không đồng ý).

UBND xã Chà Val đồng ý với tất cả các tác động môi trường đã được nêu trong báo cáo đánh giá tác động môi trường của dự án thủy điện ĐắkPring do Công ty C.á. ph.ã. n. Tư. v.ã. n. X.ã. y. đ. u. g. Đ. i. n. 1 thực hiện

2. - Ý kiến về các giải pháp, biện pháp giảm thiểu các tác động xấu của Dự án  
đến môi trường tự nhiên và kinh tế - xã hội: (nếu rõ ý kiến đồng ý hay không  
đồng ý với các nội dung tương ứng được trình bày trong của Chủ dự án; trường  
hợp không đồng ý thì chỉ rõ các nội dung, vấn đề cụ thể không đồng ý).



UBND xã Chà Vạt đồng ý với các giải pháp, biện pháp giảm thiểu các tác động xấu đến môi trường và kinh tế - xã hội của dự án thủy điện Đắk Pring.

3. – Kiến nghị đối với Chủ dự án: (nêu cụ thể các yêu cầu, kiến nghị của cộng đồng đối với Chủ dự án liên quan đến việc cam kết thực hiện các biện pháp, giải pháp giảm thiểu các tác động xấu về môi trường của Dự án và các kiến nghị khác có liên quan đến Dự án nếu có)

UBND xã Chà Vạt yêu cầu chủ đầu tư thực hiện đúng và đầy đủ các biện pháp, giải pháp giảm thiểu tác động đã được đưa ra trong báo cáo "đánh giá tác động môi trường".

Biên bản đã được thông qua và nhất trí của các đại biểu tham dự  
Cuộc hội thảo tham vấn ý kiến kết thúc và hồi ..... giờ ..... phút ..... cùng ngày.

**ĐẠI DIỆN ĐOÀN CÔNG TÁC**

**TM. ỦY BAN NHÂN DÂN XÃ**  
(Ký, ghi họ tên, chức danh, đóng dấu)

CHỦ TỊCH

*Đỗ Văn Sỹ*

**NAM GIANG DISTRICT  
CHA VAL CPC**

**SOCIALIST REPUBLIC OF VIETNAM**  
Independence - Freedom - Happiness  
-----\*\*\*\*\*-----

**Cha Val, dated 24 May 2010**

## **PUBLIC CONSULTATION MINUTES**

*(Between environmental survey team of DakPring hydropower project and Cha Val CPC-  
Nam Giang district- Quang Nam Province)*

The environmental survey team of DakPring hydropower project of PECC1 held a public consultation meeting with Cha Val CPC dated 24 May 2010 at the Cha Val commune, Nam Giang district, Quang Nam province in order to consult representatives of the communities where the project activities will affect environmental issues in the region.

The survey team presented summary of the project scale, main items and environmental damages in the project area along with measures to mitigate the adverse impacts of the project and after collecting of opinions of meeting participants and relevant parties in the territory of Cha Val commune. The two parties have some following opinions:

1. **Opinions of the adverse impacts on natural environment and socio-economic issues caused by the Project:** *(Giving your opinion- agree or disagree in the corresponding contents presented by the Project owner; in case you don't agree with the presented contents given the contents and issues disagree).*

*Cha Val CPC agrees to the environmental impacts caused by the project which have been described in the "Environmental impact assessment" report of the DakPring Hydropower project (PECC1).*

2. **Opinions about the adverse impact mitigation measures for the Project to natural and social environment** *(Giving your opinion- agree or disagree in the corresponding contents presented by the Project owner; in case you don't agree with the presented contents given the contents and issues disagree).*

*Cha Val CPC agrees on the adverse impact mitigation measures and solutions to the natural environment and socio- economic issues of DakPring Hydropower Project*

- 3. Proposal to the Project owner: (specifying requirements and recommendations of the communities for the Project Owner, their commitment in the implementation of measures to minimize adverse impacts and other recommendations if necessary).**

*Cha Val CPC requires the Project owner to comply with and implementfully all the mitigation measures that have been outlined in the EIA report.*

**The minutes is agreed by the participants in meeting  
The ending time at....h..... same day.**

REPRESENTATIVE OF  
CONSULTATION TEAM

REPRESENTATIVE OF  
CHAVAL COMMUNE PEOPLE COMMITTEE

**NAM GIANG DISTRICT                      SOCIALIST REPUBLIC OF VIETNAM**  
**CHA VAL COMMUNE FATHERLAND FRONT (CFF)      Independence - Freedom -**  
**Happiness**

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*Cha Val, dated 24 May 2010*

## **PUBLIC CONSULTATION MINUTES**

*(Between environmental survey team of DakPring hydropower projects and Cha Val CFF-  
Nam Giang district- Quang Nam Province)*

The environmental survey team of DakPring hydropower project of PECC1 held a public consultation meeting with Cha Val CFF dated 24 May 2010 at the Cha Val commune, Nam Giang district, Quang Nam province in order to consult representatives of the communities where the project activities will affect environmental issues in the region.

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1. **Opinions of the adverse impacts on natural environment and socio-economic issues caused by the Project:** *(Giving your opinion- agree or disagree in the corresponding contents presented by the Project owner; in case you don't agree with the presented contents given the contents and issues disagree).*

*Cha Val CFF agrees on the environmental impacts caused by the project which have been described in the "Environmental impact assessment" report on the DakPring Hydropower project.*

2. **Opinions about the adverse impact mitigation measures for the Project to natural and social environment** *(Giving your opinion- agree or disagree in the corresponding contents presented by the Project owner; in case you don't agree with the presented contents given the contents and issues disagree).*

*Cha Val CFF agrees on the adverse impact mitigation measures and solutions to the natural environment and socio- economic issues of DakPring Hydropower Project*

**3. Proposing to the Project owner: (specifying requirements and recommendations of the communities for the Project Owner, their commitment in the implementation of measures to minimize adverse impacts and other recommendations if necessary).**

*Cha Val CPC requires the Project owner to comply with and implement fully all the mitigation measures that have been outlined in the EIA report.*

**The minutes is agreed by the participants in meeting  
The ending time at....h..... same day.**

REPRESENTATIVE OF  
CONSULTATION TEAM

REPRESENTATIVE OF  
CHAVAL COMMUNE FATHERLAND FRONT

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[illegible]



Time : 14h 30 – date 24/5/2010.....

Location : Cha Val commune – Nam Giang district – Quang Nam province .....

Content: The public consultation of the hydropower project

Full name	Title	Address	Sign
BlupNghet	Chairman of commune	Ta Un – Cha Val commune	
Zo Ram Poong	Chairman of Vietnam Fatherland Front	Cha Val	
Blup Dung	Commune Police Chief	Cha Val	
Po Loong Di		Cha Val	
Bo nuoch Denh		Cha Val	
Bo nuoch Bong		Cha Val	
Hien Van		Cha Val	
Zo Ram Nghe	Village chief	Ta un – Cha Val commune	
Alang At	Village chief	Can Don – Cha Val commune	





Dùng cụ vờ vờ các biện pháp giảm thiểu đã nêu.  
Nguyên do bị nêu một số các biện pháp sau đây:  
- Nếu không xây dựng cấp nước đúng như là  
đó thì các công trình qua khu vực dân cư.  
- Giảm thiểu các công trình qua khu vực dân cư.  
- Giảm thiểu các công trình qua khu vực dân cư.

3. – Kiến nghị đối với Chủ dự án: (nêu cụ thể các yêu cầu, kiến nghị của cộng đồng đối với Chủ dự án liên quan đến việc cam kết thực hiện các biện pháp, giải pháp giảm thiểu các tác động xấu về môi trường của Dự án và các kiến nghị khác có liên quan đến Dự án nếu có)

Yêu cầu chủ đầu tư thực hiện đúng và đầy đủ các  
biện pháp giảm thiểu tác động xấu về môi  
trường của Dự án và các kiến nghị mà M.T.T.Q. đã  
trình bày.

Biên bản đã được thông qua và nhất trí của các đại biểu tham dự  
Cuộc hội thảo tham vấn ý kiến kết thúc và hồi ..... giờ ..... phút ..... cùng  
ngày.

**ĐẠI DIỆN ĐOÀN CÔNG TÁC**

**TM. MẬT TRẦN TỔ QUỐC XÃ**  
(Ký, ghi họ tên, chức danh, đóng dấu)



*Trần Văn Hòa*









NAM GIANG DISTRICT  
TA BHRING CPC

SOCIALIST REPUBLIC OF VIETNAM  
Independence - Freedom - Happiness  
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Ta Bhring, dated 21 May 2010

## **PUBLIC CONSULTATION MINUTES**

*(Between environmental survey team of DakPring hydropower projects and Ta Bhring CPC- Nam Giang district- Quang Nam Province)*

The environmental survey team of DakPring hydropower project of PECC1 held a public consultation meeting with Ta Bhring CPC dated 21 May 2010 at the Cha Val Commune, Nam Giang district, Quang Nam province in order to consult representatives of the communities where the project activities will affect environmental issues in the region.

The survey team presented summary of the project scale, main items and environmental damages in the project area along with measures to mitigate the adverse impacts of the project and after collecting of opinions of meeting participants and relevant parties in the territory of Ta Bhring commune. The two parties have some following opinions:

1. Opinions of the adverse impacts on natural environment and socio-economic issues caused by the Project: *(Giving your opinion- agree or disagree in the corresponding contents presented by the Project owner; in case you don't agree with the presented contents given the contents and issues disagree).*

*Recommended when driving car across the route, the driver should go slowly and respect motorcycles and local people since the road is too narrow, local people still lack of understanding of road traffic laws.*

2. Opinions about the adverse impact mitigation measures for the Project to natural and social environment *(Giving your opinion- agree or disagree in the corresponding contents presented by the Project owner; in case you don't agree with the presented contents given the contents and issues disagree).*

*Agree on the adverse impact mitigation measures and solutions to the natural environment and socio- economic issues of DakPring Hydropower Project*

*Add some comments as follows:*

- *Material on the vehicle should be covered, do not more overload,*
- *There are some measures such as watering to reduce dust concentration at the local areas near road.*

3. Proposing to the Project owner: *(specifying requirements and recommendations of the communities for the Project Owner, their*

*commitment in the implementation of measures to minimize adverse impacts and other recommendations if necessary).*

*Ta Bhing CPC requires the Project owner to comply with and implement fully all the mitigation measures that have been outlined in the EIA report.*

**The minutes is agreed by the participants in meeting**

**The ending time at....h..... same day.**

REPRESENTATIVE OF  
CONSULTATION TEAM

REPRESENTATIVE OF  
TA BHING COMMUNE PEOPLE COMMITTEE

**NAM GIANG DISTRICT  
VIETNAM**

**TA BHRING CFF**

**SOCIALIST REPUBLIC OF**

Independence - Freedom - Happiness

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**Ta Bring, dated 21 May 2010**

### **PUBLIC CONSULTATION MINUTES**

*(Between environmental survey team of DakPring hydropower projects and Ta BHing CFF- Nam Giang district- Quang Nam Province)*

The environmental survey team of DakPring hydropower project of PECC1 held a public consultation meeting with Ta Bhing CFF dated 21 May 2010 at the TaBhing Commune, Nam Giang district, Quang Nam province in order to consult representatives of the communities where the project activities will affect environmental issues in the region.

The survey team presented summary of the project scale, main items and environmental damages in project area along with measures to mitigate the adverse impacts of the project and after collecting of opinions of meeting participants and relevant parties in the territory of Ta Bhing commune. The two parties have some following opinions:

1. **Opinions of the adverse impacts on natural environment and socio-economic issues caused by the Project:** *(Giving your opinion- agree or disagree in the corresponding contents presented by the Project owner; in case you don't agree with the presented contents given the contents and issues disagree).*

*Some suggestion to higher authorities as follows:*

*At present, the traffic in the Ta Bhing commune is very difficult due to road is too narrow and many vehicles often cause accidents.*

*Request driver need to reduce speed.*

2. **Opinions about the adverse impact mitigation measures for the Project to natural and social environment** *(Giving your opinion- agree or disagree in the corresponding contents presented by the Project owner; in case you don't agree with the presented contents given the contents and issues disagree).*

*Agree on the adverse impact mitigation measures and solutions to the natural environment and socio- economic issues of DakPring Hydropower Project*

*Add some comments as follows:*



*Expanding and upgrading the road surface, especially the road across residential areas*

*Reducing speed of vehicles*

*The driver must comply with the traffic law*

- 3. Proposing to the Project owner: (specifying requirements and recommendations of the communities for the Project Owner, their commitment in the implementation of measures to minimize adverse impacts and other recommendations if necessary).**

*Require the Project owner to comply with and implement fully all the mitigation measures that have been outlined in the EIA report.*

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**The minutes is agreed by the participants in meeting**

**The ending time at....h..... same day.**

REPRESENTATIVE OF  
CONSULTATION TEAM

REPRESENTATIVE OF  
TA BHING COMMUNE FATHERLAND FRONT

## LIST OF PARTICIPANTS

[illegible]

Time : 14h 30 – date 24/5/2010.....

Location :TaBhing commune – Nam Giang district – Quang Nam province.....

Content: The public consultation of the hydropower project

Full name	Title	Address	Sign
BH Ling On	Chairman of commune	Ta Bhing commune	
Zo Ram Dia	Chairman of Vietnam Fatherland Front	Ta Bhing	
Bnuoch Dung		Ta Bhing	
Zo Ran Dom	Village chief	Pa Xua	
To Ngo La Dan	Village chief	Pa Toih	
Bria T Ghim	Village chief	Pa Rong	
Bnenh Han	Village chief	Pa Ia	
Chu Rang Ban	Village chief	Ca Dang	
Coor Mim	Village chief	Vinh	
Coor Chu	Village chief	Pa Va	
A lang Mat	Village chief	Pa Ting	

HUYỆN Nam Giang CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM  
UBND XÃ Cà Duyệt Độc lập - tự do - hạnh phúc

Cà Duyệt, ngày 20 tháng 5 năm 2010

**BIÊN BẢN THAM VẤN Ý KIẾN CỘNG ĐỒNG**

Giữa đoàn công tác khảo sát môi trường công trình thủy điện ĐắkPring với  
UBND xã Cà Duyệt

Hôm nay, ngày 20 tháng 5 năm 2010 tại UBND xã Cà Duyệt huyện Nam Giang  
....., tỉnh Nam Giang. Đoàn khảo sát môi trường công trình thủy  
điện ĐắkPring thuộc Phòng Tài nguyên và Môi trường đã tổ chức  
cuộc họp tham vấn ý kiến cộng đồng với UBND xã Cà Duyệt để lấy ý kiến  
đại diện cộng đồng dân cư nơi thực hiện dự án thủy điện ĐắkPring về vấn đề  
ảnh hưởng tới môi trường khu vực khi xây dựng dự án.  
UBND xã Cà Duyệt đã nhận được công văn số ..... ngày ..... tháng .....  
năm ..... của ..... Sau khi nghe đoàn công tác tóm tắt quy  
mô, các hạng mục chính công trình, những thiệt hại về môi trường trong khu vực  
thực hiện dự án cùng biện pháp giảm nhẹ các tác động bất lợi và sau khi tổng  
hợp ý kiến đối thoại giữa Đoàn công tác và các bên liên quan trên địa bàn  
xã Cà Duyệt..... chúng tôi có ý kiến sau :

1. - Ý kiến về các tác động xấu của Dự án đến môi trường tự nhiên và kinh tế -  
xã hội: (nêu rõ ý kiến đồng ý hay không đồng ý với các nội dung tương ứng được  
trình bày của Chủ dự án; trường hợp không đồng ý thì chỉ rõ các nội dung, vấn  
đề cụ thể không đồng ý).

Xã Cà Duyệt nằm dọc theo đường quốc lộ 14.D  
Đi xây dựng công trình xã sẽ bị ảnh hưởng trực  
tiếp do bụi và tiếng ồn gây ra do khi xây dựng  
các công trình.....

2. - Ý kiến về các giải pháp, biện pháp giảm thiểu các tác động xấu của Dự án  
đến môi trường tự nhiên và kinh tế - xã hội: (nêu rõ ý kiến đồng ý hay không  
đồng ý với các nội dung tương ứng được trình bày trong của Chủ dự án; trường  
hợp không đồng ý thì chỉ rõ các nội dung, vấn đề cụ thể không đồng ý).





HUYỆN Nam Giang CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM  
MTTQ XÃ Cà Dy ..... Độc lập - tự do - hạnh phúc

Cà Dy, ngày 20 tháng 5 năm 2010

**BIÊN BẢN THAM VẤN Ý KIẾN CỘNG ĐỒNG**

Giữa đoàn công tác khảo sát môi trường công trình thủy điện ĐắkPring với  
MTTQ xã Cà Dy .....

Hôm nay, ngày 20 tháng 5 năm 2010 tại MTTQ xã Cà Dy huyện Nam Giang  
....., tỉnh Quảng Nam..... Đoàn khảo sát môi trường công trình thủy  
điện ĐắkPring thuộc Công ty cổ phần Thủy điện XD Miền I..... đã tổ chức  
cuộc họp tham vấn ý kiến cộng đồng với MTTQ xã Cà Dy..... để lấy ý kiến  
đại diện cộng đồng dân cư nơi thực hiện dự án thủy điện ĐắkPring về vấn đề  
ảnh hưởng tới môi trường khu vực khi xây dựng dự án.  
MTTQ xã Cà Dy..... đã nhận được công văn số ..... ngày ..... tháng .....  
năm ..... của ..... Sau khi nghe đoàn công tác tóm tắt quy  
mô, các hạng mục chính công trình, những thiệt hại về môi trường trong khu vực  
thực hiện dự án cùng biện pháp giảm nhẹ các tác động bất lợi và sau khi tổng  
hợp ý kiến đối thoại giữa Đoàn công tác..... và các bên liên quan trên địa bàn  
xã Cà Dy..... chúng tôi có ý kiến sau :

1. - Ý kiến về các tác động xấu của Dự án đến môi trường tự nhiên và kinh tế -  
xã hội: (nếu rõ ý kiến đồng ý hay không đồng ý với các nội dung tương ứng được  
trình bày của Chủ dự án; trường hợp không đồng ý thì chỉ rõ các nội dung, vấn  
đề cụ thể không đồng ý).

Xã Cà Dy nằm dọc trục đường Quốc lộ 19D  
Khi xây dựng công trình sẽ bị ảnh hưởng trực tiếp  
Đoạn đất trồng lúa của người dân địa phương bị mất diện tích

2. - Ý kiến về các giải pháp, biện pháp giảm thiểu các tác động xấu của Dự án  
đến môi trường tự nhiên và kinh tế - xã hội: (nếu rõ ý kiến đồng ý hay không  
đồng ý với các nội dung tương ứng được trình bày trong của Chủ dự án; trường  
hợp không đồng ý thì chỉ rõ các nội dung, vấn đề cụ thể không đồng ý).







NAM GIANG DISTRICT  
CA DY CPC

SOCIALIST REPUBLIC OF VIETNAM  
Independence - Freedom - Happiness  
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**Ca Dy, dated 20 May 2010**

## **PUBLIC CONSULTATION MINUTES**

*(Between environmental survey team of DakPring hydropower projects and Ca Dy CPC-  
Nam Giang district- Quang Nam Province)*

The environmental survey team of DakPring hydropower project of PECC1 held a public consultation meeting with Ta Bhing CPC dated 20 May 2010 at the Ca Dy Commune, Nam Giang district, Quang Nam province in order to consult representatives of the communities where the project activities will affect environmental issues in the region.

The survey team presented summary of the project scale, main items and environmental damages in project area along with measures to mitigate the adverse impacts of the project and after collecting of opinions of meeting participants and relevant parties in territory of Ta Bhing commune. The two parties have some following opinions:

1. **Opinions of the adverse impacts on natural environment and socio-economic issues caused by Project:** *(Giving your opinion- agree or disagree in the corresponding contents presented by the Project owner; in case you don't agree with the presented contents given the contents and issues disagree).*

*Ca Dy commune located along the National Road No.14D, when the project is constructed, this commune will be effected directly by the Project such as: dust and noise due to transport of construction materials to the Project area.*

2. **Opinions about the adverse impact mitigation measures for the Project to natural and social environment** *(Giving your opinion- agree or disagree in the corresponding contents presented by the Project owner; in case you don't agree with the presented contents given the contents and issues disagree).*

*Agree on the adverse impact mitigation measures and solutions to the natural environment and socio- economic issues of DakPring Hydropower Project*

**3. Proposal to the Project owner: (specifying requirements and recommendations of the communities for the Project Owner, their commitment in the implementation of measures to minimize adverse impacts and other recommendations if necessary)**

*Require the Project owner to comply with and implement fully all the mitigation measures that have been outlined in the EIA report.*

**The minutes is agreed by the participants in meeting  
The ending time at....h..... same day.**

.

REPRESENTATIVE OF  
CONSULTATION TEAM

REPRESENTATIVE OF  
CA DY COMMUNE PEOPLE COMMITTEE

**NAM GIANG DISTRICT**  
**CA DY CFF**

**SOCIALIST REPUBLIC OF VIETNAM**  
Independence - Freedom - Happiness  
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**Ca Dy, dated 20 May 2010**

## **PUBLIC CONSULTATION MINUTES**

*(Between environmental survey team of DakPring hydropower projects and Ca Dy CFF-  
Nam Giang district- Quang Nam Province)*

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*Ca Dy commune located along the National Road No.14D, when the project is constructed, this commune will be effected directly by the Project such as: dust and noise due to transport of construction materials to the Project area.*

2. **Opinions about the adverse impact mitigation measures for the Project to natural and social environment** *(Giving your opinion- agree or disagree in the corresponding contents presented by the Project owner; in case you don't agree with the presented contents given the contents and issues disagree).*

*Agree on the adverse impact mitigation measures and solutions to the natural environment and socio- economic issues of DakPring Hydropower Project*

3. **Proposing to the Project owner:** *(specifying requirements and recommendations of the communities for the Project Owner, their commitment in the implementation of measures to minimize adverse impacts and other recommendations if necessary).*

***Require the Project owner to comply with and implement fully all the mitigation measures that have been outlined in the EIA report.***

**The minutes is agreed by the participants in meeting  
The ending time at....h..... same day.**

REPRESENTATIVE OF  
CONSULTATION TEAM

REPRESENTATIVE OF  
CA DY COMMUNE FATHERLAND FRONT

## LIST OF PARTICIPANTS

[illegible]

Time : 14h 30 – date 20/5/2010.....

Location : Ca dy commune – Nam Giang district – Quang Nam province .....

Content: The public consultation of the hydropower project

<b>Full name</b>	<b>Title</b>	<b>Address</b>	<b>Sign</b>
BhanuochPhuoc	Chairman of commune	Ca dy	
ÂratChooch	Chairman of Vietnam Fatherland Front	Ca dy	
BnuochCuong	Village chief	Pa Rong – Ca dy	
Dinh Van Nao	Village chief	Ho – Ca dy	
Ka PhuKhuong	Village chief	Ngoc – Ca dy	
Doan Hon	Village chief	Pa Don - Cady	
A langNghe	Village chief	Ka Rung – Ca dy	



**FORM OF COMMUNITY CONSULTATION**  
**(With regard to environmental impact assessment of DakPring hydropower project)**

**I. Information about consulted person**

**1, Full name**

..... **Age**.....**Ethnic**.....**Address**.....

...

.....

...

**2. Number of members in family .....in which: Male**

.....**Female**.....

**3. People of working age ....., Main income of family from**

**Agriculture.....Forestry.....other**

**job.....**

**II. Content of community consultation**

**1, Do you agreed or disagree with the major impacts that are prepared in the EIA report?**

**Agreement**

**Disagreement**

**2, Do you agreed or disagree with the mitigation measures that are prepared in the EIA report?**

**Agreement**

**Disagreement**

**Additional mitigation**

**measures.....**

.....

**....3. The effected family household directly by the Project:**

.....

.....

.....

.

**4. The requirements and recommendations of the family to Project owner:**

.....

.....

.....

Consulted person

Local representation

Interviewed person

