

**PHU THO PROVINCIAL PEOPLE'S COMMITTEE  
DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT**

**VIETNAM DAM REHABILITATION AND SAFETY PROJECT (WB8)**

**REPORT  
ENVIRONMENTAL AND SOCIAL IMPACT  
ASSESSMENT (ESIA)**

**PROJECT: REPAIR AND IMPROVEMENT OF BAN RESERVOIR,  
TIEN LUONG COMMUNE, CAM KHE DISTRICT – PHU THO  
PROVINCE**

**PHU THO, 5/2015**

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## **LIST OF ABBREVIATIONS**

AH	Affected Household
AP	Affected People
BOD	Biochemical Oxygen Demand
CPC	Communal People's Committee
CPO	Central Project Office (MARD)
CSC	Construction Supervision Consultant
DARD	Department of Agriculture and Rural Development
DO	Dissolved Oxygen
DONRE	Department Of Natural Resources and Environment
DPC	District People's Committee
EMDP	Ethnic Minority Development Plan
ESMP	Environmental and Social Management Plan
ESMoP	Environmental and Social Monitoring Plan
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
GoV	Government of Vietnam
HH	Household
IMC	Irrigation Management Company
MARD	Ministry of Agriculture and Rural Development
MONRE	Ministry of Natural Resources and Environment
NTR	National Technical Regulation
OP	Operating Policies of the WB
PMU	Provincial Management Unit
NTR	National Technical Regulation
RAP	Resettlement Assessment Plan
RPF	Resettlement Policy Framework
WB	World Bank
WHO	World Health organization
WUA	Water User Association

## SUMMARY

**Background:** Ban reservoir is located in Tien Luong commune, Cam Khe district, Phu Tho province. It was built in 1976. The function of the reservoir is the water supply for about 150ha of agricultural land belonging to the Tien Luong commune, Cam Khe district

Due to the long-time exploitation, the work has seriously degraded. The current status of headworks as follows:

- Earth dam is about 354m length, consists of three dams A, B, C, the upstream face of dam hasn't reinforced, some places near the spillway has eroded.
- The spillway is the earth spillway. In the rainy season, the flood discharge capacity is not guaranteed, the spillway serious eroded, especially in the downstream of the spillway. Before each rainy season, local people often have discharged the water through the drain to prevent erosion at the spillway. Therefore, reducing the capacity of the reservoir in the water supply.
- Drain water has a broken valve and the body of drain, they are needed to be repaired or remade.

In the Ban reservoir's downstream, people have settled, lived, and produced stably (194 households, of which 102 poor and near poor households; 150ha of rice and vegetables). The deterioration of Ban irrigation works has limited the water supply capacity, decreased the water resources for the development of social economy, and threatened the safety of the reservoir downstream. If the dam breaks, the damage of lives and property of the people is immeasurable.

The main purposes of the renovation and improvement to safety of the dam and reservoirs are: (i) Ensure the safe of the reservoir during operation and exploitation process, adapting to climate change and meeting the increasing demands for water of people in the downstream area, mitigating the negative impacts on the environment, landscape of reservoir foundation and downstream; (ii) Ensure original design goals of supplying water for 150ha of rice and vegetables; and (iii) create the appropriate infrastructure to attract investment in tourism and services. The project "**repair and improvement of Ban reservoir, Tien Luong commune, Cam Khe district**" has been proposed with the funding from the World Bank, the project is belongs to the rehabilitation and dam safety project.

Project description: The activities under the project include the repair and upgrade dams, spillway, drain water, construction and management route, and some works along the construction route. The project has been designed and implemented in lines with environmental and social management framework (ESMF) and dam safety framework of WB, assuring to comply strictly with administrative regulations as well as criteria of the Socialist Republic of Vietnam. The potential impacts during preparation and implementation periods of the project has been assured sufficient determination, strictly supervision and management by detail plans and periodical reports submitted to management organizations.

***Environmental and social impacts and mitigation measures:*** The project implemented will bring in considerable benefits to the local community, such as: (i) Stabilize water supply, facilitate agriculture production and improve the life of local people; (ii) Dam safety improved will be secure about the life and production of people in downstream; (iii) Improve the landscape, ecosystem and microclimate conditions of the reservoir. However, the project implementation will be results of some potential adverse impacts and risks of natural and social environment, relating to: (i) Land acquisition and clearance, (ii) construction activities, and (iii) operation of the reservoir.

A detailed plan to prevent or mitigate the adverse impacts are described Environmental and Social Management Plan (ESMP).

At the site, 100% of affected people in sub-project area are Kinh people.

A preliminary study shows that the project will permanently affect to the alluvial land area of 15,000m<sup>2</sup> and the garden of 15 households, and 1100m<sup>2</sup> of land that managed by commune will be temporary recovered for construction purposes. There is no household has to relocate and resettle. The affected household will be compensated and supported sufficiently complying with the resettlement policy framework (RPF). The details are stated in the project's RAP report. There is no grave, temple or any culture, belief, religious structures affected in the project area.

The project construction may arise negative impacts to the natural environment such as increasing pollution of air, water, soil, noise, vibration, etc., and social environment such as traffic jam, social security, etc... However, these impacts are partial, temporary with small sphere and can be prevented/minimized via:

- (i) Ensuring to comply with Environmental and Social management plan of the project,
- (ii) Consult with local authorities as well as local residents of the project preparation period and maintain during the project construction period,
- (iii) Supervising closely the project's implementation.

Environmental and Social Impacts Assessment (ESIA) report aims to make a detailed implementation plan in order to ensure natural environmental and social quality in the project area. The entire process of project implementation will be closely monitored by the Provincial management unit (PMU), Department of Natural Resources and Environment (DONRE), construction supervision consultants (CSC), environmental management consultants and local communities. Monitoring process will be recorded and publicly periodically reported.

***A plan to manage and mitigate impacts during project implementation process:*** To minimize potential adverse impacts during project implementation period, the following measures need to be done adequately under the close, uninterrupted and open consultancy with local authority and community, especially with AH:

- Make sure that the environmental protection criteria will be stated in contract's terms of the project and make clear with the contractors.

- Implementing mitigation measures adequately with the observation and modification suitable to actual conditions to achieve the highest minimization.
- Supervising and monitoring closely the implementation of safety measures to ensure the mitigation measures should be sufficient and effectively implemented during the project's implementation.
- Planning and performing completely the stakeholder consultation during project's preparation and implementation.

**Responsibility:** Central Project Office (CPO) takes responsibility for supervision overall project and the progress of the subproject: ***“Repair and Improvement of Ban Reservoir, Tien Luong commune, Cam Khe district”***, including the implementation of environmental protection measures proposed in ESMP.

Phu Tho irrigation management and exploitation unit takes responsibility for preparing detail bids/tender information, selecting a contractor suitably, preparing contracts and ensuring effective implementation and close supervision of ESMP of the project. The contractor takes responsibility implementing project as plan, periodically report to CPO. CPO will associate closely with local authorities to ensure the effectiveness of stakeholder consultation and promote minimized measure effectiveness. Department of Natural Resources and Environment of Phu Tho province will have the responsibility of supervising the implementation of environmental policies as per regulated by Vietnam Government. After project completed, the operation organization will take responsibility of maintenance and periodic inspection project's works.

**Budget allocation:** Both ODA fund and Counterpart fund of Vietnam Government are used for sub-project investment. Total budget estimation is: **25.515.398.000 VND.**

Budget for ESMP implementation includes:

Implementing ESMP: 636.000.000 VND,

Implementing ESMoP: 270.458.000 VND

The report consists of 8 parts as follows:

- Part 1: Introduction
- Part 2: Sub-project description
- Part 3: Policy, legal, and administrative framework
- Part 4: Environmental and socio-economic characteristic of the project area
- Part 5: Environmental and social impacts assessment
- Part 6: Alternative analysis
- Part 7: Environmental and Social Management Plan (ESMP)
- Part 8: Stakeholders consultation and information disclosure

## **PART 1 INTRODUCTION**

### **1.1 GENERAL INFORMATION OF THE PROJECT**

**Dam Rehabilitation and Safety Project (WB8)** is funded by the World Bank with objectives to support implementation of Safety dam program of Government via improving safety of prioritized dams and reservoirs as well as protecting people and property of community in downstream area. The project is expected to improve safety level of dams and related facilities, as well as safety of people and socio-economic infrastructures of community in downstream areas as defined in Decree No. 72 on dam safety management in Vietnam. Components of the project include:

Component 1: Dam Safety Rehabilitation;

Component 2: Dam Safety Management and Planning;

Component 3: Project Management Support;

Component 4: Disaster Contingency.

The proposed subproject will be implemented in 31 provinces in North region, Central region and high land region. Totally over 400 dams will be selected based on highest priority criteria being agreed to give prioritized interventions to address the risks in context of poverty and inequality.

Estimated implementation time of the project is 6 years – from 12.1.2015 to 1.12.2021. Draft of ESIA of the first year subprojects and Environmental and Social Management Framework (ESMF) will be finalized and announced on 5.12.2015. Environmental assessment for next year subprojects will be based on the report for the first year subprojects and ESMF agreed by GoV and WB.

Ministry of Agriculture and Rural Development (MARD) is generally responsible for project implementation and management. CPO under MARD will provide support for three Ministries to coordinate and monitor overall project. The performance of improvement and repair and preparation for safety dam plan, including protection and trustee, will be decentralized to provincial government. Department of Agriculture and Rural Development (DARD) will be host institution at provincial level. PMU of DARD in each province will be in charge of managing and monitoring dams repair with support from MARD.

The project will support to repair irrigation dams constructed in 1980s and 1990s. Approximately 90% of dams planned to repair are earth dam and small dams with height under 15m, design capacity under 3 million m<sup>3</sup>. Investment into complete change of existing structure or building new structure or expanding main structure is not under project magnitude. The main work of the project is to repair and reshape the structure of the main dam, reinforce upstream slope with concrete wearing or stone, reinforce or expand size of spillway in order to improve drainage capacity, repair or renovate existing water intake, replace hydraulic lifting system in the suction (water

intake) and spillway outlet, or drill for waterproof in main dam body, improve service roads (reservoir construction, management and operation road).

First-year subprojects are selected and implemented in provinces of Nghe An, Thanh Hoa, Hoa Binh, Binh Dinh, Quang Ngai, Quang Ninh, Binh Thuan, Tuyen Quang, Phu Tho, Quang Binh.

## **1.2 APPROACHES AND METHODOLOGY FOR ESIA IMPLEMENTATION**

ESIA is carried out in accordance with the Law on environmental protection, policy and legal of Government of Vietnam (GoV) and regulations of WB.

### **1.2.1 Approaches and methodology for social assessment**

The purpose of this social assessment (SA), conducted in an integral manner with environmental assessment for this subproject, is two-fold. First, it examined the potential impacts of the subproject –positive and adverse impact –on the basis of planned project activities. Second, its findings inform the design of measures addressing identified potential adverse impact and proposing community development activities that are relevant to the project development goal. For identified adverse impact that could not be avoided, consultation with local people, governmental agencies, project stakeholders, etc., were carried out to ensure affected peoples will be appropriately compensated for, and supported in a manner that their socioeconomic activities will be promptly and fully restored to the pre-project level, at least, and that their livelihoods will not be worsen off, in the long run, as a result of the subproject.

As part of the social assessment, where ethnic minority (EM) peoples are present in the subproject area –as confirmed by the EM screening (as per Bank’s OP 4.10), consultation with them were carried out in a free, prior, and informed manner, to confirm if there is broad community support from affected EM peoples for the subproject implementation. EM screening was conducted as per Bank’s OP 4.10, and was done the scope and coverage of the social assessment vis-à-vis the environmental assessment (OP 4.01). A gender analysis was also done as part of the SA to understand underlying gender dimensions (from project impact perspective) to enable gender mainstreaming to promote gender equality, and enhance further the development effectiveness of the subproject, and the project as a whole. Depending on the magnitude of the identified potential project impact, and the project development objective, a gender action plan and gender monitoring plan were prepared (please see these plans in the Appendix 7 of this ESIA).

To ensure all potential impact could be identified during project preparation, the SA was conducted through series of consultations with various project stakeholders. A particular focus was maintained on households who are potentially affected (both positively and adversely). The research techniques employed for this SA include 1) review of secondary data, 2) field observations; 3) focus groups discussions/ community meetings, 4) key informant interview, and 5) households survey (Please see Appendix 1 for how the Sampling Frame). A total of 177 of respondents participated in the SA exercise for this subproject, of which 128 people participated in

the households survey (quantitative), and 49 people participate in focus groups discussions, community meetings, key informant interview (qualitative).

In Section 5, we will present the findings of the SA (positive and positive impact), including the result of the gender analysis. In section 4, we will present briefly the SA results, along with the recommendations on the basis of the SA findings. A gender action plan and gender monitoring plan are presented at Appendix 7 of this ESIA, and the public health intervention plan and public consultation and communication plan were presented at Appendix 5 and 6, respectively).

### **1.2.2 Approaches and methodology for environmental assessment**

- Field survey method: Collecting, synthesizing results from studies related to the project; Collecting and analysis data on topography, geology; meteorological, hydrological conditions; socio-economic conditions in the project area. This method is used to set natural, socio-economic condition of the project area.
- Sociological survey method: Taking survey, interviewing affected people (AP), a local authority in affected areas and beneficiaries.
- Realistic environment survey method:
  - Conducting a survey on realistic environment by field sampling and analysis of indicators in the laboratory to determine the status of surface water quality, groundwater quality and soil quality in the project area and surrounding areas.
  - The samples were taken out on location which is shown on the sampling scheme (Appendix 4).
  - Air quality is collected from the background environment reports of Phu Tho province or from similar projects in the project area in 2014.
  - The quality of surface water, ground water was taken by water sampling device as regulated in TCVN 6663-6:2008 (ISO 5667-6:2005). Handling and storage of water samples as regulated in TCVN 6663-14:2000 (ISO 5667-14:1998);
  - Samples of soil, water after taking were preserved and delivered to the standardized laboratory of the Institute for Water and Environment to analyse.
- *Rapid Appraisal method*: Use the pollution factors of the World Health organization (WHO) established to:
  - Evaluate the pollution load in wastewater and gas emissions.
  - Develop measures to mitigate pollution.
  - Estimate the load and concentration of pollutants generated during the construction and operation stages of the project, which evaluated quantitatively and qualitatively the impacts on the environment.

- *Comparison method:* Evaluating the impacts by comparison among the norms and standards for the quality of soil, water, noise, air and environmental standards related.



## PART 2

### SUB-PROJECT DESCRIPTION

#### 2.1 OVERVIEW OF SUB-PROJECT

- a) *The subproject:* Repair and improvement of Ban reservoir, Tien Luong commune, Cam Khe district in Phu Tho province

Ban Reservoir was built in 1976. Ban reservoir is IV grade work with basin area of  $2.48\text{km}^2$ , capacity of  $1.05 \times 10^6\text{m}^3$ , normal water level is of 31.5m. The work system includes categories: reservoir, dam A, B, C, spillway, water intake, and canal route and management road. The dam route is homogenous earth, length of 353.8m, 11m high, broad of the crest is of 6.5m. The spillway has threshold elevation of 31m, 20m broad, design flood flow is  $18\text{ m}^3/\text{s}$ . Water intake is located at dam C, is steel round culvert, 35m long, bed elevation is of 27m, design flow  $0.23\text{m}^3/\text{s}$ . However, degradation of Ban reservoir irrigation work has currently decreased capacity to supply water for economic development of the commune, and dangerous safety of downstream area.

- b) *Objectives of the subproject*

- Repair and improve the dam safety to ensure the reservoir safety in the context of climate change;
- Ensure a stable source of irrigation water for the traditional agricultural production, water for aquaculture.

- c) *Subproject owner:*

Department of Agriculture and Rural Development, Phu Tho province

Address: No. 215, Minh Lang str., Tien Cat ward, Viet Tri city, Phu Tho province.

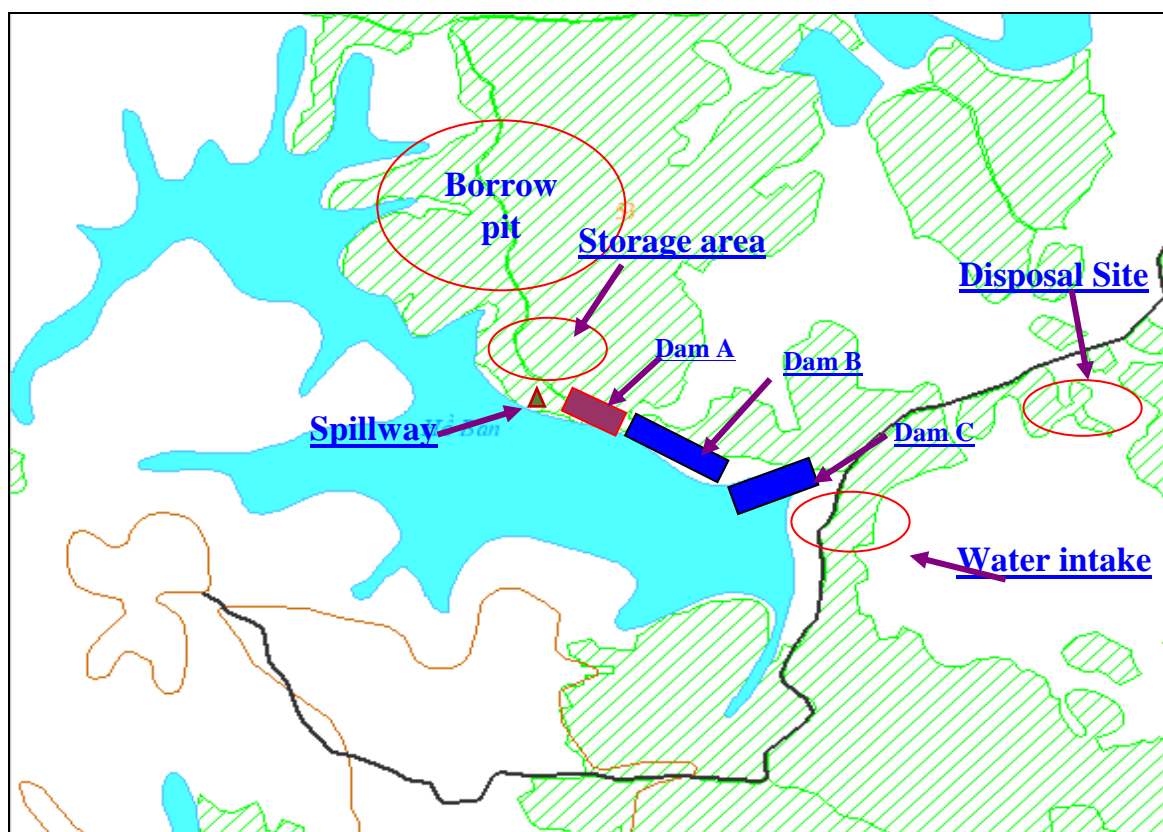
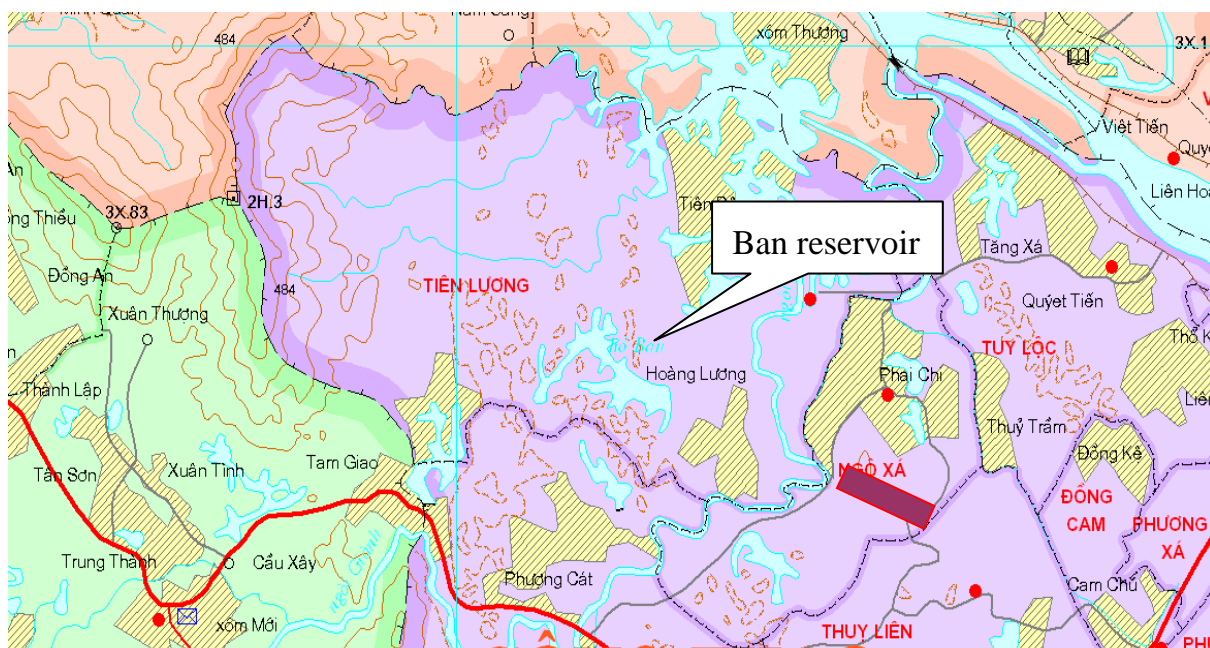
Phone number: 0210. 3 812 891

- d) *Location of the subproject:*

Ban reservoir is located at coordinates at  $21^{\circ}28'20''$  north latitudes and  $105^{\circ}01'$  east longitude, in Tien Luong commune, 12 km center of Cam Khe district to the North-West. Benefited areas of Ban reservoir is Tien Luong commune and Tuy Loc commune.

Geographical location:

- The north borders with communes Minh Coi, Vo Thanh - Ha Hoa district;
- The south borders with communes of Ngo Xa, Phuong Vy - Cam Khe district;
- The east borders with communes Ngo Xa, Tuy Loc - Cam Khe district;
- The west borders with Luong Son commune - Yen Lap district;



e) *Total investment budget:*

Total investment for the subproject is **25,515,398,000 VND**.

**Table 2 - 1: Budget for project implementation**

No	Constructed categories	Total
1	Construction cost	14,350,265,000
2	Project management cost	289,455,000
3	Cost for construction investment consultation	4,251,291,000
4	Other cost	1,304,807,000
5	Site clearance, compensation cost	3,000,000,000
6	Preventive cost (10%)	2,319,582,000
7	<b>Total</b>	<b>25,515,398,000</b>

(Source: Subproject investment report)

In which:

- ODA budget: 22,964 bil. VND (accounting for 90%)
- GoV budget: 2,552 bil. VND (accounting for 10%)

## **2.2 THE PROPOSED SCOPE OF WORK**

### **2.2.1 Proposed investments**

The subproject will invest into the categories with the following scale:

**Table 2 - 2: Scale of proposed construction of the subproject**

No	Category	Current parameter	Upgraded works
1	Dam	Earth dam is 11m high, dam crest is 354m long, and 6.5m wide; including 3 dams A,B, C; Upstream slope has not been reinforced, some places near the spillway has been eroded causing seepage formed.	Remain as the current condition, just move the centerline of the dams: Dam A: move centre line of the dams 4m toward upstream; Dam B, dam C: move centre line of the dam 4.5 m toward upstream Treat seepage on upstream slope; concrete placement on dam top and upstream slope, plant grass and install drainage facilities on downstream slope.
2	Spillway	Elevation of spillway is 31.5m; 10m wide. Currently, the spillway is earth, design flood flow is	New spillway is located on the left side of dam A, near the existing spillway, 5m toward dam B. Repairing, upgrading spillway with stone M100 coated by reinforced concrete M200 20cm thick;

No	Category	Current parameter	Upgraded works
		18 m <sup>3</sup> /s	chute is made of reinforced concrete M200, 14 m long, slope i=15%; width B = 10 m. It is free flowing spillway threshold, with stilling basin, flood discharge flow: Q <sub>max1,5%</sub> = 18 m <sup>3</sup> /s. Before construction of bridge crossing the spillway, bypass will be prepared to ensure travelling of local people.
3	Water intake	Water intake is located at dam C, 35m long, is steel encased concrete M200, diameter Φ600mm, design Q = 0.23 m <sup>3</sup> /s, water intake bed elevation is 27m. The drain valve has current been broken, drain body is broken, upper valve cannot be used anymore.	Build new water intake, 5m away from the old one, on the right side of dam C. Water intake is 35m long, is steel encased concrete M200, diameter Φ600mm, design Q = 0.23 m <sup>3</sup> /s.
4	Administration building	None	Located between dams A and B, at elevation + 340. Total land area is 810 m <sup>2</sup> , fenced with concrete brick and steel nets. The building comprises of 4 rooms, 108 m <sup>2</sup> .
5	Access road	The road is now earth road, L = 1600m, steep slope of the road is rather high, it is difficult to travel in rainy season	Upgrade Concrete road, length L =1600m, 5m wide of road surface, concrete M300, 22cm thick, beneath the concrete layer is sand layer 5 cm thick and 18cm thick macadam.

The volume of construction works and transportation of soil, rock and building materials

**Table 2 - 3: Estimated stone and construction materials transportation activities**

Items	Location	Quantity (exploring capacity)	Distance to construction site, transport routes
Borrow pit	Zone 4, Tien Luong	About 20,000 – 40,000m <sup>3</sup>	0.02 – 0.5km
Quarry	Cam Khe township	Not identified	25-30 km
Equipment suppliers (valve, etc.)	Viet Tri city	Not identified	80 km
Disposal site	Zone 4, Tien Luong, at ending point of the management road	300,000m <sup>3</sup>	2.5km
Construction materials suppliers	Cam Khe township	Not identified	7 km
Storage area	Zone 5, Tien Luong	1000 m <sup>2</sup>	300m

Total amount of topsoil removal and demolition of old works is estimated by design unit of 6,400m<sup>3</sup> and backfilling soil amount of about 6,850m<sup>3</sup>. Amount that utilized as backfilled soil is 6,300m<sup>3</sup>. Thus, remaining about of about 99,6m<sup>3</sup> of excavated soil will be dumped in disposal sites. Disposal site 2-2.5km from the construction site. Estimated capacity of the disposal site is about 1,000 – 1,500m<sup>3</sup>. In plan for new rural development of the commune, this land will be area for market construction. Amount of not enough land around 545.6m<sup>3</sup> will be exploited from a borrow pit adjacent to the access road. It is currently a hill with planted eucalyptus, reserves from 20,000m<sup>3</sup> to 40,000m<sup>3</sup> managed by 3 HHs in zone 4, Tien Luong commune.

### 2.2.2 List of workers, machinery, and equipment for construction

The preparation stage of land clearance needs 20-30 workers in the short term (1 month). The number of workers in the construction site in the peak construction time is about 50 people

**Table 2 - 4: Expected machinery, and equipment used for construction**

N <sup>o</sup>	Name	Capacity
1	Bulldozer	110 CV
2	Excavator	Bucket 1,6m <sup>3</sup>
3	Truck with load	7 ÷ 10 T
4	Mixer	250 l
5	Concrete compactors	
6	Generator	100 KVA
7	Water pump	120 m <sup>3</sup> /h

## 2.3 THE CONSTRUCTION SCHEDULE

**Table 2 - 5: Implementation schedule**

No.	Construction categories	Construction time (month)	Beginning time	Finishing time
1	Water intake	2	October	November
2	Dams	9	October	June
3	Spillway	9	October	June
4	Access road	4	September	December

## **PART 3**

### **POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK**

Project Repair and improvement of Ban reservoir, Tien Luong commune, Cam Khe district, and Phu Tho province will not affect to ethnic minority. No natural forest, reservation area, wet land and rare and precious animal and plant species in the project area is found. Impacts of the project mainly relate to natural environment due to activities during construction such as earth work, repairing work items, material and waste transportation, etc. and some impacts on social environment due to temporary and permanent land acquisition of 15 households. Policy framework, institution and regulation applied in ESIA of the project include:

#### **3.1 APPLICABLE NATIONAL AND REGULATIONS**

##### **a) Policy framework on environmental assessment**

*Law on environmental protection* (2014) has defined the issues relating to strategic environmental assessment, environmental impact assessment and environmental protection commitments for development activities. Development of environmental impact assessment report is carried out simultaneously with the process of setting up an investment project (feasibility study report). Time of making, appraisal and approval of reports are specified in detail in Item 2 of Article no. 13 of Decree no. 21/2011/ND-CP. Environmental screening (type of environmental assessment for the project) is done according to the list of project types in Annex 2 of the Decree no. 18/2015/ND-CP.

*Environmental assessment.* In Chapter 4 of Decree No. 18/2015/ND-CP dated 14/02/2015, from Article 12 to Article 17 specifies the formulation, evaluation and approval of environmental impact assessment reports and the implementation of projects and measures to protect the environment before the official operation of the project and operational phases of the project. Article 12 of this Decree defines that during the implementation process of environmental impact assessment, project owners must conduct consultation meeting with People's Committees of communes, wards and townships (collectively CPC) where project will be carried out, organizations and communities directly affected by the project; study, receive objective opinions and right proposals of the consulted stakeholders in order to minimize the adverse impact of the project on natural environment, biodiversity and community health . Annex 2 of the Decree states that Environmental Impact Assessment must be done for the project to build reservoirs with the capacity of 100,000m<sup>3</sup> and more.

*Environmental protection plan.* Chapter 5 of Decree No. 18/2015/ND-CP dated 02/14/2015, from Articles 18 and 19 defines the object to develop environmental protection plan is new investment projects. Projects to invest into expanding the scale, increasing the capacity of the production, business and services agencies are not subject to develop environmental impact assessment Report specified in Annex II of this Decree.

According to regulations of GoV, the project "Repair and improvement of Ban reservoir, Tien Luong commune, Cam Khe district" will be performed report Environment Impact Assessment.

#### **b) Policy framework for dam safety**

Decree No. 72/ND-CP dated 05/07/2007 of GoV on dams safety management in Vietnam has defined construction, management and ensuring safety of the dams. According to this Decree, large dams are dams with height from 15 and or capacity of reservoir from 3 mil. m<sup>3</sup> or more; medium dams are dams with height from 10m to 15 m or capacity of reservoir from 1 to 3 mil. m<sup>3</sup> and small dams are dams with height from 5 to 10 m or capacity of reservoir from 50,00 to 1 mil. m<sup>3</sup>. According to this decree, the dam owner should have plan to operate the reservoir, sluices and related works, inspect and monitor dam safety and hydrological conditions, maintain and protect the dam, rescue dam, report dam safety, implement flood protection for downstream areas. All plans must be taken seriously. MARD is responsible for state management of dam safety. Water resources department under MARD is responsible for performing the function of dam safety management in the country. Ministry of Industry and Trade is responsible for State management of hydroelectric dams. PPCs are responsible for State management of reservoirs in the province. PPCs assign DARD to implement this function.

#### **c) Policy framework related to land acquisition and resettlement**

Land Law no. 45/2013/QH13 takes effect from 07/01/2014 and the decrees relating to land acquisition, compensation and resettlement applied in Vietnam and the provisions of the cities/provinces constitute the legal framework confirms the right of citizens on the land use rights and assets attached to land, land classification, land use origin, legal nature and legitimacy, classification of compensation and support types, regulations on land acquisition, compensation and resettlement, safety requirements for safety corridors of dam, reservoirs, irrigation works.

### **3.2 WORLD BANK SAFEGUARD POLICIES TRIGGERED**

The provisions on environmental protection of WB are given in form of operational policies (OPs), which includes 10 policies, from which important policy relating to the environment is OP 4:01 on environmental assessment. Here is a summary of the WB's policy related to the sub-project:

**Table 3 - 1: Environmental World Bank safeguard policies related to the project**

<b>Name</b>	<b>Objectives</b>
OP 4.01 Environmental assessment	<ul style="list-style-type: none"> <li>• Ensure that the proposed project is sustainable and ensure environmentally and socially.</li> <li>• Provide for the decision makers information about the potential risks of environmental and social issues associated with the project.</li> <li>• Increase transparency and participation of affected people in the decision-making process.</li> </ul>



Name	Objectives
OP      4.37 Safety    of Dams	The essential problem for the safety of dams in: <ul style="list-style-type: none"> <li>• The projects involve in construction of new dams</li> <li>• The project may be affected by safety factors of operating an existing dam or dams under construction</li> <li>• The other important issues: dam height, reservoir capacity, suitability of safety standards</li> </ul>
OP      4.12 Involuntary Resettlement	<ul style="list-style-type: none"> <li>• Avoid or reduce compulsory resettlement and the influence on economic activities, including loss of livelihoods</li> <li>• Provide transparent compensation procedures in the compulsory acquisition process of land and other assets</li> <li>• Provide adequately for people resettled new investment resources and opportunities to benefit from the project (implemented through resettlement plan)</li> <li>• Restore and improve the living conditions of people affected by the project</li> <li>• Compensation for affected people at replacement cost. The resettlement planning and mitigation measures should be taken on the basis of consultation with those affected and by the participatory approach.</li> </ul>

## PART 4

### ENVIRONMENTAL AND SOCIO-ECONOMIC CHARACTERISTIC OF THE PROJECT AREA

#### 4.1 PHISYCAL CONDITION

##### 4.1.1 Natural conditions

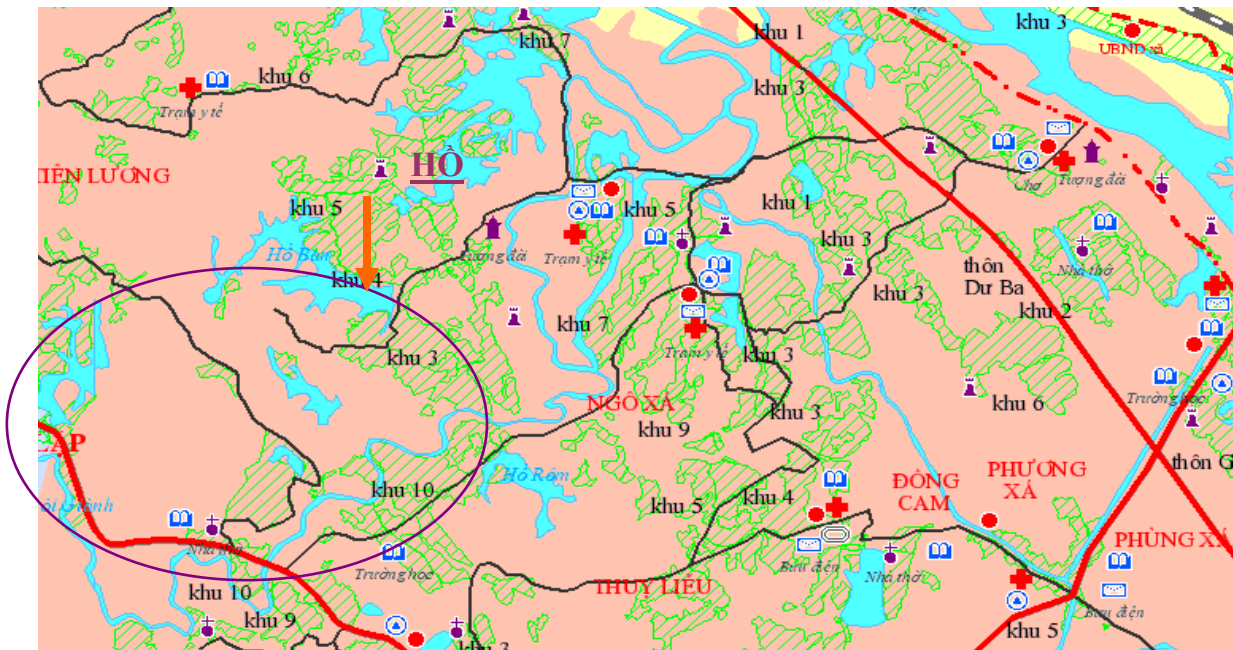
##### Geographycal Location:

The Ban reservoir is located at coordinates at 21<sup>0</sup>28'20" north latitudes and 105<sup>0</sup>01' east longitude, in Tien Luong commune, 12 km center of Cam Khe district to the North-West of Phu Tho province.

**Table 4 - 2: Coordinates of Ban reservoir**

No	Point	Longitude	Latitude
1	Most easterly point	21 <sup>0</sup> 28'10"	105 <sup>0</sup> 01'06"
2	Most westerly point	21 <sup>0</sup> 28'09"	105 <sup>0</sup> 00'28"
3	Most southerly point	21 <sup>0</sup> 28'05"	105 <sup>0</sup> 01'05"
4	Most northerly point	21 <sup>0</sup> 28'25"	105 <sup>0</sup> 00'25"

Phu Tho is situated in northern mountainous and midland region of Vietnam. Benefited areas of Ban reservoir is Tien Luong commune and Tuy Loc commune. The reservoir is bordered with Minh Coi and Vo Thanh communes of Ha Hoa district to the north, with Ngo Xa and Phuong Vy communes of Cam Khe district to the south, with communes Ngo Xa and Tuy Loc communes of Cam Khe district to the east and with Luong Son commune of Yen Lap district to the west.



**Figure 4 - 1: Map of project location**

### Hydrological and meteorological conditions:

Ban reservoir is located in northern mountainous and midland region, in tropical monsoon region. The highest air temperature appears in the June, July, and August up to 38°C, the lowest is in December, January, and February of 4.1°C. Average temperature, even in high mountainous regions, is ranging from 12 – 23.3°C, temperature gap between hottest and coldest places is up to 12.5°C. The relative humidity of the air is high, monthly average humidity is over 80%.

Average wind speed of the study basin has the lowest level compared with other regions of the country. The common annual average wind speed is around 1.0 to 1.5 m/s. Usually, the wind in March, April is stronger than other months. The average sunshine hours annually are from 1350 to 1500. From May to July in summer are the sunniest months of the year. The lowest sunshine hour months are February and December.

In this basin, average evaporation over 80mm appears only in the period from May to July. Annual rainfall of Ban basin area is  $X_0 = 1528\text{mm}$

### River network:

The density of rivers in the project area is not uniform across regions from very sparse density level to thick density ( $0.46\text{--}1.94\text{ km/km}^2$ ). Distribution of river network is dense to very dense in the west and the northwest, where the rainfall level is the highest in the basin. The rainfall level in the East and the Northeast is low, distribution of river here is sparse. There are 3 large rivers flowing across Phu Tho province : Red River (segment from Lao Cai province to Viet Tri city named Thao River), Lo River and Da River. They join together in Viet Tri city, where called river junction. There is no river in Tien Luong commune, but Gianh stream crossing with length of about 5.5km; water volume is relatively plentiful.

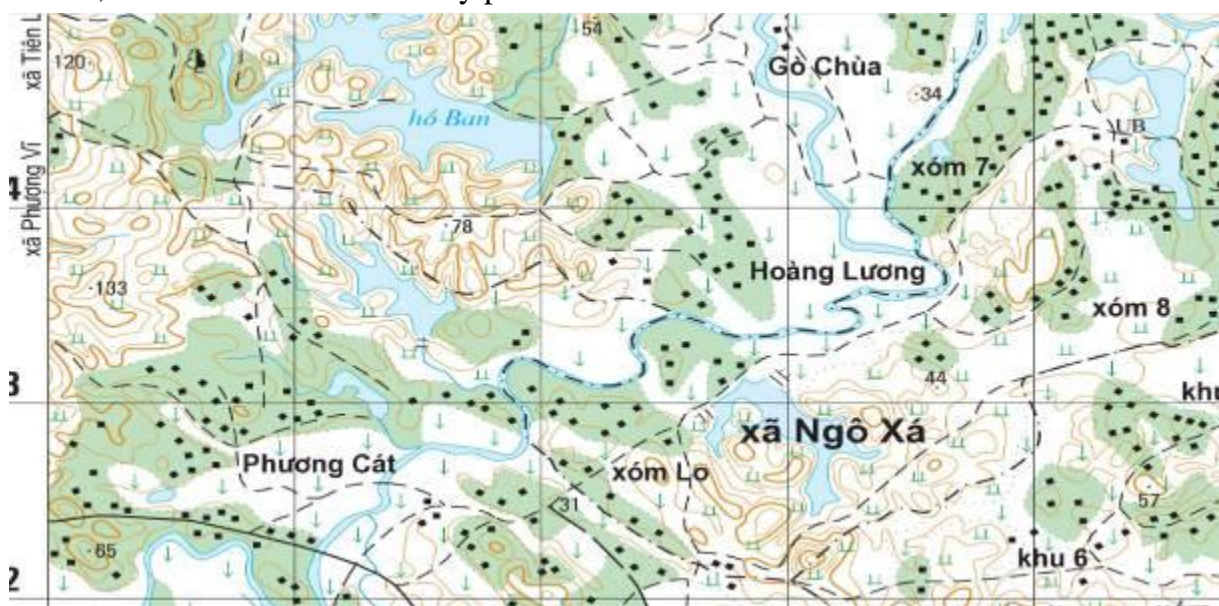


Figure 4 - 2: River network

### **Topography:**

The study area is characterized by the general topography of Phu as mountains, midlands and plains interspersed. The topography is divided into various subregions. High mountainous subregion in the west and the north of the province, and low hill subregion is much fragmented, alternating with field and plain range along the Red River Delta, right bank of Lo River, left bank of Day River. The terrain is mostly mountainous, the flat land scattered. Mountainous region accounts for 79% of natural land area of the province; midland area accounts for 14.35% ; plain – 6.65. The highest point has an elevation of 1,200 meters over sea level, the lowest point is 30m high; average height is of 250m compared to sea level.

### **Geology:**

No sign of fragment cutting through the reservoir area during mapping process is revealed. The reservoir bank is covered with weak permeability rock and soil; groundwater levels in the watershed line is much higher than normal water level. With such geological conditions, possibility of water loss into next basin from Ban reservoir is not likely to take place.

Backfilling soil layer: Mainly semi-heavy clay and few particle, yellow brown, reddish brown, hard plastic state, tightly medium structure. Thickness of the layer varies from 0.8 -:- 6,1m, distributed at dam A, B, C, water intake and spillway route with medium water permeability.

Layer 1: Semi-heavy clay and few particle and organic humus, gray brown, gray green (particle occupies for 1-:-6%, size 2-4mm). Soft plastic state, tightly medium structure. Layer 1 is distributed in the old stream bed heart, dam A, B, C and water intake route, thickness varies from 0.8-:-3,1m with strong water permeability (according to NTR4253-86).

Layer 4: Semi-heavy clay and few particle, yellow brown, reddish brown (particle component is clay with soft friable texture, particle concentration occupies 1-:-9%, size 2 -:- 10mm). Hard plastic state, tightly medium structured. Layer 4 is distributed in dam A, B, water intake, thickness varies from 0.9 -:- 4.5 m with medium water permeability, (according to NTR4253-86).

## **4.1.2 Water environment**

### ***4.1.2.1 Surface water***

The catchment area of Ban reservoir is  $2.48\text{km}^2$ , the annual flow is  $0,0288\text{m}^3/\text{s}$ , and the water active storage of Ban is  $1.05 \times 10^6\text{m}^3$ . Water source for irrigation mainly comes from Ban reservoir, while Ban reservoir does not meet the water requirements because the auxiliary works have been seriously degraded decrease capacity of the reservoir. The water level is often lower in the January to May every year.

There are 9 zones in Tien Luong commune taking water directly from Ban reservoir for agricultural production and partly for living purpose.

**Table 4 - 3: Surface water sampling location**

No	Symbol	Sampling location	Coordinates X	Coordinates Y
1	NM1	Upstream slope	527991,02	2374463,77
2	NM2	Dam position (reservoir bed)	527576,87	2374638,04
3	NM3	Downstream area – irrigation canal	527206,32	2373494,01

The detailed results of surface water analysis are showed in Appendix 2.

The physical and chemical criteria ( $BOD_5$ ,  $NO_2^-$ ,  $NO_3^-$ ,  $PO_4^{3-}$ ,  $SO_4^{2-}$ ) and heavy metal (As, Pb, Cd, Fe) of surface water are all below the allowed limitation in NRT08:2008/BTNMT, column B1 – water quality for irrigation, drainage and aquaculture.

Comparing to the above water quality analysis to NRT39:2011/BTNMT – National Technical Standards on water quality for irrigation, all criteria such as: pH, DO,  $SO_4^{2-}$ , As and Cd are below the allowed limitation, ensuring quality for irrigation.

Almost project areas are in rural, there are nearly no industrial production activities; the main waste sources are from agricultural production and livestock activities. However, these waste sources are not insignificantly, water environment water quality in project area is quite good. It can be used for irrigation or other purposes which have the same water quality requirement.

#### **4.1.2.2 Ground water quality**

River network in the project area is quite dense, however rivers are mostly short and steep, water volume provided for ground water layer is insignificant.

According to survey data in 2015, since annual rainfall is uneven, water volume on rivers, streams, reservoirs depletes in dry season, which affecting not only the production but also to human activities people in the region.

**Table 4 - 4: Ground water sampling location**

No	Symbol	Sampling location	Coordinates X	Coordinates Y
1	NN1	House of Mr. Long, zone 4	527555,08	2374659,82
2	NN2	House of Ms. Ha, zone 3: 300m away from land fill	528176,3	2374572,69
3	NN3	House of Mr. Chien, zone 4, next to spillway area	527685,86	2374736,06

Analyzed results showed that ground water quality in project area is relatively good. Physical and chemical indicators (pH, total hardness) and indicators about toxic (Pb, As, Cd, Hg) are in the allowed limitation of NTR 09:2008/BTNMT; Ecoli and Coliforms criteria has not been found in water samples; excepting COD and Fe criteria. COD is from 2.5-4.5 times higher than the standard and Fe is from 25-4.6

times higher than the standard. These show that ground water in project area is polluting contamination.

The detailed results of surface water analysis are showed in Appendix 2.

#### **4.1.2.3 Factors influence to water environment**

In general, water quality in the projects region is at good condition, because within a radius of 30km there is no large scale industrial or urban waste source. The main factors affecting water resources in the subproject are:

- i) Pesticides, chemical fertilizers used in agriculture
- ii) Domestic waste from households and farms. Currently, there are 5 livestock farms in the commune. Although these farms have been complied with the regulations on wastewater treatment in livestock but they are also as a source of minor impact on water quality
- iii) Dust, garbage: These sources cause minor impact on water quality due to garbage thrown down in some locations around Ban reservoir.

#### **4.1.3 Air environment**

Tien Luong is a mountainous commune in Cam Khe district, Phu Tho province. Except for the areas along the road in the dry season, it is little influenced by dust, but not significantly. According to the collected data, results of monitoring and analysis of ambient air quality at other communes around Tien Luong commune showed that the criteria are much less than allowed regulations (NTR 05: 2009/BTNMT);

The project scope is located far from the center, population density of the area is low. The main occupation is agricultural production. On the other hand, density of large trees is high. The work is located in geographical area of one commune, air environment is relatively clean, no signs of contamination.

Similar to air quality described above, there is almost no noise pollution source or vibration source in the area affected directly and indirectly by the project, excepting for sources from vehicles. It was observed that daily traffic flow is quite low, noise and vibration levels are within the allowed limits by regulation.

#### **4.1.4 Soil environment**

**Table 4 - 5: Soil sampling location**

No.	Symbol	Sampling location	Coordinates X	Coordinates Y
1	Đ1	At water intake	5927914,73	2374376,63
2	Đ2	At spillway	527522,38	2374561,79
3	Đ3	Irrigation area in Zone 5	528067,31	2374322,17



As the results from analysis, heavy metal concentration in 3 soil samples is within allowed limitation (NTR 03:2008-BTNMT) for agricultural soil. Thus, in the study area there is no sign of pollution by heavy metal.

The detailed results of soil sample analysis are shown in Appendix 2.

## **4.2 BIOLOGICAL ENVIRONMENT**

There is no forestry land area in land use structure of Tien Luong commune. Common fruit trees planted in the area include banana, apple, grapefruit, etc. However, because of low value, these kinds of trees have not been currently abundant. People in surrounding area are mainly engaged in agriculture and small trade, vegetable crops are mainly vegetables, fruits, rice. Aquatic fauna in the region are common species, characteristic of the fresh water fish such as carp, grass carp, etc. raised in ponds. In addition, there are fishes living in river such as mud carp, tilapia in this area, however the amount is not much compared to other regions in the province. The animal species in areas are such as cattle, pigs, chickens, ducks, geese, goats, etc.

In general, ecosystem in surrounding area and nearby area of project position is no longer diverse, plant crops and other types of aquatic ecosystems no longer strongly developed. Urbanization in the region partly influence to this situation. The flora and fauna are not the types to be protected or preserved in terms of biodiversity. There is no rare plant and animal species should be preserved

Within 50km radius from the project position, there is no sensitive area, such as: wetland area, conversation area, protected park, ecological reserve, genes and biosphere reserved area; security and defense area.

## **4.3 SOCIO-ECONOMIC AND CULTURAL CHARACTERISTICS**

### **4.3.1 Population**

The total population of Phu Tho province in 2011 was 1,327,600, of which 672,512 are women (representing 50.65%). Number of female employees is 439,794 people (representing 50.65%) of the total workforce of the province of 868,300. More than 34.52% of such female employees work in agriculture, forestry and fisheries sector, 10.63% higher than men (accounting for 23.89%). So there is a difference between male and female workers in agriculture, forestry and fishery workers because male workers was mobilized to work in the industrial sector (accounting for 15,541%) and services (accounting for 9.92%). This is also the reason for the big difference between the proportion of men and women working in the industrial and construction sector. This sector attracted 15.54% of male workers and only 3.95% of women workers, much less than men. The average unemployment rate of the province is 5%. However, this rate is 3% for men, and 7% for women, twice as much as men.

There are more than 28 ethnic groups living in Phu Tho province in which Kinh accounted for the largest percentage with 85.89% of the total population, the remaining 27 ethnic minorities accounted for 14.11% of the provincial population.

The main income of the people is from agriculture, forest and handicrafts. The products are mainly rice, other agricultural and livestock products. The average income is about VND25 million/person/year.

According to the statistics of 2014, population in Tien Luong commune is 5,927 people equivalent of 1,224 households, in 10 administrative areas. The average population density is 298 people/km<sup>2</sup>, but uneven distribution. In which male accounts for 51.5% and female accounts for 48.5%. The population of working age is in a high proportion, about 65%. Population growth rate of the commune is of 1.15% /year. The inhabitants are scattered in 10 areas in the commune. Children under 16 years old account for 20% of the population.

#### **4.3.2 Socio-economy**

##### ***4.3.2.1 General view of socio-economic condition in project area***

Phu Tho has 12 administrative units including Viet Tri city, Phu Tho town, Doan Hung, Ha Hoa, Thanh Ba, Cam Khe, Phu Ninh, Lam Thao, Tam Nong, Thanh Thuy Thanh Son and Yen Lap district. Viet Tri city is the political - economic – cultural center of the province; 274; commune-level administrative units consisting of 14 wards, 10 towns and 250 communes, including 214 mountainous communes 7 upland communes and 50 communes in extremely difficult ..

The total natural area of Phu Tho is 3519.56 km<sup>2</sup>, according to a recent soil survey, land of Phu Tho province is divided into the following groups: gold and red Feralit soil developed on clay, 116 266 27 ha accounted for 66.79% (area of investigation). Land altitude is usually above 100m with steep slopes, rather thick soil layer, heavy mechanical composition with rather high content of humus. This land is often used for forest plantations, some areas with the slope of less than 25° can be used to plant industrial crops.

Currently, Phu Tho still uses approximately 54.8% of potential agricultural – forestry – fishery land; unused land remains 81.2 thousand ha, of which there are 57.86 thousand hectares of hills and mountains.

Cam Khe district is located in the Northwest of Phu Tho province, is one of the 13 administrative divisions of Phu Tho province. With half mountain – half plain terrain, lower from Northwest to Southeast, this peaceful land is formed by two quite distinct regions: the mountains and the riverside. With a total natural area of 23,425ha, the length of the district is 45 km, the average width of the district is 4 km, Cam Khe borders Thanh Ba district to the East with the boundary of Thao river with red water all year-round by alluvium; borders Yen Lap district to the West by the acr mountain range in Hoang Lien Son range running along from the Northwest to the Southeast; borders Tam Nong district to the South by the Bua river flowing from the West to the East and pouring to Thao river, the boundary is the river flowing from west to east hammer down the river Sports; borders Ha Hoa district to the Northby the Gianh canal – a small branch of Thao river.

##### ***4.3.2.2 The social-economic condition of people at Tien Luong commune***



*The social-economic condition:*

In the subproject area, Tien Luong commune is a mountainous province located in the Northwest of Cam Khe district, Phu Tho province. The survey found that this commune is a poor commune focusing on agricultural production, other industries, services and auxiliary industries account for a small proportion, the infrastructure for production is till poor, local people's life based primarily on agricultural production while a large area of agricultural land is dependent on natural conditions which are not active in irrigation, crop yields is precarious , often unstable, people's lives face many difficulties.

Tien Luong commune is poor agricultural commune of Cam Khe district. Economics of Tien Luong is mainly dependent on agricultural activities at the rate of labor in agriculture of about 75%. Time for agricultural activities accounts for about 30 to 40%, while the other occupation and services in local does not develop.

**Table 4 - 6: Synthesis of some basic information on the socio-economic conditions in Tien Luong commune**

Item	Value
Land area	1,990.28ha
Agricultural land area	1,629ha
Population	5,927 people (2014)
Rate of ethnic minorities	Kinh: 93.7%; ethnic people; 6.3%
Average income per person	14.4 bil. VND
Population in working age	4,200
Labors in agriculture	75%
Labors in the field of handicrafts	15%
Labors in service field	15%

*(Source: Statistic in Tien Luong commune, 2014)*

Land use structure in subproject area is expressed in table below:

**Table 4 - 7: Land use status in subproject area**

No.	Zone	Natural are (ha)	Agricultural land (ha)		Forestry land (ha)	Aquaculture land (ha)	Other agricultural land (ha)	Traffic land (km)
			Rice	Crop				
1	Zone 3	163	8,7	2,7	0	1,0		0,8
2	Zone 4	126	21,3	50,3	0	6,2		2,9
3	Zone 5	120	25,0	3,7	0	4,3		1,5
4	Zone 6	137	21,3	3,7	0	7,0		2,6
5	Zone 7	70	3,5	1,3	0	3,2		2,0
6	Zone 8	89	3,7	2,0	0	3,5		2,1
7	Zone 9	176	1,8	4,0	0	2,3		1,8
	Total	881	85	68	0	28	0	14

### Demographics:

The average number of household members in the survey sample in the project area is 4.4, much higher than the national average demographics in households, which is 3.9 (Statistical Yearbook, 2013). There are no difference in the number of inhabitants per household between communes, ethnic groups, income groups, female-headed households and male-headed households.

In terms of ethnic minorities, the average scale of an ethnic minority is 4.5 persons and that of Kinh group is 4.4 persons. By gender of head of household, number of female-headed households is less people than its of male-headed households (respectively 4.35 compared with 4.46) (Pls refer to Table 4-7)

**Table 4 - 8: Demography and average laborers per household**

Content	Demography	HH structure by scale of Demography (%)			
	Average in HHs	1-2 people	3-4 people	5-8 people	Above 9 people
Total sample	4,4	22,8	36,2	33,0	8,0
By commune/ Ward					
Tien Luong	4,4	22,8	36,2	33,0	8,0
By ethnic minorities					
+ Kinh	4,4	21,5	36,5	35,0	7,0
+Ethnic minority	4,5	17,9	38,3	35,8	8,0
By HH gender					
+ Male Headed households	4,46	20,5	38,8	33,2	7,5
+ Female Headed households	4,35	21,9	34,9	35,2	8,0
By income group					
Group 1 (the poorest)		18,3	37,5	36,2	8,0
Group 2		19,2	35,8	37,5	7,5
Group 3		15,3	33,5	37,5	8,5
Group 4		14,8	43,0	35,7	6,5
Group 5 (The richest)		13,8	46,5	35,2	4,5

*Source : Survey Data*

By income groups, for Tien Luong commune, the HH size of 5 persons and more is equal in groups by income, group 1 (36.2%), group 2 (37.5%), group 3 (37.5%), group 4 (35.7%) and group 5 (the richest 35.2%). This indicates that in Tien Luong commune, the large scale family with many members is also one of the reason from poverty of people in the commune, the rate of 3<sup>rd</sup> and 4<sup>th</sup> child in the commune is still popular

The analysis of the household structure by demographic scale in the project area showed a majority of households has 3-4 person (36.2%) and 5-8 persons (33.0%); those households with 1-2 persons (22.8%) is popular in the families of communal officers, those households with 9 persons and more only accounts for 8%. Compared to the size of nuclear family in Vietnam, the rate of families with many children in Tien Luong is rather high.

Thus, the survey data shows that the model of few member family occupies higher percentage, this also make the economic conditions of surveyed households develop slowly and at average level and indicating that the development of the project area is also at average level.

#### Occupational structure

Among the occupational structures of family members having jobs and income in the project area survey, agro-forestry-fishery sector accounts for 58.6% as the highest; small handicrafts have the percentage of 9.6% as the second rank; remaining are staff-officers, employees, workers with the percentage of less than 10% for each category. Thus, the agriculture-forestry-fishery is the dominant sector in the economy - society of the project area, where the majority of the workforce lives.

**Table 4 - 9: Main occupation of laborers**  
(Including all member of HHs involved in labor force)

Contents	Labor health loss	Agriculture forestry and fishery	Trade and services	Officials and employees	Pupils and students	Handicraft	Hired	Jobless	Not suitable	Others
Total samples	3,0	58,6	8,5	3,0	5,8	9,6	6,5	5,0	0,0	0,0
By communes										
Tien Luong	3,0	58,6	8,5	3,0	5,8	9,6	6,5	5	0	0
By ethnic minorities										
+ Kinh	4,2	58,0	7,8	5	6,5	8,5	5,6	4,4	0	0
+Ethnic minority	5,0	54,2	10,5	4,5	2,5	8,6	6,5	8,2	0	0

The rate of HHs which do agriculture-forestry-fishery of Kinh group is equal to ethnic minorities (58.0% compared to 54.2%). In addition, the rate of HHs with non-agricultural occupation of Kinh group is also equal to ethnic minorities. For Kinh households, the rate of business households accounts for 10.5% and the rate of employed people in ethnic minorities also accounts for 6.5% only.

In terms of occupational status, the contribute to the family income at present, the survey showed that the proportion of dependents in Tien Luong commune is low

accounting for under 10%, of which a significant proportion of the unemployed and semi-unemployment. The subjects included eat most students, students, and the rest are still small/elderly, lost labor and even are in working age, health but does not have a job. The project will increase the area of irrigated land, more seasonal produce in a year, diversifying outside the plantation industry (such as livestock, and professional services that use other countries); thereby increasing jobs and eliminate unemployment and underemployment present in the project area.

On the other hand, will have a significant negative impact on the livelihoods of households are relatively stable land recovered without implementing the mitigation measures to be effective in design, construction and compensation reasonable for the affected people can buy replacement land or a new job change. In terms of occupational rate contributing to the family income currently, the survey shows that the number of dependents is as high as 20%, of which there is a significant proportion of the unemployment and semi-unemployment. The dependents include pupils with the highest numbers, students, and the rest are young/elderly, those who are in labor health loss and even those in working age but unemployed. The project implementation will increase the area of irrigated land and seasonal crops per year, diversify the plantation (such as livestock, and other professional services that use water); thereby create more jobs and eliminate unemployment and underemployment in the project areas. On the other hand, there will have some significant negative impacts on households, whose livelihoods are relatively stable and whose land is acquired, if there are no effectively applied mitigation measures, reasonable construction and compensation for the affected people for them to buy another land or have a new job.

In general, for people living Tien Luong commune, the livelihood is mainly agriculture, commonly two rice crops and one secondary crop a year. Therefore, the safety of dams and water stability for irrigation is very important for agricultural production in the residential areas, while there is a high demand of water for agriculture activities in most surveyed areas but actually it is not proactive. In the entire commune, there are 9 hamlets which take water directly from Ban lake for production and a part of it is for daily use.

In actual qualitative surveys in the project area show that in the past there were some contradictions, conflicts between farmers, inequality of water supply amount because some households have more favourable conditions in receiving more water for their slots if they are at the upstream of the water resources. This is caused by the reservoir's water loss. The repair and rehabilitation of reservoirs will address the lack of equality of water supply for the upstream and downstream.

### Land

In Tien Luong, agriculture is the main production activities, the basic livelihood of the people, so that land is the main production resource of farmers. Of which, 89.5% HHs have residential land, 100% HHs have paddy land, 75.5% HHs have land for vegetables, 25.6% of HH have land to plant industrial trees and 15.3% of HHs have ponds and water surface.

The data of land of all types of surveyed households in the project area showed that agriculture and farming are popular in the localities. Therefore, the demand for irrigation for agriculture in these regions is very high, the lack of water in 1-2 months will certainly affect the lives of local people.

By income, the two lowest income groups (group 1, 2) have the rather high percentage of arable land types, thus we can see that they depend mostly on agriculture. It is obvious that the lack of arable land is now only one of the reasons causing poverty in agriculture area, rural areas, but the demand for water irrigation for cultivation land is important. For the purpose of reducing poverty, the stability and increasing of irrigated areas, increasing crops/ season/ year for the existing area as well as increasing activities of non-agricultural employment is very important.

**Table 4 - 10: Kinds of land of households**

Unit %

Contents	Residential land	Paddy field area	Land for vegetables, secondary crops	Land for industrial trees	Ponds, surface water
Total	89,5	100	75,5	25,6	15,3
By commune					
Tien Luong	89,5	100	75,5	25,6	15,3
By income					
+ Group 1	85,0	100,0	75,5	10,5	0,0
+ Group 2	90,0	100,0	62,3	19,2	6,4
+ Group 3	88,2	100,0	65,2	20,9	13,6
+ Group 4	80,5	100,0	63,2	20,2	17,5
+ Group 5 (the richest)	99,0	100,0	68,9	32,7	24,3

*Characteristics of irrigation management:* Currently, Ban reservoir is managed and operated by Tien Luong agricultural cooperative. This cooperatives manages all irrigation works and reservoirs in the commune. Ban reservoir is the largest work that the cooperatives in charge of.

The cooperative is inter-village scale, organizational structure of 7 people, Cooperative governing board has size of 3-5 people; DPC assigns business license for cooperatives; Cooperatives has an account, seal and is licensed to operate in the field of mining irrigation works and receive subsidies funding for irrigation charges.

### **4.3.3 Culture – Society**

#### ***4.3.3.1 Insurance – Health care***

Tien Luong commune has 1 health center, 6 staffs and 7 beds. Health center primarily perform duties of initial health care, especially immunization for children and pregnant women, as well as distribution drug under insurance. There is 01 health

care staff in every neighborhood. This staff is in charge of management, reporting problems related to primary health care. In the process of preparing and implementing the project, it is possible to call for support of health center for problems related to health

There is about only 30.5%% of surveyed households last month were ill. This is an average rate and this shows that the people in the commune receive rather good healthcare. There are no HIV / AIDS people in the region, and there are no people who earn money from prostitution.

**Table 4 - 11: Health and health care conditions**

Contents	With sick person in the past one month	With medical insurance
Total		
By commune		
Tien Luong	30,5	85,0
By ethnic minorities		
+ Kinh	25,0	90,0
+Ethnic minority	25,5	60,5
By income		
Group 1 (the poorest)	30,5	65,4
Group 2	25,1	76,0
Group 3	25,5	80,1
Group 4	23,3	85,8
Group 5 (the richest)	10,2	95,5

The number of surveyed households having insurances of all kinds is relatively high, accounting for 85.0%. In particular, the health insurance rate in the highest income group is at the highest of 95.5%.It is noteworthy that the number of surveyed households of Kinh group (90.0%) is lower than that of ethnic minorities (60.5%). The incidence of medical insurance in the highest income households (95.5%) is much higher than it of households with the lowest incomes (65.4%).

According to the respondents of surveyed households, in Tien Luong commune, there are four main reasons causing negative impacts on the health situation are listed as follows from the highest to lowest level, namely: polluted water, polluted areas, foods insecurity, and lacking of running water.

Two out of five important reasons adversely affecting people's health and relating to water is the water source pollution (accounting for 25.8%) and lack of domestic water (accounting for 26.1%).

#### **4.3.3.2 Education**

There are 5 public schools, including one secondary school and 02 primary schools and 02 kindergartens in Tien Luong with a total of 560 secondary school students, 600 primary school students. Percentage of attendance of pupils is 100%. Repetition percentage of secondary school students is 0.1%.

About nearly 90.0% of the project population graduated from elementary school to college/ university or higher, in which more than 63.3% people graduated from junior high school and high school. Only 17% people graduated from college/ university or higher. The illiteracy rate is 1.0%. The rate of preschool people in communes of project areas is 8.0%, which is higher than the national average as stated in the Statistical Yearbook 2013 (6.0%). It is noteworthy that the rate of people graduated from college/ university or higher is 17%.

The rate of illiteracy in ethnic minorities is higher than that of Kinh group (4.5% compared to 0.5%) and the pre-schooling rate (8.3% compared to 6.5%). According to the standard of living, the illiteracy rate in the poorest income group (group 1) is 2.5 times as much as the richest (2.5% compared to 0.0%)

Percentage of children at the 6-18 age dropped out of school is 5.0%. This shows that the intellectual level of people in Tien Luong commune is average.

**Table 4 - 12: Education level of household members (Unit %)**

Contents	Highest education level							
	Illiteracy	Primary School	Junior high school	High school	College/ University or above	Not suitable	Pre-school	No infor
Total	0,5	10,5	33,2	30,1	17,0	0,0	8,0	0,2
By commune								
Tien Luong	0,5	10,5	33,2	30,1	17,0	0,0	8,0	0,2
By ethnic minorities								
+ Kinh	4,5	32,4	26,8	18,2	0,0	0,0	8,3	9,8
+Ethnic minority	0,5	6,5	29,3	34,5	22,5	0,0	6,5	0,2
By income								
Group 1 (the poorest)	2,5	32,3	32,0	13,3	6,5	0,0	8,5	4,9
Group 2	1,5	22,7	32,5	25,4	10,0	0,0	6,9	1,0
Group 3	1,3	21,8	30,2	26,1	11,0	0,0	7,0	2,6
Group 4	1,2	14,8	35,5	29,5	9,8	0,0	7,3	1,09
Group 5 (the richest)	0	9,04	24,0	42,9	12,8	0,0	6,9	4,0

#### **4.3.3.3 Existing infrastructure**

In general, rural infrastructures in Tien Luong have not been developed. In addition to the main roads, communal roads are asphalt, many inter-village roads are still dirt roads, travelling is difficult, slipper and sliding during the rainy season, and

dusty during dry season. Currently, the transportation system are connected to all communal areas (10 areas) in the commune

Electric grid has connected to all residential areas. All households in the commune are using electricity from national grid. In addition, there are also other technical infrastructure such as irrigation works in the commune

There is no welfare facilities, however, all zones have cultural center of the zone so that people can participate in meetings of community. The issues related to the project can be shared and discussed at the meeting at the cultural center.

#### ***4.3.3.4 Tangible and intangible cultural heritage***

There is no areas of archaeological or cultural history. Only a few houses, pagodas and churches are located in the commune. This is the religious activities of the people and no work located near the project site within 2km or transportation of materials, construction waste road.

#### ***4.3.3.5 Religion and beliefs***

In Tien Luong commune, only in area (zone 10) there are Christian people live (approximately 10% of population in zone 10). This area is about 6km away from Ban reservoir and no construction activities, transportation of material to go through the zone 10. According to the survey results, practical interview, religious and non-religious people live in harmony in the community and so far no conflict between social groups...

#### ***4.3.3.6 Gender and role of women***

Gender activities are well implemented. There are not big gender inequalities in the community. Both men and women have the right to make decisions and participate in the family and community meetings. Women often do the farm work and housework, tidy the house. Men also do the same work, however, the time spent on household chores, taking care of the children of men are less likely than women about 2 hours / day.

**There are some gender issues in the scope of the sub-project.**

(i) **Labor and Labor division:** Most of women are involved in agricultural activities. Women in mountainous areas encounter severe time constraints having to work much longer hours than men especially in the areas of land cultivation, transportation, family care, housework, etc. Women can work 9-10 hours/day while men only work for 8 hours/day). The limitation of knowledge, access to technology and use of traditional agriculture methods contribute to local people often facing high risks of bad crops, diseases for cattle and undernourishment.

(ii) **Access to education:** All boys and girls have equal rights to go to school however the rate of attendance for girls is always lower than boys.

(iii) **Women's Involvement in group activities:** In subproject area, most women are Kinh women. Women do not know how and are not trained and empowered to



express their rights in front of the community. Therefore, they have few opinions in the community meeting.

(iv) **Women's participant in local government system:** Through interviews with chairmen of commune PCs, it was recorded that women accounted for 35% within the Commune PC structure. No woman played a role as chairwoman of the Tien Luong CPC. Most women do not play leadership positions that influence the decision-making process.

(v) **Health:** Health conditions of women in Tien Luong commune is not serious. However, not only women but also the community has the high potential risks of contracting diseases such as diarrhoea, skin allergies and other forms of infection.

In general, women play an important role and position as men in family. They are involved in the decision making of the big things in their family. In society, women are actively engaged in social activities such as participating in the movement, local media activities. Besides, women also work in the unions, government agencies such as CPC, Clinics, and schools. According to CPC estimation, the rate of women in the government agency is about 30%.

Women and girls have the equal opportunities to access to the social services such as health, education, and entertainment. In the families, boys and girls have been treated as the same. However, there are still gender prejudice families, but that does not significantly affect the access to social services locally.

#### 4.3.4 Other social service

*Domestic water supply:* Most of surveyed households in subproject area use water from dug/drilled wells for living purposes (95%), The rate of using other water sources is low: no household uses lake or river water, no household uses private faucet, 1.4% of surveyed households uses another water source and 3.6% of them uses rainfall.

**Table 4 - 13: Percentage of households using drinking water  
in the project areas (%)**

Communes	Private running water tap	Public water	Wells	Water from ponds, lakes	Rainwater	Others	Private running water tap
<b>Total samples</b>	<b>0,0</b>	<b>0,0</b>	<b>95,0</b>	<b>0,0</b>	<b>5,0</b>	<b>0,0</b>	<b>0,0</b>
<b><i>By commune</i></b>							
<i>Tien Luong</i>	0,0	0,0	<b>95,0</b>	<b>0,0</b>	<b>5,0</b>	<b>0,0</b>	<b>0,0</b>
<b><i>By income</i></b>							
+ Group 1 (the poorest)	0,0	0,0	85,5	0,0	14,5	0,0	0,0
+ Group 2	0,0	0,0	93,7	0,0	7,3	0,0	0,0
+ Group 3	0,0	0,0	92,6	0,0	8,4	0,0	0,0
+ Group 4	0,0	0,0	95,1	0,0	4,9	0,0	0,0
+ Group 5 (the richest)	0,0	0,0	100	0,0	0,0	0,0	0,0

*Market and other services providing goods:* Tien Luong has a temporary market, 500m from Ban reservoir. This market is opened every day in morning and afternoon, providing food and essential items for daily life.

*Sanitation:* There are more than 90% of households in surveyed area using sanitary latrines, including 62.5% of households using flush/semi-flush toilets, 27% of households use 2-compartment toilet. Just about 5% of surveyed households use the simple type toilet (digging in the garden, bridge on lakes, rivers and streams), and 2% of households have no toilet

*Garbage disposal collection:* Among 10 zones of Tien Luong commune, garbage disposal collection service appears only in zone 4 and zone 5, the service is managed by community themselves. Domestic waste is collected in afternoon and transported to landfill for processing. In other zones, garbage is often collected and treated by household. The source of this garbage is buried or burned for processing.

#### **4.3.5 Ethnic minorities**

In Tien Luong commune, ethnic people account for 6.3% of population, mainly are Tay people (accounting for 2.5%), Cao Lan (1.7%), Dao (0.7 %), and other ethnic groups account for 1.4%.

**PART 5**  
**ENVIRONMENTAL AND SOCIAL IMPACTS ASSESSMENT**  
**5.1 SUBPROJECT ENVIRONMENTAL AND SOCIAL IMPACTS SCREENING**

**5.1.1 Environmental and social impacts screening**

**Table 5 - 1: Environmental and social impacts**

Nº	Does subproject cause these impacts?	Impact levels	Description of impact
1	The trespass on historical/cultural heritage	No impact	There is NO any cultural works or heritage been found in subproject scope area
2	The trespass on ecosystem (natural sensitive living environment or nature reserve, natural park, etc.)	No impact	There is no nature reserve or natural sensitive living environment in the distance of 20km from Ban 2 reservoir. Ecosystem in surrounding area and nearby area of project position is no longer diverse, plant crops and other types of aquatic ecosystems no longer strongly developed. Urbanization in the region partly influence to this situation. The flora and fauna are not the types to be protected or preserved in terms of biodiversity. There is no rare plant and animal species should be preserved Therefore, activities of the project will NOT trespass on ecosystem.
3	To deform landscape and increase waste	Low	<i>To deform landscape</i> may be generated from activities of land clearance including land acquisition making change of land use, dismantling for construction site, trees cutting, etc.  The subproject will permanently occupy 15,000m <sup>2</sup> of vacant land and garden land area around Ban reservoir area and temporarily use 11,000m <sup>2</sup> of land surrounding to build auxiliary works. No impact of relocation to any HH, 15 HHs are affected of land loss.  The impact is LOW because: i) No impact of relocation to any HH; ii) Permanently affected area is all garden land, vacant land, not affecting on livelihoods of AHs.  (Detail is in RAP)

N <sup>o</sup>	Does subproject cause these impacts?	Impact levels	Description of impact
			<p><i>Increase of waste:</i> There are 03 solid waste sources arising from construction activities including: type (i) construction waste likes debris from surface leveling activities (plants, residual, etc.), cement bags, oil barrels and type (ii) domestic waste from tents of workers in construction site and type (iii) superfluous excavated soil. In addition, waste mud from latrine can contain harmful bacterium's need to be treated during construction process.</p> <p>The above impact is LOW and TEMPORARY because:</p> <p>a) With type (i) and type (iii), the solid waste is not harmful, as for surplus material (with total estimated volume of 6,399.6 m<sup>3</sup> of excavated soil and 750m<sup>3</sup> of topsoil removal) will be collected, moved fast to disposal sites. Disposal sites are located in zone 3, Tien Luong commune, 2.5 km from the construction site, area of 3,000m<sup>2</sup>. Amount of excavated soil is not high, amount that utilized as backfilled soil is 6,300m<sup>3</sup>. Thus, remaining about of about 99,6m<sup>3</sup> of excavated soil will be dumped in disposal sites.</p> <p>b) For the waste type (ii): In the high-leveled construction period there are around 50 people working in construction site thus the amount of potential waste is not much, estimating around 15–25 kg per day (around 0.3-0.5kg/person/day).</p> <p>c) The amount of solid waste arising in construction period can be easily managed as per regulation on solid waste management. The domestic waste like mud of latrine will be treated conforming to designed standards of Ministry of Health and the quantity of this mud can be used for planting as a fertilizer for soil.</p> <p><u>Location:</u> Head-work location of Ban reservoir, workers' camp in zone 3, Tien Luong commune and within 50 m around the camp, disposal site area in zone 3, 2.5 km</p>

N <sup>o</sup>	Does subproject cause these impacts?	Impact levels	Description of impact
			<p>from construction site and within 50 m around.</p> <p><u>Period:</u> waste generates in 12 months, impacts on landscape may occur during and after the construction site and lasts more than 12 months</p>
4	Demolish trees or vegetation cover	Low	<ul style="list-style-type: none"> <li>- Topsoil removal in auxiliary works construction area of 11,000m<sup>2</sup> (from which: disposal site – 3,000m<sup>2</sup>, bypass – 3,000m<sup>2</sup> and workers' camp, storage area, operation house – 5,000m<sup>2</sup>), is mainly vacant land, vegetation is shrub, grass. Total amount of topsoil removal and demolition of old works is estimated by design unit of 6,399.5m<sup>3</sup></li> <li>- Construction of dam body will remove vegetation cover in upstream and downstream with length along the dam body of 354 m.</li> </ul>
5	Change quality of surface water or flow (e.g., increase water turbidity, wastewater discharged from camp and erosion, and construction waste).	Low	<p>Impacts on water environment may arise from the sources: domestic wastewater of workers, water with oil and grease from construction machineries, equipment, and rainfall runoff. Because the crest of existing dam will be filled and expanded toward upstream slope, during excavation work, sedimentation may occur and excavated soil may be washed out to the reservoir. The direct receiving source is Ban reservoir and it will be affected the most. Water bodies next to the Ban reservoir will be little affected.</p> <p>In construction phase, number of workers concentrating in construction site can reach to 50 people; amount of wastewater generated is 3,200 liters/day (64 liters/day/person). Domestic wastewater flowing into water source will be risk to make the amount of the substance in the water causing water pollution increase.</p> <p>There are around 10 vehicles, machineries operating regularly in construction site. The average amount of oil used each time to change oil is about of 18 liters/time x 4 times/year. Thus the amount of oil discharged in construction time (12 month) from 10 vehicles would be about 720</p>

N°	Does subproject cause these impacts?	Impact levels	Description of impact
			<p>liters. Spilled oil from machinery and construction equipment or water when washing machines can pollute and decline water quality and aquatic ecosystems.</p> <p>Wastewater and oil compounds may be sunk into the ground and over time will gradually seep into aquifers and contaminate aquifers.</p> <p>Besides, wastewater from toilets of worker camps if not applied properly can also influence water quality of nearby.</p> <p>However, this impact is LOW and TEMPORARY because:</p> <ul style="list-style-type: none"> <li>i) Location of camp, oil storage yard is far from water sources (2 km)</li> <li>ii) With low amount of domestic wastewater of 3.200 liters/day, average concentration of substance in domestic wastewater pouring into stream is very small. The impact can be controlled by mitigation measures;</li> <li>iii) Construction of the subproject will take place in dry season when rain fall level is the lowest. Thus, the possibility of oil, grease or compounds washed and swept into water source is very little</li> <li>iv) Wastes from petroleum products can easily be stored in a safe place in the standard containers (i.e. containers with lids), and the contractor will have to collect and dump waste and hazardous waste damage at right places.</li> </ul> <p><u>Location:</u> Dam, spillway and petroleum storage yard, downstream area</p> <p><u>Duration:</u> 12 months of construction time</p>
6	Increase the level of dirt or contaminants in the air during construction process	Low	<p>During dam, spillway, bridge, management and auxiliary works repairing period, some activities described below will cause negative impacts such as dust, emissions affecting lives of local people:</p> <ul style="list-style-type: none"> <li>- The operation of equipment and trucks on access road passing through residential areas of zone 3, 4 and 5.</li> </ul>

N <sup>o</sup>	Does subproject cause these impacts?	Impact levels	Description of impact
			<ul style="list-style-type: none"> <li>- Transportation of construction materials and waste passing through public earth route;</li> <li>- Every day, during construction period, there are about 6 trucks travelling on roads.</li> </ul> <p>The amount of dust and emission can cause respiratory disease or lung diseases to people (such as sinusitis, asthma, etc.) if people, workers directly contact with the pollutant sources for long time.</p> <p>However, this impact is LOW and TEMPORARY because:</p> <ul style="list-style-type: none"> <li>i) The project area is in midland interspersed large plains, open space. Dust that can easily be diluted in the air and blown by wind;</li> <li>ii) Construction of the categories in the project (dam and ancillary works) is mainly taken place in the zone 3, Tien Luong commune. The area is sparsely populated, only a few families living near the construction area. The nearest residential area is 200 m from the construction site of zone 3.</li> <li>iii) The construction materials transportation road of passes through zone 4, zone 5; road for transporting surplus and waste goes through only one zone (zone 3). Population here is sparse. Thus, the impact is evaluated as low.</li> <li>iv) Transportation distance of excavation and filled soil to and from the construction site is short (0.7-2.5 km). Dust is arisen much from these materials.</li> <li>v) Number of vehicles/construction equipment especially vehicles/equipment causing noise is not much; about 6 trucks passing through residential areas will not generate a large amount of emissions. However, if the trucks are not covered, soil and waste may drop out and become sources of dirt, especially in dry hot season.</li> </ul>

N°	Does subproject cause these impacts?	Impact levels	Description of impact
			<p><u>Location:</u> Transportation roads connecting national road no. 32 to the construction, residential area in zone 4, zone 5; residential areas (zone 3) on road transporting waste and surplus to disposal site, length of 2.5 km. (zone 3), the nearest residential area (200m) from the construction site.</p> <p><u>Period:</u> 12 months off construction</p>
7	Increase noise/vibration	Low	<p>Noise can be caused by the transportation of construction materials and construction equipment (excavators, bulldozers, road rollers, compactors) affecting HHs and schools along the road section for construction. Every day during the construction phase, about 15 trucks travel on the road. During construction and transportation of material, waste and noise will be generated and can affect to people living along the route leading to Ban reservoir. However, this impact is LOW and TEMPORARY because:</p> <ul style="list-style-type: none"> <li>i) Subproject area is open space, with lots of plants and crops which may dilute the noise</li> <li>ii) The residential area adjacent to the road and construction works are distributed fairly sparse, with a low population density.</li> <li>iii) The number of equipment / facilities construction generating noise is not significantly large. About 6 vehicles and machinery of all kinds will go through the route every day, thus the noise level is not high.</li> </ul> <p><u>Location:</u> Transportation road from national road no. 32, length off about 5km passing through zone 4 and zone 5, Tien Luong commune; road to transport surplus, waste passing zone 3, length of 2.5 km.</p> <p><u>Duration:</u> 12 months of period.</p>
8	Resettlement of households? If yes, how many households?	No impact	No HH affected in relocation, only 15 HHs are affected for construction of management road, head-work items with a total area of 15,000 m <sup>2</sup>



N <sup>o</sup>	Does subproject cause these impacts?	Impact levels	Description of impact
9	Use resettlement region being environmental and/or cultural sensitivity	No impact	No relocation affected household
10	The risk of disease transmission from workers to local people (and vice versa)	Low	<p>There will be about 20 workers from elsewhere reside in Tien Luong commune. The temporary presence of workers residing in local households or their living in camps and their interaction with local people can cause infectious diseases among workers with local people and vice versa.</p> <p>During construction process, the use of water without meeting sanitary standards for workers in the camps or at construction site may also cause gastrointestinal disease or the spread of disease transmission via insect (i.e. dengue fever, malaria, etc.) when migrant infected workers are bitten by insects (mosquitoes) and then the disease is spreaded to others. Besides, various social diseases such as HIV / AIDS, syphilis also a risk, etc. are also the risk.</p>
11	Potential to cause conflict between construction workers and local people (and vice versa).	Low	<p>During construction period, approximately 20-30 technical workers from other provinces are about living and working locally. During this time, there may be conflict between the local labors and labors from elsewhere due to disagreements about the culture or communication or disputes on employment opportunities. However, these effects are LOW and TEMPORARY because:</p> <p>i) According to state regulations, the contractor will have to declare temporary residence, temporary absence of all the local workers to live and work during the project implementation to Tien Luong commune government;</p> <p>ii). Migrant workers are disseminated, guided by contractor on how to communicate, notify with local government and people. In addition, contractor shall develop provisions in management of workers</p> <p>iii) A number of workers (30%) will be hired locally to perform simple tasks such as shoveling dirt, cutting trees, pottering construction</p>

N <sup>o</sup>	Does subproject cause these impacts?	Impact levels	Description of impact
			<p>materials.</p> <p><u>Location:</u> Tien Luong commune, camps and surrounding areas in zone 3</p> <p><u>Period:</u> 12 months of construction phase</p>
12	Use explosives and toxic chemicals.	No impact	Explosives or toxic chemicals will not be used during construction process of the subproject
13	Use construction site where the accident happened due to blasting or explosive from war.	No impact	<p>Subproject will not use the site where occurring mine accident. Some places where gathering material and workers' camp are vacant spaces and safe, introduced and allowed by the local government and the people.</p> <p>Mine clearance will be done before starting the construction works, especially the area where spillway is expanded, digging foundation more than 2m.</p>
14	Construction activities may disrupt transport, roads, or waterway.	Low	<p>Construction period may impact local travel, transportation, as well as the risk of accidents: a) increase risk of accidents due to the increase of the means through inter-commune roads and construction sites (where the excavation activities are carried out, and where the construction equipment, waste locates on or next to roads, works, etc.). It may danger local people, especially at night when visibility is limited; and suspended dust particles reduces visibility; b) the construction of the dam and ancillary works such as management road will limit the ability of people to travel as well as access to social infrastructure such as schools, markets, etc.</p> <p>However, these effects are LOW and TEMPORARY because:</p> <p>i) Volume of construction means will be shared, release pressure for the main road. Transportation of construction materials will use road connecting national road no. 32 to the work, length of about 5km, which is the current road often used passing through the sparsely populated areas of zone 4 and zone 5. At the same time, management road 1.600</p>

N <sup>o</sup>	Does subproject cause these impacts?	Impact levels	Description of impact
			<p>m long along the reservoir in the East, being earth road, will be utilized. The demand for low traffic on the route, in addition, the reduction of traffic load for the main road contributes to the ability to obstruct traffic is very low;</p> <p>ii) The number of vehicles/equipment for road construction is about 6 trucks per day during the peak construction period is negligible;</p> <p>iii) When implementing head-work items, construction contractor will take place from the bottom up, move to another item after completion of previous item to avoid duplication and create reasonable internal passageway.</p> <p>iv) A part within scope of the contractor is to ensure the health and safety on construction sites for individuals and construction site; it is not allowed to happen the risk to the safety of people. Therefore, the contractor shall take measures to minimize the impact during construction process.</p> <p><u>Location:</u> Dam, spillway, management road and road to transport material and waste in Tien Luong commune</p> <p><u>Period:</u> 12 months of construction phase</p>
15	Construction activities may cause any damage to the local roads, bridges or other rural infrastructure?	Low	<p>The construction materials or waste transporting process on rural roads can damage the road if the trucks are overloaded and operate much in rainy season.</p> <p>Other rural infrastructures such as electric cable system, communication cable system are not affected by the construction of the subproject, because these work lie in the safety corridor of the main roads. On management road, there is no electric cable system, communication cable. Other infrastructure (school, market, etc.) are all far away from works of the project. Thus, these social infrastructures are not likely to be affected</p>

N°	Does subproject cause these impacts?	Impact levels	Description of impact
			<p>by the construction activities.</p> <p>This impact is evaluated as LOW if construction contractor makes reasonable construction plan and implement measure to avoid dropping material on transportation roads.</p> <p><u>Location:</u> Transportation road to construction site, road connecting to national road no. 32 and surrounding infrastructures.</p> <p><u>Period:</u> 12 months of construction phase</p>
16	Excavation during construction of the subproject can cause increases in soil erosion potentials	Low	<p>Dam slope and spillway construction process may cause erosion on dam body or nearby location.</p> <p>Erosion potential may occur in borrow pit and soil will be washed out with rainwater runoff to lower land if excavation is not carried out properly in accordance with safety requirement.</p> <p>However, this effect is LOW and TEMPORARY because the repairing activities for dam slope and spillway will be carried out in the dry season. The location of construction is located above the water level. Moreover, dam base is built with cement; it is difficult to cause soil erosion.</p> <p>Borrow pit of the project is located within low hills and vegetation covers are shrub, grass. Sand and soil may be washed out with rainwater runoff, however will not be poured into water bodies, since the nearest point of the Ban reservoir is about 1km from the borrow pit and vegetation cover will limit load of sedimentation as well as velocity of water runoff.</p> <p><u>Location:</u> Ban reservoir, dam A, B, C</p> <p><u>Period:</u> 12 months of construction phase</p>
17	Is it needed to create a temporary and permanent service road?	No impact	Construction of bypass crossing dam A will temporarily acquire 3,000 m <sup>2</sup> of vacant land area serving for travelling demand during bridge construction time. Until June, when the bridge is completed, temporarily acquired land for the

N <sup>o</sup>	Does subproject cause these impacts?	Impact levels	Description of impact
			<p>bypass will be returned.</p> <p>The subproject will upgrade current access road running along the reservoir from earth road to concrete road. Length of the road is 1.6km</p>
18	Divide or disintegrate habitat of animals and plants.	No impact	<p>+ For flora and fauna in the reservoir: Construction activities are calculated to be done in dry season when water volume coming is minimum in order to minimized impact on water quality or water level. Water environment for flora and fauna in the reservoir is remained as normal, thus they are not affected.</p> <p>+ For terrestrial flora and fauna: Surrounding area of the project area is indirectly affected. There is no location as habitat of flora or fauna.</p>
19	Long-term impact on air quality.	No impact	<p>The sources of air pollution mainly from dust caused by the disturbance to the ground, temporary storage of loose materials and wastes, transportation of construction materials, waste transportation, etc. running on the roads in Tien Luong commune. In addition, the air may be polluted by emission from construction machinery, vehicles. However, the sources of emission can be controlled and limited by strictly applying mitigation measures and it only appears in certain time. Therefore, there is NO long-term impact on air quality but a temporary impact on air</p> <p><u>Location</u>: Construction site and surrounding area</p> <p><u>Period</u>: 12 months of construction phase</p>
20	The risk of accidents for workers and communities in the construction phase.	Low	<p>Construction process can make risk of accidents due to operating machinery, digging and filling process or transporting materials in case that the workers do not comply with regulations on occupational safety. In addition, the construction can also cause accidents for community if access of people into the construction area is not limited.</p> <p>However, the impact is LOW and TEMPORARY because:</p>

N <sup>o</sup>	Does subproject cause these impacts?	Impact levels	Description of impact
			<p>i) Number of construction machinery is few</p> <p>ii) Much activities will be carried out manually such as pottering material, etc. Thus, risk of accident will be reduced.</p> <p>iii) Construction activities are mostly undertaken in dry season, accident is also reduced.</p> <p>v) Construction site is far from residential areas, at least 300 m</p> <p><u>Location</u>: Construction sites, areas along the transportation road passing zone 3, zone 4, zone 5.</p> <p><u>Period</u>: 12 months of construction phase</p>
21	Use hazardous or dangerous material and generate hazardous waste	No impact	There is no need to use hazardous or dangerous material or generate hazardous waste. Only a low amount of oil use for machinery leaks to environment.
22	Risks to safety and human health.	Low	During construction, there may be risks of occupational safety due to operation of machineries, excavation process or transporting materials without compliance with regulations on occupational safety of workers. In addition, the construction can also cause accidents for community if access of people into the construction area is not controlled.
23	Affect to water supply and production during construction of work items	Low	The project implementation does not last long time, only in 12 months. There are 15 AHs with 70 Aps. Total permanently affected area is of 25,000m <sup>2</sup> , in which mostly are garden land with area of 15,000 <sup>2</sup> . Number of affected trees is 95 trees, including apples, guavas, grape fruits and star fruits. Activities of upgrading, repairing Ban reservoir is planned to take place in dry season. Impacts on water for irrigation water for benefited area during construction phase are not likely to be. Upgrade reservoir will ensure safety of people in downstream area, will effectively stabilize water supply capacity, step by step contributing into community economy.

N <sup>o</sup>	Does subproject cause these impacts?	Impact levels	Description of impact
24	Increase flooding, sediment transport in downstream area	Low	<p>Ban reservoir is independent reservoir; its downstream area is irrigated areas. Construction process will need to drain water in reservoir to death water level, but mainly during the dry season, when the water in the reservoir reach to low level.</p> <p>Erosion potential may occur in borrow pit and soil will be washed out with rainwater runoff to lower land if excavation is not carried out properly in accordance with safety requirement.</p> <p>Borrow pit of the project is located within low hills and vegetation covers are shrub, grass. Sand and soil may be washed out with rainwater runoff, however will not be poured into water bodies, since the nearest point of the Ban reservoir is about 1km from the borrow pit and vegetation cover will limit load of sedimentation as well as velocity of water runoff. In addition, the area is supplied with good drainage system, thus this impact is considered as LOW and TEMPORARY.</p>
25	Land acquisition (temporary or permanent) of public land (public or private) for construction	Low	<p>Serving for upgrading, repairing reservoir will directly affect to 15,000 m<sup>2</sup> of garden land, vacant land areas of 15 HHs (from which, 3,500m<sup>2</sup> for construction of management road, 11,500m<sup>2</sup> for construction of head-works. Besides, construction of auxiliary works will temporarily acquire 11,000m<sup>2</sup> of land area (from which: disposal site – 3,000m<sup>2</sup>, bypass – 3,000m<sup>2</sup> and workers' camp, storage area, operation house – 5,000m<sup>2</sup>).</p> <p>Particularly, land for disposal site with area of about 3,000m<sup>2</sup> is agreed by Tien Luong CPC to select the vacant land along the road leading to the reservoir.</p> <p>There is no relocation impact on any HH.</p> <p>Affected land areas are all garden land, vacant land, on which HHs plant vegetable using for daily demand. These affected land areas are not livelihoods of 15 AHs, since their income is from agricultural land.</p> <p>In addition, compensation and resettlement</p>

N <sup>o</sup>	Does subproject cause these impacts?	Impact levels	Description of impact
			<p>policies of the project will be applied to ensure right of AHs.</p> <p>This impact is LOW, because.</p> <p><u>Location:</u> permanently acquired land area (15,000 m<sup>2</sup>) and temporarily affected land area (11,000 m<sup>2</sup>) in zone 3, 4, 5 in Tien Luong commune</p> <p><u>Period:</u> Preparation phase</p>
26	Use land being currently possessed or used regularly for production purposes (e.g., gardening, farming, grazing, fishing, forest)	No impact	<p>Acquired land areas are garden area, belong to 15 HHs.</p> <p>All affected land areas are garden and vacant land areas. HHs plant short-term crops, vegetation for daily life demand. They are not main livelihoods of the family (main income of 15 HHs is from agriculture).</p>
27	Relocation of people, family, or business.	No impact	<p>There is no relocation of personal, family or business activity, due to the sparsely populated in construction area, no business along the dam and management road.</p>
28	Temporary or permanent loss of crops, fruit trees, house or infrastructure.	Low	<p>Land to be acquired are garden land</p> <p>No structure is affected</p> <p>95 fruit trees including apples, guavas, grape fruits and star fruits are cut, from affected garden land of HHs</p>
29	Restrict compulsory access of people into preserved park and conservation area.	No impact	<p>No preserved park or conservation area within radius of 20km.</p>
30	The ethnic minority groups living within or near the subproject.	No impact	<p>Ethnic people account for 6.3% of population in Tien Luong commune. However, ethnic people do not live in cluster but live with Kin people integrated. All impacts caused by the project will affect overall community, but not particularly to ethnic group.</p>
31	Members of minority groups in the region may be benefited or harmed by the project.	No impact	<p>Ethnic people account for 6.3% of population in Tien Luong commune. However, ethnic people do not live in cluster but live with Kin people integrated. All impacts caused by the project will</p>



Nº	Does subproject cause these impacts?	Impact levels	Description of impact
			affect overall community, but not particularly to ethnic group.
32	Relate to construction of a large dam?	No impact	Ban reservoir has low dam with height of less than 15m (11m), thus it is not a large dam as defined by WB. Moreover, the project will upgrade the dam, not construct a new dam.
33	Depend on water level supplied by a dam existing or under construction?	No impact	Ban reservoir does not depend on water providing source of other reservoir and does not supply water for beside rice cultivation area in the downstream.

### 5.1.2 Ethnic minority screening

As part of the social assessment, where ethnic minority (EM) peoples are present in the subproject area –as confirmed by the EM screening (as per Bank’s OP 4.10), consultation with them were carried out in a free, prior, and informed manner, to confirm if there is broad community support from affected EM peoples for the subproject implementation. EM screening was conducted as per Bank’s OP 4.10, and was done the scope and coverage of the social assessment vis-à-vis the environmental assessment (OP 4.01).

The results of ethnic minority screening showed that there are not any ethnic minority people living in the subproject area (including affected communities and beneficiaries). Therefore, it need not to prepare a ethnic minority development plan for this subproject.

A gender analysis was also done as part of the SA to understand underlying gender dimensions (from project impact perspective) to enable gender mainstreaming to promote gender equality, and enhance further the development effectiveness of the subproject, and the project as a whole. A gender action plan was prepared in the Appendix B4 of this Report).

## 5.2 POSITIVE IMPACTS OF SUB-PROJECT ON ENVIRONMENT AND SOCIETY

The main purposes of the renovation and improvement to safety of the dam and reservoirs are:

- Ensure the safe of the reservoir during operation and exploitation process, adapting to climate change and meeting the increasing demands for water of people in the downstream area, mitigating the negative impacts on the environment, landscape of reservoir foundation and downstream;
- Ensure original design goals of supplying water for 150ha of rice and vegetables;

### 5.2.1 Impact on the society

The project will bring many benefits to the people, in particular, increase agricultural productivity and yield, increase number of crop season, develop aquaculture through ensuring water supply for irrigated area, and reduce disaster risk. After completion, construction works will ensure stability of water supply for 150 hectares of rice and vegetables annually, prevent negative impacts on the environment, landscape and downstream area; increase production and non-agricultural business through agricultural development, increase income and improve living standards; create more jobs and contribute to poverty reduction.

Moreover, reduction of water leakage will help Tien Luong agricultural cooperatives saving water and can provide more for the area has not been previously irrigated. This will increase productivity, livelihoods and economic improvement of households.

Increase the awareness of local people and local governments in disaster risk management and safety reservoirs and dams. Construction activities along with communication activities of the local government and PMU, awareness of local people and local governments will be raised on reservoir and dam safety through public consultation activities, meeting and participation in the construction and installation activities

Dam safety improved will be secure about the life and production of people in downstream. The upgrading of the dam and replacing water intake will enhance dam's safety because after the upgrading, earthen dam and dam slope will be replaced with concrete.

The positive impact will influence large parts of disadvantaged groups. Those who have productive land are most benefited directly by irrigation impacts.

## **5.2.2 Impacts on environment**

### **1) The impact on air quality and microclimate of the region**

Repairing, upgrading reservoir may impact on air environment at different stages with different level of influence. At this stage of preparation and execution, air environment is mainly polluted by dust and emissions from the construction site preparation, roads, warehouse, material yard, transport of materials, etc. These impacts take place only within a small space, discontinuous and polluting locally. In operation stage, (after completion of the project), the impact of the work will influence some meteorological factors in the region.

Reservoir area is characterized by humid tropical climate and monsoon, river system is the product of large-scale climate. The nature of the dry continental climate of this region becomes evident during the dry season. Operation of the reservoir will contribute to change microclimate of the area.

Thus, impact on air environment and microclimate in project area in phase of management and operation is considered positive with relatively large scale. In order to quantitatively determine the variation above, it needs to conduct meteorological observation activities and regular study as well before and after construction.

During the operational phase, the sub-project will increase the stability of water, ensure the safety of the dam and downstream areas. There is almost no negative impact on atmosphere.

## **2) Impact on landscape**

New spillway will reduce the water level rising and falling erratically following the floods, ensuring conditions for the development of coastal vegetation, creating new landscape for the reservoir.

Landscape of reservoir: After upgrading, renovating, the landscape around the reservoir becomes more spacious, cleaner and beautiful. Beautiful landscape combined with convenient transportation will attract visitors to visit; tourism will increase funding for local.

Improve the ecological environment: Ecological environment will be significantly improved by planting trees, forest and ecosystem restoration after construction is completed.

## **3) Impacts on ecosystem**

Stable and safe operation of reservoir contributes to the development of forest ecosystems. Impacts on ecosystems are evaluated as medium, long term and continuous in life of the project.

## **4) Impacts on sedimentation, erosion**

The reservoir is designed, built to ensure design flood frequency of 1.5% and inspection flood frequency of 0.5%. The reservoir will be upgraded to ensure flood frequency of 0.01%. The spillway upgrade will increase the flood drainage capacity; water level will reduce faster than current status. Due to fast reduction of flood water level in the reservoir, time for floodwater to deposit in the reservoir will reduce resulting in reduction of sedimentation amount in reservoir. Slower sedimentation will improve life-time of the reservoir, reducing the cost to dredge the reservoir bed.

# **5.3 NEGATIVE IMPACTS ON ENVIRONMENT AND SOCIETY**

## **5.3.1 The historical negative impacts and mitigation action**

In 1996, water intake was broken, causing water loss. Water regulation could not be operated. In that year, the works was fixed. The water intake was removed back toward dam crest, 12 away from existing location. Water intake repair was temporary solution, however, since then the water intake has not been repaired anymore.

In 2003, flood spillway was broken causing severe damage, loss of people (1 death) and property. In 2003, local authority mobilized resources to backfill spillway threshold. Since then, the work has not been invested anymore.

To overcome the problems that happened in the history, the measures to repair and upgrade the water intake and spillway should be implemented. Some measures should be done to overcome this problem as follows:

- Works must be executed according to plan and proposed measures;
- Comply with the provisions of the state on dam construction, reservoirs and dam safety;
- Lowering the reservoir water level to ensure the safety of the construction process;

Make plans for incident prevention, mobilize governments and local people ready to respond when the incident occurs.

### **5.3.2 Impact during pre-construction phase**

#### **5.3.2.1 Activities**

- Trees cutting (trees growing on downstream and upstream slope, etc.)
- Site clearance
- Concentration of equipment and machineries to construction site

#### **5.3.2.2 Sources of impacts**

Sources of impacts relating to waste:

- Biological waste (vegetation) will be generated in occupied land area;
- Operation of mechanical equipment in site clearance, leveling: leaked oil, waste oil, dust, emission.
- Waste, wastewater of workers involving in site clearance.

Sources of impacts not relating to waste: They are sources affecting physical and ecological environment, such as: erosion, landslide, riverbank erosion, siltation; change of environmental factors, biodiversity change.

#### **5.3.2.3 Impacts on society**

##### ***a) Impact of land acquisition and land clearance, resettlement***

The area for project implementation is of 26,000 m<sup>2</sup> in Tien Luong commune, Cam Khe including: permanently affected area of 15,000m<sup>2</sup> of garden, vacant land, the remaining temporarily affected area of 11,000 m<sup>2</sup> for workers' camp, materials yard, road construction.

However, scope of impact is low since main occupation of all AHs is agricultural production, mainly rice cultivation; planting on garden land is for daily life demand. In another hand, support, compensation policies of the project will be done will stabilize live and production condition of the people.

Phase to make compensation and clearance plans:

- If the compensation and clearance plan for the project is done without consultation of AHs, it may encounter opposition from people due to

inappropriate policies applied in this plan when implementing the compensation, site clearance.

- If advocacy work, explanation from the investor/relevant agencies to government in project communes, and from the communal government to households which affected on land area in phases of community consultation is not done properly, it will cause grievances and non-cooperation by local people.

Phase to conduct compensation and clearance plans:

- In case that compensation and ground clearance are made unreasonably or improperly as approved plan, it will occur disputed by households with rights related to the project do not accept. It may result to delay site clearance so slow project implementation progress.
- If compensation clearance is implemented in long time, it may influence the project progress and tire households with rights related to the project as well as affect their lives.
- If compensation and site clearance is not supervised, the plan may not be done as approved plan.

However, because there is no residential land acquisition, but primarily as garden land, thus resettlement area is not designed, but compensation at site. PMU also organized public consultation meeting and collected people's opinion. People in affected area are all agree and support the project. However, in the process of site clearance, the PMU should compensate adequately, create the best conditions for the people, and need to comply with Constitution and existing laws.

***b) Impact on infrastructure and transportation:***

Site clearance process will increase traffic flow. Increase of traffic flow will increase risk of affecting communal infrastructure and road safety system for people (particularly segment adjacent to national road no. 32C and the nearest residential area).

However, the volume of solid waste is not much (more than 750m<sup>3</sup>) is placed at landfill 2.5 km far from the construction. Moreover, the impact only occurs in a short time. Thus the impact can be controlled.

***c) Impacts to socio-culture***

Affect the safety of workers and the community involve in dismantling activities:

- The risk of electric shock during clearance can cause fire and arise smoke, dust, debris hazard endangering workers and people.
- Falling materials during dismantling can cause accidents.

- Bulk materials transportation trucks are prone to cause accidents during travelling, especially when passing the road with relatively high traffic density or near schools.
- The process of demolition, site clearance, excavation may reveal the toxic substance was buried previously in the project area or hazardous substances in new waste directly affect the health of workers and people.
- Affecting local transport infrastructure: During site clearance process, increase of volume of vehicle in the project area is likely to affect local roads system. However the amount of trucks in clearance phase is low (6 trucks/day), effect on infrastructure is not significant;

Because number of AHs (15 HHs), APs (78 people) is not large, no HH is relocation affected, thus scope of impacts on socio-culture is very LOW.

#### ***5.3.2.4 Impacts on environment***

##### ***a) Impact on water environment:***

Demolition of bricks, concrete structures and transportation of materials such as cement, brick, stone, plastic, wood, etc. as well as solid waste and domestic waste, domestic wastewater arising from the workers without handling properly as prescribed can be swept over with rainwater into the water source and increase environmental pollution load of water;

##### ***b) Impact on air environment:***

During the preparation phase, most of the activities are likely to cause air pollution; the main pollutants are from vehicles transporting materials and construction equipment. Source of pollution is dust generated from these materials; dust generated by the friction between the vehicle and road surface, emissions from construction equipment. Demolition of works (spillway, dam, etc.) may also give rise to dust, noise at small scale;

##### ***c) Impact on soil environment:***

Site clearance will demolish part of the existing works, such as demolishing old spillway, trees in the upstream slope of earth dam and some structure of households in downstream dam. Thus, the creation of a solid waste is inevitable, and may include municipal waste generated by workers and construction machinery. If without collection and treatment, it is possible to increase the load of pollutants to soil environment;

During site preparation of the project, the construction time is short (20 days), solid waste generated mainly is from topsoil removal, and demolition of old works. Besides, there is a few amount of domestic waste of workers on the site.

Total amount of topsoil removal and demolition of old works is estimated by design unit of  $6,399.6\text{m}^3$  and backfilling soil amount of about  $6,845.6\text{m}^3$ . Amount that utilized as backfilled soil is  $6,300\text{m}^3$ . Thus, remaining about of about  $99,6\text{m}^3$  of excavated soil will be dumped in disposal sites 2-2.5km from the construction site.

Estimated capacity of the landfill is about 1,000 – 1,500m<sup>3</sup>. In plan for new rural development of the commune, this land will be area for market construction. Amount of not enough land around 545.6m<sup>3</sup> will be exploited from soil mine adjacent to the management road. It is hill planting eucalyptus, reserves from 20,000 m<sup>3</sup> to 40,000 m<sup>3</sup> managed by 3 HHs in zone 4, Tien Luong commune.

Daily solid waste generated by a workers on the site is about 0.3-0.5 kg/person/day. Preparation phase will last 20 days. With number of workers regularly work on site of 20 people, the amount of solid waste generated per day is 6 -10 kg/day, equivalent to about 120 - 200 kg/whole period. The amount of this waste will be collected and sent to process in accordance with regulations.

Number of workers, means and machines concentrating at site in this phase is not large, thus the scale of the impact is insignificant.

Due to not large scope of construction site, site clearance can be undertaken fast, time for these impacts on natural environment is short.

#### ***5.3.2.5 Impacts on biological environment***

On dam slope, including upstream and downstream slope, there are many trees growing. The trees are mostly bamboo, jackfruit, banana and some shrubs. This is the nesting place, residents of some organisms such as bird, crickets, mice, etc. When the project to upgrade and repair dam is taken place, especially upgrading the dam roof, vegetation growing on two dam slopes will be cleaned, the animals living within the dam slope will be affected

However, small animals can move to other areas, in the garden of households or vacant land with vegetation having similar characteristics to live.

As survey result, there is no HHs affected by acquisition activities of trees. Permanent and temporary acquired land areas are garden or vacant land. Affected trees are guava, grapefruit, and star fruit. According to RAP report, there are 95 trees affected.

Demolition of existing work for upgrading such as spillway, water intake may cause soil dropped out into the reservoir, affecting fishes living there. However, the construction will be planned to implement in dry season, and complying with safety requirement will limit these impacts.

### **5.3.3 Impacts during construction phase**

#### ***5.3.3.1 Activities***

- Repair water intake;
- Repairing and upgrading upstream and downstream slope;
- Expanding and constructing spillway;
- Repairing and upgrading management road.

#### ***5.3.3.2 Source of impacts***

#### **a, Generating sources relating to waste**

##### *Solid waste generating sources:*

- Domestic waste of workers at construction site;
- Solid waste from material at sites: dropping soil and rock, cement covering.

##### *Liquid waste generating sources:*

- Water to wash rock, gravel;
- Disposal oil and grease;
- Domestic waste water of workers at sites;
- Rainfall runoff.

##### *Emission generating sources:*

- Excavation, filling and leveling activities;
- Constructing management road;
- Transporting and unloading materials;
- Mixing concrete;
- Operation of transporting trucks;
- Operation of construction equipment such as bulldozers, excavators, compactors, trucks, etc.

#### **b, Generating sources not relating to waste**

Due to severe weather conditions such as heavy rain, storm, wind, floods occurring during construction phase making seepage in hillsides, upstream slope headwork area, resulting to sliding erosion due to gravity; Due to the construction method in ground leveling, removal of waste rocks in steep terrain areas along the river, leading to increase amounts of sand into the river, increasing turbidity, affecting directly to water supply and water use of downstream residents.

Lack of awareness of people and workers in the management of municipal waste, water washing machinery. Construction equipment can contaminate surface water, groundwater and soil environment.

#### **5.3.3.3 Impacts on society**

##### **1) Impact on the socio- economic environment**

- **Increase opportunities to improve the livelihoods of local people**

Construction contractors will hire local workers for jobs on work site; purchasing, use of goods and services locally. This positive impact is small and temporary because:

- i) Direct recruitment of local labor will create livelihoods for the people especially the agricultural labor (rice cultivation);



ii) Create opportunities for the store, people providing goods and services to support the work (such as rental housing for workers, providing food, laundry, transportation services, etc.). Because of this, construction contractors are encouraged to use local labor in the construction process to perform tasks such as digging, collecting waste and materials, cutting trees. Similarly, women, those who are vulnerable will be given priority to be employed by the contractor to improve their income

- **Impact on local social stability:**

- \* *Impact on local social stability*

Although construction activities such as soil excavation, ground levelling for construction of work items do not affect production, as well as much impact on water supply for production as mentioned above. However, to minimize these impacts, it needs reasonable construction method for the agricultural schedule, water supply schedule. If necessary, a mobile pumping station to temporarily supply water during construction time will be arranged.

The presence of the works will promote the short term service coming with the project, increasing demand for food to serve for workers involved in construction works. However, the demand for food and non-food of workers is not high, it will not affect much the balance of supply - demand in the region. The ability of local can fully meet the needs of the work at all aspects.

Construction process requires concentration of a number of workers from other areas may cause a conflict between the workers and local residents. So these migrant workers must comply with the provisions of the law on public administration and demographic management.

- \* *Impact on the safety of workers and the community:*

During transport, the rock dropping on road without clearing would harm the lane, endanger people and vehicles, and increase risk of traffic accidents.

Transportation of construction materials will use road connecting national road no. 32 to the work, length of about 5km, passing through zone 4 and zone 5 in Tien Luong commune. Travelling activities on the road is ensured, besides, traffic volume on this road is low, as well as population density living along the road is sparse, risk of accident is at low scope. Therefore, the operation of trucks serving for the project will not cause major problem of traffic accidents on the transportation road. However, the construction unit should still apply mitigation measures to prevent traffic accidents.

As prescribed, the maximum load of trucks is 7 tones, and velocity of 30km/h when passing inter-commune roads. The overloaded trucks may damage traffic infrastructures, cause traffic accident.

Domestic waste from the camps without proper management and sanitary treatment such as odors, leading to the concentration of infecting organisms such as flies, mosquitoes, rats cause adverse influence to health of workers and community.

- **Land acquisition, impact on economy of people**

Beside, project also causes negative effects such as land acquisition of several households with a total land area permanently acquired of 26,100 m<sup>2</sup>. If the mitigation measures are not applied or not applied well, such as compensation is not satisfied, no support to restore livelihoods for farmers whose land is recovered will lead to a risk that a part of AP may face to poverty and impoverishment. On the other hand, the increase in agricultural production as crop area expansion and aquaculture may lead to the risk of water pollution due to increase demand for fertilizers, pesticides and industrial food.

1 household hired water surface area of Ban reservoir for aquaculture. The cleanup, clearance may make noise affecting the fish, since the position of the cage is close to upstream slope dams. In addition, in construction process, draining water in reservoir may affect water quality for aquaculture. However, effect on livelihoods of this HH is insignificant because the lowest water level after being drained is still at 26.67 m, enough for fish to live. Cofferdam will be prepared during construction of the dam, spillway, if necessary, in order to not affect turbidity and quality of water in reservoir.

**Permanently acquired land:** Permanent acquisition of land serves only for upgrading management road. Acquired land for dam construction is within safety corridor of the work. Permanently acquired land area for construction is 11,500 m<sup>2</sup>. It is all garden land, vacant land owned by 15 HHs.

**Temporarily acquired land:** Area of temporary land acquisition of 11,000m<sup>2</sup> is for camps, material yard.

## **2) Impacts on culture, society**

- **The potential risk between workers with local people and vice versa, or disturb the lives of people**

During construction period, approximately 20-30 technical workers from other provinces are about living and working locally. During this time, there may be conflict between the local labors and labors from elsewhere due to disagreements about the culture or communication or disputes on employment opportunities. However, these effects are low and temporary because:

- i) According to state regulations, the contractor will have to declare temporary residence, temporary absence of all the local workers to live and work during the project implementation to Tien Luong commune government;
  - ii) Migrant workers are disseminated, guided by contractor on how to communicate, notify with local government and people. In addition, contractor shall develop provisions in management of workers
  - iii) A number of workers (30%) will be hired locally to perform simple tasks such as shoveling dirt, cutting trees, pottering construction materials.
- **Recruit local workers may raise the potential to increase risk of gender inequality in community**

The project may cause gender inequality if the contractor is not fair in the employment of women and men or unequal pay between male and female workers. These effects are minor and temporary because

- i) Not large number of local labors are employed, about 30% of unskilled labors;
- ii) Local labors are not mobilized for long time, about 12 months;
- iii) The policy, remuneration of labor between men and women are equal
- **The risk of accidents for workers and communities in the construction phase**

Construction process can make risk of accidents due to operating machinery, digging and filling process or transporting materials in case that the workers do not comply with regulations on occupational safety. In addition, the construction can also cause accidents for community if access of people into the construction area is not limited. However, the impact is insignificant and temporary because:

- i) i) Number of construction machinery is few, about 6 device/day
- ii) ii) Much activities will be carried out manually such as pottering material, etc. Thus, risk of accident will be reduced.
- iii) iii) Construction activities are mostly undertaken in dry season, accident is also reduced.
- iv) Construction site is far from residential areas, at least 300 m
- **The risk of transmission from construction workers to local and vice versa**

The temporary presence of workers residing in households or living in camps and their interaction with local people can cause infectious diseases among workers with locals and vice versa. During construction process, the use of water without meeting sanitary standards for workers in the camps or at construction site may also cause gastrointestinal disease or the spread of disease transmission via insect (i.e. dengue fever, malaria, etc.) when migrant infected workers are bitten by insects (mosquitoes) and then the disease is spreaded to others. Besides, various social diseases such as HIV / AIDS, syphilis also a risk, etc. are also the risk. The impact may occur in Tien Luong commune, but focused mainly in the zone 4 and zone 5, where the project construction is and road to transport construction materials and waste passing. The effect will last for the duration of project implementation, the impact of dust will occur especially on dry days, while the insects will strongly act in rainy season. However, the impact is low and temporary, because:

- i) Area of construction site is broad, dust is easily dispersed in the wind;
- ii) Toilets at the camp are designed by the standards of the Ministry of Health;
- iii) Contractors regularly check health of employees in the recruitment process;

Local authorities and commune health centers will have the propaganda activities when there are signs of infectious diseases in the locality.

#### ***5.3.3.4 Impacts on environment***

### ***1) Impacts on water environment***

During construction phase, there is risk of generation of 2 sources of liquid waste, including waste from construction activities and domestic wastewater of officers, construction workers.

**Domestic wastewater:** During peak period of construction phase, there will be 50 workers, but are scattered in four work items. Domestic wastewater is generated from the personal cleanliness such as cooking, eating, personal hygiene.

According to national regulation TCXDVN 33:2006 for region of Yen Son district – a mountainous district, average volume of water for domestic purpose is 80 liters/day/person. The amount of wastewater is equal to 80% volume of domestic water, so that it will produce 64 liters of waste water per day. With number of 50 workers, volume of waste generating every day is of about 3,200 liters/day, equivalent to  $3.2 \text{ m}^3$ .

During construction time (12 months = 360 days), about  $1,168 \text{ m}^3$  of domestic wastewater of 50 workers in construction site will generate. Without measure to collect and treat wastewater, it may be poured and overflow surface and seep into the ground and contaminate soil and groundwater environment in site areas, or pour into the water sources causing water pollution for the receiving sources.

Domestic wastewater pouring into river will be risk to increase concentration of compounds in water causing water pollution. However, volume of wastewater may pour into Gianh stream of  $3,2 \text{ m}^3/\text{day}$  (equivalent to  $1,168 \text{ m}^3/\text{year}$ ); volume of suspended solid is about  $1 \text{ kg}/\text{day}$  (equivalent to  $365 \text{ kg}/\text{year}$ ), so average concentration of suspended solid in domestic wastewater pouring into the stream is very low. The impact can be controlled by mitigation measures.

**Wastewater from construction activities:** During construction process, the agents that cause water pollution are mainly oil leaking from equipment, process of equipment repairing, dust in the air, settling dust, mud, soil on surface of work site. In rainy time, the agents will be washed into surface water, which may reduce water quality in reservoir, canals and other surface water in the area. Runoff rainfall flows through the site will swipe oil, rubble, debris, dirt, dust and rocks on the surface to the reservoir or nearby canal increasing turbidity and causing greasy scum. Runoff rainfall will wash away soil from materials yards and disposal sites, leading to increase of turbidity in the water, causing sedimentation in drainage canals, obstructing drainage capacity of the area. Construction sites of the work items with a total area of  $26,000 \text{ m}^2$ , stretch along the main dam and management road, the source of pollution of surface water should be noted and to adopt measures to reduce the impact effectively.

At the construction site for earthworks, concrete, drilling, grouting, etc. rainwater often swipes soil, rubble, construction waste away into the reservoir and

canals in surrounding area, increasing turbidity, water pollution by alkaline from concrete, reducing the pH and water quality.

Activities such as leveling, earthworks and disposal areas will also impact on surface water quality due to excavated soil, filled soil and soil erosion, especially in rainy season. However, this amount will not be concentrated in one place but scattered over 4 works (dam, spillway, water intake, management road).

In addition, activities from concrete mixing plants, the production of highly alkaline, waste materials such as cement paper, plastic may interfere with the flow, pollute water source in case of decomposition.

Measures to minimize the impacts on water environment due to construction waste, soil erosion are presented in part 6 of the report.

**Construction wastewater:** Construction wastewater from the stone grinding and screening station, stone washing places, building materials yards, concrete mixing plants, concrete placement area contains cement, sand, though few but very dense. Without centralized processing before discharge, it may increase turbidity and water pollution caused by alkaline from concrete. According to calculations of design consultants, volume of effluent approximately 1m<sup>3</sup>/day, the load of pollutants during construction (365 days) as follows:

**Table 5 - 2: Load of pollutants in construction wastewater**

<b>Pollutant</b>	<b>Norm (mg/l)</b>	<b>Pollutant load (kg)</b>
COD	625	0,3375
BOD <sub>5</sub>	303	0,1636
SS	6.800	3,672
Grease	44	0,2376

*(Source: Document of Economopoulos, WHO, Genève 1993)*

- Leaked oil, disposed sludge of motor vehicles, machinery.

Lubricant is mainly arisen from the machinery maintenance and repair facilities. The average amount of oil used for each time of maintenance of about 18 liters/vehicle x 4 times/years. With around 10 vehicles operating, amount of oil discharged during construction time will be about 720 liters. This is the source of pollution to surface water and groundwater in the area (groundwater and water in reservoir and in Gianh stream). It is necessary to take measures to collect and treat appropriately to minimize this impact.

**Runoff rainwater:** Rainwater swiping building materials, soil and sand away will also be source of contamination to water sources in the area. Construction period of important items are concentrated in the dry season, however, does not exclude the

possibility of flood in dry season causing by large showers (May, June), thus, the impact is inevitable.

Rainwater runoff flows through the ground of some areas such as fuel storage area, parking area, storage area, warehouse, etc. or areas storing garbage without carefully shielding can pollute water with oil and organic contaminants, chemical.

The concentration of pollutants in storm water runoff meets standard type A - NTR 08: 2008/BTNMT, however only TSS parameters is quite high, if waste water is not sediment but directly discharge into the receiving water will cause turbidity, affecting surface water quality in the project area. Measures to mitigate the impact of storm water runoff will be proposed in part 6.

## **2) Impacts on air environment**

### *a. Pollution from dust*

#### *Dust from transportation, unloading materials*

During transportation process, due to vibration and wind, dust, soil and sand from the trucks and road will be swept with wind generating dust. Amount of dust generating depend on the quality of the road conditions, the method of unloading and gathering materials. Concentration of dust will increase in sunny days; spreading scale can range up to 200m in days with large wind.

Excavation and backfilled solid transportation process:

- Volume of backfilled solid around 6,845.6m<sup>3</sup>;
- Volume of excavated soil around 6,399.6m<sup>3</sup>;
- Volume of soil utilized for backfilling about 6,300m<sup>3</sup>.

Thus, total volume of soil will be moved from construction site is about 99m<sup>3</sup> (transportation distance is about 2.5km); Total volume of backfilled soil will be transported to the site is about 545.6m<sup>3</sup> (transportation distance is about 700m); Volume of soil will be transported from excavating place to backfilling place is of 6,300 m<sup>3</sup> (transportation distance is about 0.7km).

**Table 5 - 3: Estimation of number of vehicles and dust generating during construction time**

No.	Transportation	Volume (m <sup>3</sup> )	Volume (kg)	Number of vehicles	Volume of dust generated (g)
1	Transport soil from the site	99	178	18	8.4375
2	Transport backfilled soil to the site	545.6	1.255	130	24.375
3	Transport soil from excavating place to backfilling place	6,300	14,490	1450	24.375

	Total	6,944.6	15,923	1,598	57.1875
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As construction period is 12 months, there are about 133 turns of vehicle/month, equivalent to 6 vehicles/day. Average distance to transport soil is 0.7-2.5km.

### ***Dust arising from earthworks***

Sources of dust are from ground leveling and compaction during manual construction of the dam; process of unloading building materials from the transporting means; the transportation of surplus from earth excavation to landfills.

- Activities undertaken during construction time include: Manually leveling and compacting: about 6,845.6<sup>3</sup>; material transportation, including sand, rubble, cement, etc. around 3,289.6 m<sup>3</sup> (detail in Table 2.3), transportation of surplus soil to landfill: 99m<sup>3</sup>;

According to rapid assessment method of WHO, it can predict the amount of dust generated during construction in accordance with the table below:

**Table 5 - 4: Estimation of dust generating during construction time**

No,	Categories	Emission coefficient	Transportation volume (m <sup>3</sup> )	Estimated dust volume (gram)
1	Manually leveling activities	1-100	6,845.3	684.530
2	Unloading material using machineries, equipment	0.1-1	1,989.6	1,989.6
3	Dust generated by concrete placement	0.1-1	6,399.6	6,399.6
	Soil dropping from transportation trucks arising dust		15,234.50	692,919.20

*(Source WHO: Soil, water, and air pollutant sources assessment)*

Calculation results shows that amount of dust from transportation, ground levelling, concrete placement is about 692.92kg.

The increase in dust will be seen most clearly in the area of the project site. However, because the construction site is spacious, tree density is relatively high in the region; it is considered that impact of dust to the atmosphere is negligible

Calculation results in table above shows that the amount of dust generated is not much, only arises in the construction area, thus it may only affect the health of construction workers. In addition, during material transport process, distance to transport building materials to the construction site is relatively far, from 7-25km, project area away from the center, the density of trees is large; it is possible to diffuse

dust. Impact does not occur often during construction time, thus the impact can be mitigated.

*b. Pollution from emission*

*\* Emission from means using diesel*

Emissions from vehicles contain gas: SO<sub>2</sub>, CO<sub>2</sub>, CO, NO<sub>x</sub>, VOC, etc. This kind of air pollution depends on number of construction vehicles, machinery and methods of construction. As estimated, there are about 6 construction trucks travelling on road every day. Forecasted load of pollutants from vehicles using diesel as follows:

Amount of dust and emission generated during activities of surplus soil transportation is very low. Moreover, this amount of waste is diluted on many roads, thus, impact is much mitigated. If the contractor applies shielding activities effectively during construction process, ability of dust dispersal it will be much limited, thereby reducing the impact on environment. Waste will be dumped at landfill is vacant land area located in Tien Luong commune (*minute on agreement between the PMU and the CPC is attached in appendix*).

In addition to the amount of dust generated by the combustion of fuel the vehicle, there is a rather large amount of dust generated in the process of moving on the road increasing the amount of dust into the air. According to rapid assessment documents of WHO- 1993, the coefficient is 10 kg/1000km. So, load of dust released into atmosphere due to operation of the vehicle is about 3.75 kg.

*\* Emission generated from machineries, equipment.*

Operation of the machineries, equipment will arise polluted air containing the products of combustion of engines fuel such as NO<sub>x</sub>, SO<sub>2</sub>, CO, etc. The amount of ash and gases generated depends on the number, capacity, longevity and fuel oil consumption.

To air environment: the scope of the impact is low and it can be controlled through mitigation measures.

To human: Labor camps area is 300m away from focus area of work items (dam area, etc.); populated areas is far away with a low population density. Compared with the largest radius of emissions arising from transport activities in the construction phase (about 50 meters), the area of workers' camps and residents will not be affected.

*\* Pollution from noise*

Noise is generated mainly from excavation and earth filling activities by equipment, transport vehicles, etc. There are number of machineries and equipment used during process of repairing, upgrading work items (table 2.4). Noise can adversely affect workers at site and cause discomfort for people living in surrounding areas.

In 50m range, the noise level will be approximately NTR26: 2010/BTNMT, so in this range, workers are allowed to work continuously for only 21 hours. However, according to the calculations, there are about 10 vehicles operating alternately, possibility of noise resonance is high. Location prone to the impact: construction sites



located in zone 3, 4, 5 in Tien Luong commune; material transportation road from national road no. 32 to the construction site, 5km long, waste material transportation road passing zone 3, 1.6 km long.

However, the above calculation results show that the largest radius of influence of noise emitted from the operation of machinery, equipment and vehicles is 50 meters (outside this range are less affected and people may live and act for 21 hours). Therefore, the impact of noise only affects workers on site. In addition, the project is far from residential areas, population density in areas is low, moreover, density of trees is high, and so the noise will not affect the people. This effect can be controlled by the mitigation measures describing in chapter 6.

### ***3) Impacts on soil environment:***

During construction, the amount of solid waste is generated as: rock, lime waste, packaging materials, domestic waste of workers in the site, etc. if these resources is not collected and processed but disposed to ambient air, it will be a source of environmental pollution, loss of landscape. Apart from domestic wastewater, storm water runoff containing sand, sludge, grease, construction wastewater may seep into the soil affected soil quality (hardened soil, reducing the amount of soil organisms).

Change the soil environment can lead to change of terrain direction, physical and chemical properties. Vegetation layer may be altered by motor vehicles, leveling background machinery. Grooves on the surface are created during construction process, creating erosion if the drainage solution is not calculated. Excavation activities will make loss of surface layer, vegetation and animal populations. These disturbances can lead to changes in the proportion of soil, reducing moisture and natural drainage capabilities.

#### *a. Solid waste from the construction process*

The disposal of waste materials can cause temporary or permanent land loss. The area of land loss is mainly due to temporary land occupation for material yards and temporary landfill. Storage area and landfill area can cause unhygienic environment affecting soil environment, water environment due to storm water runoff through the area, affecting the movement of people, transportation means and landscape loss.

The calculation results based on the investment project report show that, the total amount of soil to be transported from the site is  $99\text{m}^3$ . At the same time, construction process will also generate a large amount of solid waste including concrete, bricks, debris, etc. Estimated emissions is of about 5-7 kg / day (2.5 km distance transport).

#### *b. Domestic solid waste of workers*

Amount of workers at peak period of construction time of 50 people. Impact of domestic waste of workers in each construction area on the environment is similar and calculated as followed:

In fact one the site, average waste amount discharged by a worker one day is of about 0.3 - 0.5 kg. So the amount of waste discharged by 50 people during this period of about 15-25 kg/day, in which organic matter accounts for 60-70%, other components including paper, plastic, packaging, etc. about 30 - 40%. After 12 months (360 days) of construction, domestic waste amount is generated of about 9 tons. Comparing with debris, waste rock, the amount of domestic waste is very small but the main ingredients are organic compounds at high risk of causing disease to human and animal. Thus, it needs effective remedies for this impact.

Source of solid waste generated during construction will be collected and taken to the processing area. The size of land used for storage of solid waste will be calculated in the specific mitigation measures (part 6). The land acquisition is only temporary (12 months). As per agreement with CPC, the contractor will plant trees on land area for landfill and return the landscape. The impact is assessed at low level, can be controlled by mitigation measures.

#### *c. Hazardous solid waste*

Hazardous waste generated in this phase may contain fluorescent lamps, rags containing oil, waste oil, etc. These sources, if not being collected, processed but dispose without control to surrounding area will be a source of environmental pollution, degradation of land environment (land becomes harder, dead microorganisms, affecting yield), breaking the landscape. Therefore, investor should request construction units to implement measures to rent functional units to collect waste and transport to processing area to reduce, minimize adverse impacts due to this discharged source.

### **4, Impacts on biodiversity**

As analyzed above, there is no reserves, natural habitat of wild animals in Ban reservoir construction area. Thus, the biological environment will be only affected by some impacts with very small scope. The impact can be mitigated, because:

- i) Scope of affected area is small, within the project, there is only construction of 354m of dam and 1,600m of management road. The area is sparsely populated with no wild animals live;
- ii) In clearance phase, number of trees will be cleared (95 trees) which are mainly fruit trees and some common timber trees such as acacia, and shrubs. Therefore, flora is not affected;
- iii) For aquatic fauna (Ban reservoir, Ban reservoir downstream) project construction may affect the habitat of several species of crustaceans such as shrimp, crab or species of fish. However, these effects are very small because there is no rare plants and animals need protection. Besides, construction of upstream slope in the dry season will not affect water in the reservoir;
- iv) The project construction will not affect water supply for downstream, so the flora and fauna are not affected by water shortage or interruption due to

construction.

### **5.3.4 Impacts during operation phase**

#### **5.3.4.1 Activities**

- Reservoir operation
- Water intake operation

#### **5.3.4.2 Sources of impacts**

In management, operation stage of Ban reservoir, no pollutant source of air, water because there is no work under Ban reservoir may arise such pollutant sources. There is only risk of oil dropping from water intake operation.

#### **5.3.4.3 Impacts on society**

*Increased crop yields in irrigated areas:* Currently, Ban reservoir is providing water for 150 ha of 2-crop rice, however, in recent years due to climate change, water for this area has been not enough. Lack of water in some years affected 30% - 50% of irrigated areas. It affects the productivity of rice and other crops. The lack of water also takes more time and effort of population in general and women in particular to get water. The positive impacts will be brought after completion of Ban reservoir include:

- i) Reduce water loss due to leakage from water intake and dam. That will increase irrigation capacity for downstream area and release pressure on water shortage. Thus, the work contributes in increasing crop yield in Tien Luong commune.
- ii) Besides, in Tien Luong commune, it is a land area of about 160ha without canal system to take water. Therefore, in the future if water to Ban reservoir can be well accumulated, it can supply more water to the area currently having no canal. This will improve the livelihoods of people in the commune.

*Increase the awareness of local people and local governments in disaster risk management and safety reservoirs and dams:* Construction activities along with communication activities of the local government and PMU, awareness of local people and local governments will be raised on reservoir and dam safety through public consultation activities, meeting and participation in the construction and installation activities

*Increase the water storage capacity of Ban reservoir and water supply for downstream area as well as increasing the safety of Ban reservoir:* The upgrading of the dam and replacing water intake will enhance dam's safety because after the upgrading, earthen dam and dam slope will be replaced with concrete. The upgrade will support:

- i) Replacement of new water intake and reinforcement of the dam will ensure that the dam body will not be infiltrated, and become more safety, since the dam slope, dam surface has been being upgraded.

- ii) Water supply to the downstream area (150 ha of rice) will be guaranteed, not missing in the dry season. Moreover, reduction of water leakage will help Tien Luong agricultural cooperatives saving water and can provide more for the area has not been previously irrigated. This will increase productivity, livelihoods and economic improvement of households.

### **5.3.5 Impacts on environment**

*Disaster risk causing unsafety of Ban reservoir (landslides, leaks, broken dam):* Ban reservoir area unprecedented dam broken but the break may occur. Impacts if the dam is broken are as follow:

- (i) Inundate, damage livelihoods of people, including 150 ha for rice and some aquaculture ponds.
- (ii) Irrigation system may be broken or leveling by dropping soil, material.
- (iii) Rock can be drifted, filling the paddy fields, fish farms of the people. That may result in lost or reduction productive capacity of this area
- (iv) Reservoir water can wash away the pesticides, chemical fertilizers and water pollution
- (v) Flooding in downstream may cause environmental pollution
- (vi) If the people are not informed and timely evacuate, affect to travel activities of a number of households in the region downstream

However, this risk is small because

- (i) Project area unprecedented natural disasters or hazards such as earthquakes
- (ii) The Ban reservoir operation and management units will adopt measures to ensure the safety of dams and reservoirs in the process of operating under the provisions of the State
- (iii) The works are being upgraded to ensure the water supply and easy and safer drainage (accidental spills, drain water)
- (iv) Local government and people have been raised awareness about community-based disaster risk management through available activities, training activities and communication in this project
- (v) The reservoir dam safety inspection assessment will be conducted periodically by the relevant units. Thus in case of happening, the risks will be detected early and timely intervention


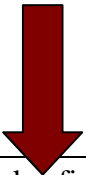
*Regulating reservoirs, flood discharge in the case of large floods affecting downstream:* During operation process, management units may discharge flood to ensure the safety of the reservoir. The flood discharge can cause damage to property (farms, crops) of people. At the downstream (behind the spillway) there are about 10 hectares of aquaculture farming of households. This land area is owned by CPC. People rented this land area for a short time. Therefore, when the water rises,

completely filling the spillway, it may impact on the fish pond. However, this effect is small because:

- i) Downstream of flood spillway is mainly some ponds and farms of people. Source of water discharged through the ponds will flow into Gianh stream. Therefore, the impact is not large in case that water overcomes flood spillway.
- ii) Irrigation canal will be used to drain water in order to regulate the reservoir if water level reach the top and also flows passing rice field and into Gianh stream.

## 5.4 GENDER ANALYSIS

The schematic representation below shows the identification of different roles and responsibilities related to water management, water use and water collection in the project area.

MEN	WOMEN
LESS concern with household water security and family health, unsafe water and its harm on family's health.	CONCERN with household water security and family health, unsafe water and its harm on family's health.
MUCH LESS participation in hygiene and sanitation education	PARTICIPATE most in hygiene and sanitation education
PLAY MINOR ROLE in educating children and other members of the family on good hygiene behaviors such as regular bathing, safe drinking, handling of water etc.	PLAY MAIN ROLE in educating children and other members of the family on good hygiene behaviors such as regular bathing, safe drinking, handling of water etc.
	
TOTALLY make decision on water use plan, water distribution and water store	NOT ABLE to make final decision on water use plan, water distribution and water store
OFTEN make decision of construction, design and location	HARDLY make decision of construction, design and location
OFTEN assume responsibility of managing and protecting the reservoir	HARDLY assume responsibility of managing and protecting the reservoir

**Expected positive impacts on gender.** The project when implemented will have a positive impact on the people in the project area in general and on women in particular. These effects are:

- (i) Creating new opportunities for economics, trade and services; creation of jobs to increase income for women, especially poor women and EM groups during project construction time, temporarily contributing to poverty alleviation in the project communes; and

- (ii) Providing opportunities to improve the status of women and enhance their participation in community activities through gender action plan.

**Negative impacts on gender.** Besides the positive impacts, the project may also impact negatively on women in particular and people in general in the area. The negative effect is the land acquisition that will affect the lives of families. However, the mitigation measures will be conducted through the compensation and resettlement plan. In addition, during construction, environmental pollution caused by dust, construction waste, noise may occur and affect people. These effects can be significantly reduced by the proposed mitigation measures

**Measures to Minimize negative impacts.** To mitigate the negative impacts to women in the project areas before and after the design, compensation and resettlement assistance, as well as supervision of construction projects, the project will enhance the dissemination of project information to the people in general and to women in particular to ensure that women will get maximum benefit from the advantageous conditions brought by the subproject.

**Table 5 - 5: Mitigation measures to reduce negative impacts.**

Adverse Effects	Mitigation
1. Loss of productive land	<p>Sufficient public consultation with local people right from the project design through the organization of meetings with the affected families for project disclosure and land acquisition possibilities. At the same time, discuss the compensation plan and suitable alternative income generation (if there is a significant impact on income).</p> <p>Adopt a compensation policy, which is suitable to State policies and local distinctiveness.</p> <p>Audit the properties in an appropriate time to prevent the illegal planting after project auditing.</p> <p>The compensations must be paid on time and at the right price.</p>
2. Number of social evils may increase. Construction of civil items will attract workers from outside who may bring vices such as drug addiction and prostitution, trafficking of women and children and spread of communicable diseases.	<p>GAP will conduct communication campaigns (traffic safety, HIV/AIDs/STIs and human trafficking prevention for local women and children.</p> <p>Consult to local young female about marriage and sexual health</p>
3. Disruption in daily living of people during construction period like their mobility in going to school and market.	<p>Create temporary access during the construction time and return the existing condition after completion.</p> <p>Apply successive methods in construction to reduce the length of excavated areas</p> <p>Install the warning panels at the dangerous site</p> <p>Assign instructors at the construction area</p>
4. The outsiders (the workers)	The contractor commits to ensure the harmony between in

Adverse Effects	Mitigation
can raise the risks of social and cultural conflicts.	culture and customs between their workers and the local people.



## **PART 6**

### **ALTERNATIVE ANALYSIS**

#### **6.1 NO ACTION ALTERNATIVE**

##### **6.1.1 Dam**

At dam A, dam crest is combined in use as traffic road, earth structure, possible to be deformed when vehicles travelling. On dam crest, at edge of both upstream and downstream slope, trees overgrow, facilitating animals burrowing, living. That may disfiguring dam crest, affect safety of dam. Current width of the crest is of 4,0m, smaller than minimum width under design standard for compacted earth dam TCVN8216-2009 (III. level work, minimum crest dam width  $B=5\text{m}$ ). Thus, expansion and reinforcement of crest dam is necessary.



**Figure 6 - 1: Current status of dam crest A**

Upstream slope of the dam has not been fixed, much trees grow on the slope. In addition to this situation, effect of unusual climatic events such as heavier rains and stronger winds may raise the risk of the dam to be eroded, landslide. Besides, much trees growing may be a threat to the safety, stability and scenic view of work.



**Figure 6 - 2: Upstream slope of dam A**



Due to weak work management, lack of awareness of people, adverse impacts happen to safety, stability of the dam, such as trees planting, farming on dam crest, digging pond for aquaculture at feet of downstream of the dam. Such activities, combined with seepage, water leakage without water drainage facilities are underlying causes leading to loss of dam safety. It needs emergency repair of dam, and boundary demarcation to prohibit infringing works with propaganda measures and education to people so that they have knowledge to not affect safety and stability of the dam.

Dam B is a homogenous earth dam, 92,75m from dam A, on the right side of A dam. Elevation of dam is of 31,5m; length of 145,6m, width of 4,0m; dam crest is also used for traffic road. It has currently not been reinforced, uneven surface. Much trees plant on edge of upstream and downstream slope. There is no breakwater wall, lighting system, displacement landmark for monitoring, seepage on dam body monitoring equipment.



*Current status of upstream slope of dam B*



*Fishing in reservoir*

**Figure 6 - 3: Current status of upstream slope of dam B**

Downstream slope of dam B has coefficient of 2.5 as management document. Currently, lot of positions are deformed, without ditch to drain water from the crest. Slope coefficient in many position is only 0.5, trees overgrow.

Dam C is at distance of 85 m from B dam, on the right side of dam B. Crest elevation is of 31.5m; length of 87.2m, width is 4m; dam crest is also used for travelling purpose, this road is earth currently with a lot of convex and concave. On dam crest, at edge of both upstream and downstream slope, trees overgrow. Dam crest is affected by both nature and human. Dam crest is deformed, eroded and recessed, not reinforced. That may affect safety and stability of dam.

### **6.1.2 Spillway**

Spillway is located on the left side of dam A, free flow style. Entrance, spillway threshold, spillway body and downstream stilling basing is totally earth. Width of spillway under initial design is of 10m, however current spillway width and chute is not identified because of much deformation. At the end of the chute, downstream, there is no device for drainage, without reinforcement. Trees overgrow on both sides of the chute, chute body and ending segment of the chute.



**Figure 6 - 4: Condition of flood spillway**

### **6.1.3 Water intake**

Water intake is severely degraded, water is leaked from the water intake body. Entrance is broken, filled earth part of entrance is eroded, slided; valve staging system is rundown valve; valve gate is damaged. People put a lot of sacks of soil and sand in front of the valve to close. In case of opening the intake, management unit must mobilize workers to wade out to pull the sacks. Time to open is 6 hours at least. This work endangers live of the operator.





**Figure 6 - 5: Condition of water intake**

#### **6.1.4 Access road**

Management road has length of 1,600m, width of road surface ranging from 3.0 to 4.0m; the surface road is now earth, uneven, much potholes. Management road is combined to use as transportation road of people. Road is narrow and degraded causing difficulties in management and operation of the dam as well as dam incident rescue in case of emergency.



*Access road to Dam A, B*



*Access road to Dam C*

**Figure 6 - 6: Access road**

### **6.2 WITH PROJECT IMPLEMENTATION ALTERNATIVE**

#### **6.2.1 Repairing water intake**

**Parameters after repairing:** Water intake is 35m long, is steel encased concrete M200, diameter  $\Phi 600\text{mm}$ , design  $Q = 0.23 \text{ m}^3/\text{s}$ .

**Construction, repairing, upgrading activities:** Build new water intake, 5m away from the old one, on the right side of dam C. No land is acquired.

**Impact assessment:** The project is upgraded based on the current condition and will not change flow. In C dam, water intake will be constructed next to the old one. Construction activities will not affect water taking from the current water intake. Thus, water supply for downstream area is not affected. Moreover, upgrading water intake at dam C will be taken place during time without use of water from Ban reservoir (February to May). Thus, water supply for downstream will not be affected.

The water intake construction will affect water quality in the reservoir due to the dismantling, oil dropping during installation of equipment.

However the impact is low and temporary because:

i) Construction of water intake is carried out in dry season and cofferdam will be developed if necessary. Thus, scope of impact on water supply is very low.

ii) Construction schedule will be informed to people so that they can make plan for production, living.

iii) Time to drain water is properly selected, prevent time required to take water for crop in downstream

Location: Ban reservoir, water intake, downstream area

Period: 3 months (February to May)

## **6.2.2 Upgrading upstream and downstream slope of the dam**

***Construction, repairing, upgrading activities:***

- Dam A: move heart line of the dams 4m toward upstream;
- Dam B, dam C: move heart line of the dam 4,5 m toward upstream

Treat seepage on upstream slope; concrete placement on dam surface and upstream slope, plant grass and equip drainage facilities on downstream slope.

**Impact assessment:** On upstream slope, there are many plants encroaching into the reservoir (figure 5-1, appendix 10), including timber trees and fruit trees such as bead tree, mango tree, guava tree, etc. It is inhabited by some insects such as mites, crickets, beetles, etc. When the project to upgrade and repair dam is taken place, especially upgrading the dam roof, vegetation growing on two dam slopes will be cleaned, the animals living within the dam slope will be affected

However, small animals can move to other areas, in the garden of households or vacant land with vegetation having similar characteristics to live.

Besides, there is fish cage farming in reservoir. The cleanup, site clearance generating noise will affect the fish being farmed in cage, since position of the cage close to the upstream slope of dam. However, area and amount of cut trees is low, this impact is insignificant.

Dam slope and spillway construction process may cause erosion on dam body or nearby location. However, this effect is LOW and TEMPORARY because the repairing activities for dam slope and spillway will be carried out in the dry season. The location of construction is located above the water level. Moreover, dam base is built with cement; it is difficult to cause soil erosion

Location: Ban reservoir, upstream and downstream of the dam

Period: 12 month of construction

### **6.2.3 Upgrading spillway**

***Construction, repairing, upgrading activities:***

- Spillway is located on the left side of dam A, next to the existing dam, 5m away from the existing one toward dam B, as surveyed route of TR2; TR3.
- Repairing, upgrading flood spillway with stone M100 coated by reinforced concrete M200 20cm thick; chute is reinforced concrete M200, 14 m long, slope  $i=15\%$ ; width  $B = 10$  m. It is free flowing spillway threshold, with stilling basin, flood discharge flow:  $Q_{\max 1,5\%} = 18 \text{ m}^3/\text{s}$ .

***Impact assessment:***

There are about 10ha of aquaculture ponds and land for crops planting behind the spillway. Construction of the spillway may increase turbidity of water supplied for those areas and cause economic loss to HHs. This risk and impact is low, because:

- i) Location of the spillway is now 1.5m higher than the dead water level, while excavation and ground leveling for construction of the spillway is still over the dead water level. Thus, there is no risk of water pouring into the ponds.
- ii) Ponds behind the spillway are linked together and play role as seamless flow. Thus, if water flows into these pond, this water volume will continuously flow to Gianh stream (drainage canal of downstream area). Therefore, the impact is insignificant.

Spillway construction process may cause erosion on dam body or nearby location. However, this effect is LOW and TEMPORARY because;

- i) The repairing activities for dam slope and spillway will be carried out in the dry season.
- ii) The location of construction is located above the water level. Moreover, dam base is built with cement; it is difficult to cause soil erosion.

Location: Dam A, Ban reservoir

Period: 12 month of construction (mainly in 3 months of spillway construction)

### **6.2.4 Repairing, construction management road**

***Parameters after repairing:*** Concrete road, length  $L = 1600\text{m}$ , 5m broad of road surface, concrete M300, 22cm thick, beneath the concrete layer is sand layer 5 cm thick and 18cm thick macadam.

***Construction, repairing, upgrading activities:*** Upgrade, repair management road connecting to the dam, cut slope.

***Impact assessment:***

The road running along the reservoir is earth road, relatively steep, width of road surface of 3m - 4. The road passes through zone 3, Tien Luong commune. The road will be temporarily used when the dam under construction. Material transport will also use this road to release pressure on the main road. Recognized vegetation along the road is mainly bushes, shrubs and some common timber trees such as acacia, bead tree

Acquired land area for construction of management road estimated of 11,500 m<sup>2</sup> is garden land and vacant land. Affected trees are fruit trees (grapefruit, star fruit, etc.) and crops with low value, not rare vegetation.

Construction period may impact local travel, transportation, as well as the risk of accidents:

- Increase risk of accidents due to the increase of the means through inter-commune roads and construction sites (where the excavation activities are carried out, and where the construction equipment, waste locates on or next to roads, works, etc.). It may danger local people, especially at night when visibility is limited; and suspended dust particles reduces visibility;;
- The construction of the dam and ancillary works such as management road will limit the ability of people to travel as well as access to social infrastructure such as schools, markets, etc.

However, these effects are LOW and TEMPORARY because:

- Volume of construction means will be shared, release pressure for the main road. Transportation of construction materials will use road connecting national road no. 32 to the work, length of about 5km, which is the current road often used passing through the sparsely populated areas of zone 4 and zone 5. At the same time, management road 1.600 m long along the reservoir in the East, being earth road, will be utilized. The demand for low traffic on the route, in addition, the reduction of traffic load for the main road contributes to the ability to obstruct traffic is very low.
- The number of vehicles/equipment for road construction is about 6 trucks per day during the peak construction period is negligible
- A part within scope of the contractor is to ensure the health and safety on construction sites for individuals and construction site; it is not allowed to occur the risk to the safety of people. Therefore, the contractor shall take measures to minimize the impact during construction process

Location: Dam A, B, C, spillway, management road and road to transport material and waste in Tien Luong commune

Period: 12 months of construction phase

## **PART 7**

### **ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)**

#### **7.1 ESMP OBJECTIVE**

- Ensure to comply with regulations, laws, standards and application manuals at the provincial and national levels.
- Guarantee to have sufficient allocated sources based on project budget to implement ESMP activities.
- Ensure the environmental and social risks of subproject have been managed properly.
- To cope with unanticipated and undefined environmental issues in environmental impact assessment of project.
- Feedback to continue to improve environmental activities results.

#### **7.2 MITIGATION MEASURE**

##### **7.2.1 Potential impacts and mitigation measures**

###### **a, Mitigation measures in preparation phase**

Some mitigation measures should be considered and incorporated into engineering proposals, as follows:

- Slope design, levelling, compaction and tree planting at disposal site and borrow pits
- Design of embankment for erosion protection at downstream of spillway
- Rehabilitation of all disturbed areas such as workers camps, materials storage areas, etc.
- Camps: must ensure septic tanks area in place, proper accommodation including water supply and sanitation facilities for the workers to use
- Impacts on water supply/irrigation: communication plan to make agreements with communities
- Safety on dam crest as it is also used as local road: lighting, rail to prevent bike from falling into the water etc.

During the project preparation stage, the main impact is caused by the work of clearance. This action will permanently affect 15,000m<sup>2</sup> of planted land and temporarily affect 15 households in the affected area of 11000m<sup>2</sup>. However, these effects are small and it can be minimized by the following measures:

**Table 7 - 1: Measures to minimize the environmental impact of the sub-project in the preparation phase**

<b>Potential impacts</b>	<b>Mitigation measures</b>	<b>Effectiveness Advantages / disadvantages</b>
Dust emissions	Equipping sprinkler vehicles, watering the road. Spray water in the leveling area or transport routes	These mitigation measures are feasible, simple, easy to implement, and consistent with the ability of the contractor. It will be effective under close and serious monitoring. However, these impacts can only minimize, not being able to completely overcome.
Noise generation	Ensure the best operating status for construction machinery and trucks by maintenance works	These mitigation measures are simple, easy to implement, and do not need the complex technology and complex technique. However, there must be a commitment by construction contract between building contractors and project management unit. Noise impacts can only mitigate, not being able to completely overcome.
	The loud noise activities should conduct over a period of working day	
Waste generation	Solid waste bins	These measures are highly effective, feasible and easy to implement. It needs the participation in the form of a contract between the contractor and the functional units for collection, disposal, and treat oil waste. It should have the consistency between the construction contractors. There should be a strict sanctions and the closely monitoring.
	Oil waste bins	
	Grease rag bins	
	Portable toilet	

**Table 7 - 2: Measures to minimize the social impacts of the sub-project in the preparation phase**

<b>Potential impacts</b>	<b>Mitigation measures</b>	<b>Effectiveness Advantages / disadvantages</b>
The impact on families that losing agricultural	Implement the mitigation measures as outlined in the resettlement plan. The clearance and resettlement is the responsibility for the compensation, support and resettlement of the	It is inevitable that land loss affects negatively to the lives of people. In the current situation, the difference in compensation rates between frame rates of the state and the actual rates,



<b>Potential impacts</b>	<b>Mitigation measures</b>	<b>Effectiveness Advantages / disadvantages</b>
land	district	and the inflation impedes the compensation work. However, the compensation and policy support make the lives of the landless households somewhat stable.

**b, Mitigation measures during construction**

**Table 7 - 3: Measures to minimize the environmental impact of the sub-project during construction period**

Potential impacts	Mitigation measures	Effectiveness Advantages / disadvantages
Detecting artifacts during excavation	<ul style="list-style-type: none"> <li>- The contractor must protect the scene and reporting to the constructive supervised officers, PMU, museum/culture management agencies in local</li> <li>- Put the found items for museum/culture management agencies. Determine whether to continue to build or suspend to further investigation</li> </ul> <p>Director of Information and Culture department and Director of the Provincial Museum have the responsibility for the subsequent processing steps for items that found under the Article 21 of Decree No. 92/2002 guiding the implementation of the Law on Cultural Heritage</p>	After detecting the artifacts, perform the actions in order, protecting the artifacts.
Detection of relics during excavation	<p>Protect the scene and report to the local governments</p> <p>Determine the people who have the responsibility to solve the works.</p> <p>Determine where and how to resolve, and suggest the follow-up activities</p>	After detecting the relics, perform the actions in order, protecting the relics
Rocks and dropping material deposits the reservoir, channels, and rice fields during clearance, soil excavation and	<ul style="list-style-type: none"> <li>+ Avoid clearance activities in the rainy season, clean up the completed work before moving on to a new line.</li> <li>+ Install the sewer grates in the drainage ditch;</li> <li>+ Dredge canals in the rainy season (if necessary) if the canals have a lot of sedimentation.</li> <li>+ Clean and dredge soil, sand and rubble that spill down to paddy fields, canals ...from the vehicle being dumped</li> </ul>	Highly effective, without technology or complex technical, and easy to implement. These mitigation measures will depend on the progress of implementation of the project, experience and responsibilities of the construction unit. Therefore, the commitment of the construction unit will be needed.

Potential impacts	Mitigation measures	Effectiveness Advantages / disadvantages
material transport		
Soil pollution from spilling and leaking oil or other chemicals	<ul style="list-style-type: none"> <li>+ Chemicals (oil, additive chemicals, etc.) for construction should be contained in containers, boxes that suit for each type of chemical and store in a safe area, with concrete floors and water resistant roof;</li> <li>+ Vehicles and construction equipment should be maintained in a good condition.</li> <li>+ Unused chemical and petroleum should be wrapped carefully before transporting to the qualified store. The box contains chemical waste that cannot reuse should be separately collected and transported to specialized units to handle.</li> </ul>	The mitigation measures are simple, easy to implement, and do not need the complex technology and technique. However, the contractor must prepare the warehouse and yard before starting construction. It should be coordinated between the specialized units to ensure that the waste is being handled. These measures will bring good results if the construction contractors and workers are aware and educate about environmental protection, and they are tested by the project owner.
Water and aquatic environment pollution from waste, chemicals, effluent or contaminated land	<ul style="list-style-type: none"> <li>+ Oil should be stored in a safe area, with concrete floors and roof that avoid rainwater and floodwater;</li> <li>+ Vehicles and construction equipment should be maintained in a good condition.</li> <li>+ Camp for workers require to have 2 toilets by the standards of the Ministry of Health.</li> <li>+ Soil spillage should be collected and processed regularly to prevent clogging in canals and water resources in the region.</li> <li>+ No chemical preparation close to the water source</li> </ul>	The mitigation measures are simple, easy to implement, no complex technology and technique, without raising machines. However, the contractors must prepare the warehouse and yard before starting construction. It should be coordinated between the specialized units to ensure that the waste is being handled. These measures will bring good results if the construction

Potential impacts	Mitigation measures	Effectiveness Advantages / disadvantages
	<p>areas</p> <ul style="list-style-type: none"> <li>+ Do not wash tanks, boxes containing materials.</li> <li>+ Do not leave waste in the ranges of 10m in the water sources.</li> </ul>	<p>contractors and workers are aware and educate about environmental protection, and they are tested by the project owner.</p>
Air pollution due to dust or other emissions (CO, NO <sub>x</sub> , SO <sub>x</sub> , etc.)	<p>Carry measures to minimize dust and air pollution, as follows:</p> <ul style="list-style-type: none"> <li>+ Cover the trucks that transport constructive materials with canvas during the transport process.</li> <li>+ Vehicles and construction equipment should be maintained in a good condition.</li> <li>+ During the dry season, the trucks should be sprayed water when they pass through the crowded residential areas, schools, etc. in the rush hour.</li> <li>+ Regulate the limited speed (15kph) and guide the driver to know and comply with it.</li> <li>+ The contractor will perform the proposed construction plans, approved by the PMU to minimize the time for clearance and construction, and temporary material storage.</li> </ul>	<p>These mitigation measures are feasible, simple, easy to implement, and consistent with the ability of the contractor. It will be effective under close and serious monitoring. However, these impacts can only minimize, not being able to completely overcome.</p>
Materials waste arising from the construction activities on site and from activities of workers	<ul style="list-style-type: none"> <li>+ Cleaning and carrying the waste from the construction to the dump regularly (1 disposal)</li> <li>+ Put the trash in the proper position in the field and worker's camps.</li> <li>+ With the hazardous waste (e.g. sludge, grease and other related products from surplus oil, if any), install the collective system, temporary store around the site, contacting with the specialized</li> </ul>	<p>These measures are highly effective, feasible and easy to implement. It needs the participation in the form of a contract between the contractor and the functional units for collection, disposal, and treat oil waste. It should have the consistency between the construction contractors. There</p>

Potential impacts	Mitigation measures	Effectiveness Advantages / disadvantages
	unit to handle	should be a strict sanctions and the closely monitored
The temporary dump materials such as dust, noise impacts on water quality	<ul style="list-style-type: none"> <li>+ Store material along the route, dam or near the construction site to avoid congestion;</li> <li>+ Materials should be stored in a reasonable way to avoid affecting the vehicle and pedestrians passing through the construction area;</li> <li>+ Install fences around the area where contain the material to prevent the entry of people and animals;</li> <li>+ Reasonable compensation for the agricultural produce of the local residents that affected by putting materials as well as using cultivated land as a temporary dump material;</li> </ul>	<p>These measures are highly effective, feasible, easy to implement, and do not need complex technology or technique. These measures shall require the responsibility of construction units as well as the full assessment before starting construction. Therefore, measures to punish and monitor closely should be needed.</p>
Impacts generate from land mines, stone and sand such as dust, noise, safety and the soil or water pollution.	<p>In the land and stone mines, contractors should follow the environmental protection issues, including:</p> <ul style="list-style-type: none"> <li>- Machines and construction equipment need regular maintenance, in accordance with quality requirement during operation.</li> <li>- The hazardous waste such as oil and other chemicals must be strictly managed, stored in separate areas around the constructive area, waiting the treatment from competent authorities. Workers need to be equipped with protective tools while working in the made ground.</li> <li>- Mining area must have fences, the entrance gates must have protective latches in order to prevent the entry of people and animals;</li> </ul>	<p>These mitigation measures are simple, easy to implement, and do not need the complex technology and technique. However, the contractor must prepare the constructive machines, warehouse, and yard before starting construction.</p> <p>It should be coordinated between the specialized units to ensure that the waste is being handled. These measures will bring good results if the construction contractors and workers are aware and educate about environmental protection, and they are tested</p>

Potential impacts	Mitigation measures	Effectiveness Advantages / disadvantages
	<ul style="list-style-type: none"> <li>- During dry days, the land mine areas should be sprayed with water.</li> <li>- The contractor must select the material provider that has the suitable business license.</li> </ul>	by the project owner.
The impacts at disposal sites	<ul style="list-style-type: none"> <li>- Construction units have to level, move and compact carefully</li> <li>- Planting on the surface of disposal sites after completing the project to create a stable, prevents the soil, and prevent the disposal area from the landslide phenomena.</li> </ul>	These mitigation measures are simple, easy to implement, and do not need the complex technology and technique.
The noise generate from construction equipment	<ul style="list-style-type: none"> <li>+ The motor vehicles, construction equipment must be maintained periodically.</li> <li>+ Avoid performing construction activities near residential areas in the lunch hour, or after 20 PM.</li> <li>+ Inform the construction plans regularly to communities and local government by phone, speakerphone, text, or on the notice board of the Commune people's committees</li> </ul>	These mitigation measures are simple, easy to implement, do not need the technology or complex technical. However, there must be a commitment by construction contract between building contractors and project management unit. Noise impacts can only mitigate, not being able to completely overcome.

**Table 7 - 4: Measures to minimize the social impact of the sub-project during construction period**

<b>Potential impacts</b>	<b>Mitigation measures</b>	<b>Effectiveness Advantages / disadvantages</b>
1. Irrigation channels and reservoir construction interrupt supplying water for downstream and rice fields	<ul style="list-style-type: none"> <li>+ Most of the activities that upgrading the system should be carried in the dry season.</li> <li>+ Accelerate repairing system in the construction phase.</li> <li>+ Technical measures such as temporary water channels should be created.</li> </ul>	Highly effective, without complex technology or technique, and low budget. The mitigation measures will depend on the progress of the project, experience, and responsibilities of the construction units. Therefore the commitment of the construction units should be needed.
2. Dam safety risk	<ul style="list-style-type: none"> <li>+ Most of the activities that upgrading the dam, drain water should be carried in the dry season.</li> <li>+ Speed up the construction</li> </ul>	Highly effective, without complex technology or technique, and low budget. The mitigation measures will depend on the progress of the project, experience, and responsibilities of the construction units. Therefore the commitment of the construction units should be needed.
3. Obstruct traffic, increase risk of traffic accidents and reduce the ability to access to social services (schools, markets, health centers ...) in the	<ul style="list-style-type: none"> <li>+ Install the signs and lights in the construction area to guide traffic;</li> <li>+ Create a temporary way for people to travel when necessary;</li> <li>+ Do not set the material before the passage of local people and other busy spots</li> <li>+ Notice the construction plan for the community</li> </ul>	These mitigation measures are simple, easy to implement, and do not need the complex technology and technique. However, there must be a commitment by construction contract between building contractors and project management unit. The risk of accidents can be entirely prevented. However obstructing traffic and reducing the ability to access to social

<b>Potential impacts</b>	<b>Mitigation measures</b>	<b>Effectiveness Advantages / disadvantages</b>
subproject area		services can only mitigate, not being able to completely overcome.
4. Constructive workers temporary stay in the locality may cause social problems, affecting the lives of people	<ul style="list-style-type: none"> <li>+ Consult local authorities about rent house for workers instead of setting up camp. It has more advantages in solid waste management.</li> <li>+ Orientate workers how to communicate with the community, guiding them about protecting their health, sanitation, prevention of infectious diseases.</li> <li>+ Orientate workers how to prevent infectious diseases such as HIV / AIDS, other social evils such as gambling, whoredom, theft, etc.</li> <li>+ Workers should be strictly banned to exploit the local resources.</li> </ul>	These measures are workable, consistent with the ability of the contractor. However, the effect also depends on the consciousness of the workers and the responsibility of the construction unit. Communities should be monitored and detected the violations to fine. The construction units and related parties should have an agreement.
5. The threats to the worker's health and labor safety in the project area	<p>Safety measures in the construction area:</p> <ul style="list-style-type: none"> <li>+ Safe staff should be arranged to implement safety measures at construction sites. Safe staff should be trained in emergency first aid;</li> <li>+ Provide adequate equipment and personal safety for employees (such as helmets, gloves, belt, etc.) and training them to use;</li> <li>+ Install safety regulation table in the field.</li> <li>+ Install fencing around the construction.</li> </ul> <p>Reduce the risk from material transport processes along the route:</p> <ul style="list-style-type: none"> <li>+ The speed should be limited along the route (management road and</li> </ul>	The above measures can fully implement and they will have highly effective if they are in full compliance with the above provisions. However, it depends largely on the self-consciousness and the observance of workers.



Potential impacts	Mitigation measures	Effectiveness Advantages / disadvantages
	<p>dam) but it should be compliant with the residential areas and intersection segments.</p> <p>+ The contractor should conduct meetings or informing with commune staff and local people regularly, informing them about the progress of construction and traffic safety, and helping residents aware of the risks to beware.</p> <p>+ Limit material transport in the wet season and the vehicle should be avoided overloading than the standard of roads and bridges.</p> <p>+ Damaged pavements should be repaired timely. Implement measures to reduce dust as stated;</p>	

### c, Mitigation measures during operation

**Table 7 - 5: Measures to minimize the environmental and social impact of the sub-project during operation**

Potential impacts	Mitigation measures	Effectiveness Advantages / disadvantages
1. Natural disaster caused the insecurity	<ul style="list-style-type: none"> <li>+ Ban reservoir operational management unit – Phu Tho irrigation works management periodically checked the safety of the reservoir.</li> <li>+ Ban reservoir operational management unit closely coordinates with the CPC and the local people to promptly report the risks related to the dam safety for timely handle measures</li> <li>+ At the time that the safety might be prone to insecurity as the rainy season, the reservoir should be monitored regularly to ensure the reasonable water regulation</li> <li>+ For the flood discharge problem, the flood inundation mapping for downstream area will be made. The plan will be informed to people at least 01 days before to prevent people and reduce the damage.</li> <li>+ Build a safe corridor for the flood (if necessary) based on forecast scenarios on the impact of space due to dam failure.</li> </ul>	These measures will reduce the impact during operation if they are implemented strictly. These measures also require the strict implementation of the principle of irrigation works protecting corridors under the ordinance exploitation of irrigation works.
2. Reservoir regulatory, flood discharge in the case of large flood affecting downstream	<ul style="list-style-type: none"> <li>- Managerial and operational unit must notify prompt and accurate about flood discharge in order to help people in the community have the prompt response.</li> <li>- At the time that the safety might be prone to insecurity as the rainy season, the reservoir should be observed regularly to ensure the reasonable water regulation</li> <li>- People and the local government should have an active plan to cope with the disaster.</li> </ul>	This measure has the highly feasible. However, the monitoring system should be equipped to support operating officers in the forecast work.

#### 7.2.2 Estimated cost of mitigation measures

Environmental and Social Management Plan (ESMP) outlines impacts mitigation measures, supervision and institution that will be deployed during project construction and operation to avoid or controlling adverse environmental and social impacts and necessary activities for implementing mitigation measures. ESMP creates

useful association between measures to mitigate adverse impacts and ensures those measures will be deployed.

The contents of ESMP give out implementation responsibility, performance supervision, implementation expenditure and time of the implementation of mitigation measures as proposed. The synthesis of environmental and social management plan of subproject is as follows:

**Table 7 - 6: Environmental and Social Management Plan**

<b>Subproject's stage</b>	<b>Subproject's activities</b>	<b>Environmental and Social Impacts</b>	<b>Measures to minimize the adverse impacts</b>	<b>Implementation expenses</b>	<b>Time of implementation and operation</b>	<b>Implementation responsibility</b>	<b>Supervision responsibility</b>
Pre-construction	Permanent or temporary land acquisition of living or agriculture land	Loss a part of livelihood opportunity of local residents.	+Compensate for household/landowner according to price frame of Phu Tho province and harmonies with WB's policies  +Stakeholder and beneficiaries consultation must be done  +The tally work of damage complies with regulations, especially must have the participation of direct affected people	Provincial budget	Before implementing subproject. Expected in month	PMU coordinates with Compensation and land clearance committee of Cam Khe district	PMU and Department of Agriculture and Rural Development People's Committee of Cam Khe district
	Transport of waste	- Increase traffic accident risk. - Arising dust, noise on the road.	- Equip 10 canvases for lorries that have no canvas or replacing for old canvas. + Guarantee the means and construction equipment have been maintained in good condition. + In sunny season, the material transport means must be spray water on the road when they moving through crowded	2million VND/canvas x 10 canvases = 20million Spraying water: 5 million Speed limitation signs: 4 signs x 1 million/sign = 4 million	Every day	Execution Unit	Project Owner

Subproject's stage	Subproject's activities	Environmental and Social Impacts	Measures to minimize the adverse impacts	Implementation expenses	Time of implementation and operation	Implementation responsibility	Supervision responsibility
			residential area, schools... in the rush hours. + Assign speed limitation (15km/h) and guide drivers familiarize and obey. + The contractor will propose execution plans that approved by PMU to reduce the time of land clearance, construction and temporary storage of material.				
	Assembling means, machines	-Noise, dust waste, space withholding	- Make movement plan, assemble equipment reasonably to avoid effect on local people's life		Project preparation phase	Execution Unit	Project Owner
	Workers reside temporarily in the project area	Causing the disorder in local people's life	+ Register temporary residence for workers + The contractor guides the communication way with local community and authorities for workers + The contractor develops and requires workers to obey rules/regulations when living in the local region (no quarrel	Contractor	When workers start living at local communication	Contractor	Supervision consultant

Subproject's stage	Subproject's activities	Environmental and Social Impacts	Measures to minimize the adverse impacts	Implementation expenses	Time of implementation and operation	Implementation responsibility	Supervision responsibility
			with the local people, no gambling and theft, etc...)				
Construction period	Construction activities of project works	- Decline the air environment quality by dust, noise and vibration	- Non-use the equipment are too old, maintain periodically machines and equipment 6months/time	15million/ time * 1 time/1 year = 30million.	Regularly during construction time	Construction company	Project Owner
			- Spraying water periodically on the construction area and along the execution road line	Change by day			
			- Cover canvas for materials storage yards and means transport material.	10 million			
		- Arising construction solid waste, scattered sandy soil, hazardous waste (waste machine oil, greasy clouts) cause environmental pollution, decline bio diversification	- clean up and treat the volume of digged sandy soil and weathered soil scatters on the ground	30 million	Doing day by day	Construction company	Project Owner
			- At each construction site places 02 dustbins keep hazardous waste; and 02 dustbins keep normal waste	1 million /dustbin x 04 bins x 1 placing point = 4 million	Purchasing before deploying subproject	Construction company	Project Owner
			- Regularly collect and clean scattered materials	Service fee for waste collection	Doing day by day	Construction company	Project Owner

Subproject's stage	Subproject's activities	Environmental and Social Impacts	Measures to minimize the adverse impacts	Implementation expenses	Time of implementation and operation	Implementation responsibility	Supervision responsibility
			<ul style="list-style-type: none"> <li>- Classify solid waste and put rightly to bins as per required</li> <li>- Collect and treat rightly hazardous waste as per regulation</li> </ul>	and treatment 20million/year * 2 years = 40 million.			
		Overflowed rain-water, washing water means and materials	<ul style="list-style-type: none"> <li>- Economical use of water source</li> <li>- Constructing accumulation pit to collect construction wastewater, machines washing water to treat waste matter, colloidal sludge.</li> </ul>	10 million/1 construction site * 01 site = 10 million.	Constructing before deploying execution	Construction company	Project Owner
					Implementing day by day	Workers in the project site	Project Owner
		- Impact to labor safety, working condition, worker's health at the construction site.	<ul style="list-style-type: none"> <li>- Arrange the reasonable working schedule</li> <li>- Equip sufficiently labor safety instruments for workers</li> <li>- Hold the training, capacity building on labor safety and environmental protection before construction.</li> <li>- Organize periodic medical checkup for workers on the construction site</li> </ul>	<ul style="list-style-type: none"> <li>- Equip labor safety instruments: 20 million/year * 2 years = 40 million.</li> <li>- Organize training on labor safety: 30 million/course *2</li> </ul>	Implementing during construction process	Construction company	Project Owner

Subproject's stage	Subproject's activities	Environmental and Social Impacts	Measures to minimize the adverse impacts	Implementation expenses	Time of implementation and operation	Implementation responsibility	Supervision responsibility
		- Environmental problems: natural calamity, rainstorm, oil leakage, combustion, detonation, etc...	- Make prevention plan of storm, tropical low pressure, and whirlwind. - Disseminating the response plan. - Organizing maneuver.	course/year*2 years = 60 million. - Arrange periodic medical checkup: 20 million/year *2 year = 40 million.	Annually	Appropriate authorities	Project Owner
	Production activities of concrete components	- Soil and water pollution by water washing machine equipment.	- Economical use of water source - Constructing wastewater collection system, accumulation pit for treatment before discharge to environment	Same expenses for construction accumulation pit	Building before deploying subproject	Construction company	Project Owner
		- Dust, exhaust fumes, noise due to mix and pour concrete	- Maintain machines periodically		Periodically every month	Construction company	Project Owner
	Materials transportation activity	- Air pollution by noise, dust, exhaust fumes of transport means	- Transport in the regulated time - Carry loading capacity rightly as per regulated and having guarded canvas. Equip more 20 canvases for lorries have no canvases or replacing for too old	02 million/canvas x 20 canvases = 40 millions	Everyday	Construction company	Project Owner
		- Impact to traffic infrastructure of region					



Subproject's stage	Subproject's activities	Environmental and Social Impacts	Measures to minimize the adverse impacts	Implementation expenses	Time of implementation and operation	Implementation responsibility	Supervision responsibility
		- Increase risks in traffic accident for people travel on road	canvases. - Run follows the speed limit.				
	Life activities of staffs and workers	- Arising domestic wastewater	Make contract to purchase 03 mobile latrines.	30million/latrine x 2 unit = 60million	Purchasing and installing before deploying subproject	Contract with distribution agency	Project Owner
		- Domestic waste	- Equip 03 dustbins to collect rubbish at the tents - Clean up regularly - Contract with environmental sanitation agency of local to transport and treat waste	2million/dustbin x 03 bins x 01 tent = 6 million - The transport and rubbish treatment fee 20million/year *2years = 40 million	Purchasing and make the contract for collecting rubbish before implementing project	Construction company	Project Owner
	Repair and return the road lines that have been damaged	- Protect traffic road line in the project area	- Repair, levelling and improve the damaged, depressed and low quality road lines	80 millions	Doing immediately after finishing construction period	Construction company	Project Owner
	Observation and supervision	- Guarantee environment quality of project region as	- Take the sample for observation and monitor environment quality at	66 millions	Implementing during construction	Agency has sufficient legal status and to be	Project Owner

Subproject's stage	Subproject's activities	Environmental and Social Impacts	Measures to minimize the adverse impacts	Implementation expenses	Time of implementation and operation	Implementation responsibility	Supervision responsibility
	environment during construction time	per permitted standard	construction site (18 months)		period periodically 3-6 months/time	hired by project owner	
Operation period	Return whole construction area: tent area, dumping ground, soil exploitation area	- Arising solid waste	- Dismounting tents, signs - Gathering, and selling for user. - Assembling and movement of machines, construction equipment. - Fill up and leveling the ground of explosion field.	50million	Implement when the construction phase finishes	Construction company	Project Owner
	Management, operation, maintenance water inlet sluices	- Safety guarantee for residential area, cultivated land, works and infrastructure	- Organize to inspect the maintenance regularly and periodically. - Discover and tackle opportunely the encroachment and use canal line out of purpose.	Subproject's maintenance budget	Annually	PPMU	Project Owner
	Training, prevention of problem	- Serving inspection mission, discovering opportunely, rescuing when the problem happens	- Arrange the training on coping with unexpected events with frequency of 1 time/year according to proposed program of Department of Agriculture and Rural Development	Subproject's operation budget			

Subproject's stage	Subproject's activities	Environmental and Social Impacts	Measures to minimize the adverse impacts	Implementation expenses	Time of implementation and operation	Implementation responsibility	Supervision responsibility
			(DARD).				
	Dredge irrigation	- Avoid the accumulation state that pollutes water environment and change hydrology regime due to the narrowed river/canal bed	- Operate water sluice flexibly; - Observation and monitor to find out the region that get accumulation or erosion state; - Get the periodic canal dredge plan to guarantee water flow and environment	Subproject's operation budget			
	Operating close and open sluice gate	- Cause the interior field water stagnant that effect to surface water quality	- Regularly monitor the salty level, regional hydrology regime - Operate water inlet sluice flexibly and timely	Subproject's operation budget			
	TOTAL ESTIMATED COST			626,000,000đ			

### 7.3 ENVIRONMENTAL AND SOCIAL MONITORING PLAN (ESMoP)

#### 7.3.1 Environmental Monitoring Program

This part describes proposed monitoring program implementing during subproject development period. The program includes (a) Implementation monitor according to mitigation measures mentioned in ESMP; and (b) monitor environmental quality.

**Observed monitoring of PPMU:** PPMU will monitor the conformity with safeguard policies of contractor during construction period. PPMU will appoint Construction supervision consultant (CSC) to supervise everyday based on Environmental and Social Management plan (ESMP) and approved Environmental and Social Monitoring plan (ESMoP) and show interest in minimizing potential adverse impacts causing by construction activities such as the material transportation causes dust, noise and obstructs traffic in the subproject's area, TOR for construction supervision consultant. PPMU will appoint environmental officer and environmental monitoring agency (environmental consultant of province) to monitor and supervise the conformity with safety policy.

#### **Environmental quality Monitoring:**

*i) Environmental monitoring program in construction period*

**Table 7 - 7: Environmental Monitoring in Construction period**

No	Type	Position	Frequency	Norm	Compared standard
I	Monitoring of waste sources management				
1	Potential source	Tents of workers Dumping ground	3 months/time	Volume of solid waste The number of latrines, tents and waste water treatment systems Volume of harmful waste Waste's components;	
2	Management measures of potential waste	Construction sites, Tents of workers Dumping ground	3 months/time	Amount of dustbins Receipts of collection and transport services.	
II	Monitoring the impacts to natural environment				

No	Type	Position	Frequency	Norm	Compared standard
1	Air	1. The earth dam execution area (KK01); 2. Spillway construction area (KK02); 3. Management road construction area (KK03)	6 months/time 2 times/day in each time	- Condition of micro climate, temperature, moisture, wind speed - Noise level LAeq - Indecisive dust TSP - Respiratory dust (PM10)	NTR 05:2013/BTNMT National Technical norm in surrounding environment quality NTR 26:2010/BTNMT National Technical standard on noise. NTR 27:2010/BTNMT National Technical norm on vibration.
2	Surface water	1. Surface water in river bed (NM01) 2. Surface water in water inlet sluice (NM02) 3. Surface water after dumping ground (NM03)	6 months/time	- pH - DO - TSS - COD - Coliform	NTR 08:2008/BTNMT: National Technical norm on surface water quality.
3	Ground water	dumping ground rearwards (NN01)	6 months/time	- Hardness (CaCO <sub>3</sub> ) - TDS, TS - Iron (Fe) - NH <sup>4+</sup> followed N. - E.coli	NTR 09:2008/BTNMT: National Technical norm on ground water quality
3	Soil	1. Surroundings of dumping ground (MĐ01) 2. Surroundings of the construction materials storage ground (MĐ02)	6 months/time	- Asen (As) - Cadimi (Cd) - Copper (Cu) - Lead (Pb) - Zinc (Zn)	NTR 03:2008/BTNMT: heavy metal limit in soil. NTR
4	Landslie, erosion	Spillway construction	1 time in quarter 6	Scale of landslide; Landslide level	

ii, *Environmental and Social monitoring program in operation period*

**Table 7 - 8: Environmental monitoring in operation period**

No	Type	Position	Frequency	Norm	Compared standard
I	Monitoring impacts to natural environment				
1	Surface water	1. Surface water at water inlet sluice (NM04); 2. Surface water at canal 2 (NM05)	6 months/time	- pH - DO - TSS - COD - BOD <sub>5</sub> (20 <sup>0</sup> C) - NO <sub>3</sub> <sup>-</sup> (according to N) - PO <sub>4</sub> <sup>3-</sup> (according to P) - As - Total lubricant - Coliform - Surplus vegetable protection medicine group Clo - Surplus vegetable protection medicine group Phosphorus	NTR 08:2008/BTNMT: National Technical norm on surface water quality.
2	Landslide, erosion	At downstream of splitway	In flood season 02 years after operation	Scale of landslide; Landslide level	

*Map of sampling positions for environment monitoring as presented in Annex 4*

### 7.3.2 Social monitoring program

**Monitoring of community:** The local community supervision Board has been established according to “Decision No.80/2005/QĐ-CP dated 18/04/2005 of Prime Minister on investment supervision statutes of community”. The community supervision Board of commune has right and responsibility for supervising construction activities, negative impacts to environment caused by construction activities and guarantees the measures to minimize potential adverse impacts have been implemented effectively by contractor. In case of arising environmental problems that affect to community, they will report to scene Supervision Consultant and/or PPMU by filling in forms reflect information on environmental safety.

***Social monitoring program in construction period:***

**Table 7 - 9: Social Monitoring in Construction period**

No	Type	Position	Frequency	Norm	Compared standard
<b>I Monitoring of waste sources management</b>					
1	Potential source	Tents of workers Dumping ground	3 months/time	Volume of solid waste The number of latrines, tents and waste water treatment systems Volume of harmful waste Waste's components;	
2	Management measures of potential waste	Construction sites, Tents of workers Dumping ground	3 months/time	Amount of dustbins Receipts of collection and transport services.	
<b>II Monitoring the social impacts</b>					
	Social impact	Commune at downstream	6 months/time	Income, employment, the number of crops, average yield, water supply calendar Reflection and complaint of local residents	
<b>III Monitoring environmental sanitation and labor safety</b>					
1	Environmental sanitation	Construction sites, Tents of workers Dumping ground Material storage ground	3 months/time	Quantity and condition of latrines Quantity and condition of sanitation instruments First aid box Health activity The number of infectious cases Communication plan on community health	
2	Labor safety	Construction sites, Tents of workers Dumping ground Material storage ground	3 months/time	Labor safety instruments Safety note The number of accidents	

**Table 7 - 10: Social monitoring in operation period**

Type	Position	Frequency	Norm
Social impacts	Communes get benefits	6 months/time	Income, employment, the number of crops, average yield, water supply calendar Reflection and complaint of local residents

### 7.3.3 Estimated cost for environmental and social monitoring

**Table 7 - 11: Estimated cost for Environmental and social monitoring in Construction period**

No	Items	Unit	Amount	Unit price (VND)	Cost (VND)
<b>I</b>	<b>Monitoring waste source management</b>				<b>10,000,000</b>
1	Arising source	Time	1	5,000,000	5,000,000
2	Measures to manage emission	Time	1	5,000,000	5,000,000
<b>II</b>	<b>Monitoring impacts to natural environment</b>				<b>19,340,180</b>
1	Air analysis				1,590,000
	Microclimate condition: temperature, moisture, wind speed	Sample	1	40,000	40,000
	Noise level LAeq	Sample	1	60,000	60,000
	Suspended dust TSP	Sample	1	65,000	65,000
	Respiratory dust PM10	Sample	1	100,000	100,000
	Total cost of analysis 01 sample	Sample			<b>265,000</b>
	Analysis cost 3 points x 2 samples/day	Sample	6	265,000	1,590,000
2	Surface water analysis				1,530,180
	pH	Sample	1	30,000	30,000
	Dissolved Oxygen (DO)	Sample	1	60,000	60,000
	Total suspended solid (TSS)	Sample	1	50,000	50,000
	COD	Sample	1	70,000	70,000
	Total lubricant (oils & grease)	Sample	1	300,000	300,000
	Coliform	Sample	1	60	60
	Cost for analysis 01 sample	Sample			510,060
	Total cost for analysis 3 positions x 1 time	Sample	3	510,060	1,530,180
3	Surface water analysis				580,000
	pH	Sample	1	30,000	30,000
	Hardness	Sample	1	60,000	60,000



	Total dissolved solid (TDS)	Sample	1	50,000	50,000
	Amoni (NH <sub>4</sub> <sup>+</sup> )	Sample	1	60,000	60,000
	Lead (Pb)	Sample	1	60,000	60,000
	Iron (Fe)	Sample	1	60,000	60,000
	Total Coliform	Sample	1	60,000	60,000
	Cost for analysis 01 sample	Sample			380,000
	Total cost for analysis 1 position x 1 time	Sample	1	380,000	<b>380,000</b>
4	Soil analysis				640,000
	Asen (As)	Sample	1	80,000	80,000
	Cadmi (Cd)	Sample	1	60,000	60,000
	Copper (Cu)	Sample	1	60,000	60,000
	Lead (Pb)	Sample	1	60,000	60,000
	Zinc (Zn)	Sample	1	60,000	60,000
	Cost for analysis 1 sample/ 1 position	Sample			320,000
	Total cost for analysis 2 positions x 1 time/day	Sample	2	320,000	<b>640,000</b>
5	Monitoring landslide	Time	1	15,000,000	15,000,000
<b>III</b>	<b>Monitoring social impacts</b>				<b>5,000,000</b>
	Social impact	Time	1	5,000,000	5,000,000
<b>IV</b>	<b>Monitoring environmental sanitation and labour safety</b>				<b>10,000,000</b>
	Environmental sanitation	Time	1	5,000,000	5,000,000
	Labor safety	Time	1	5,000,000	5,000,000
<b>V</b>	<b>Expenses 3 staffs x 2 days</b>		<b>6</b>	<b>350,000</b>	<b>2,100,000</b>
<b>VI</b>	<b>Car for sampling analysis (fixed price, estimated 5 million 1 time)</b>	<b>Time</b>	<b>1</b>	<b>5,000,000</b>	<b>5,000,000</b>
<b>VII</b>	<b>Make monitoring report for each time</b>	<b>Set</b>	<b>1</b>	<b>4,000,000</b>	<b>4,000,000</b>
<b>VII I</b>	<b>Total estimated cost for monitoring 1 time (add I-VII)</b>	<b>Time</b>	<b>1</b>		<b>55,440,180</b>
<b>IX</b>	Total estimated monitoring cost 1 years (2 times)	Time	2	55,440,180	110,880,360
<b>X</b>	GENERAL MANAGEMENT COST: TT*20%		<b>C</b>		22,176,072
<b>XI</b>	Total cost before tax		<b>TC</b>		133,056,432
<b>XII</b>	Tax GTGT: (VAT)= 10% x (TC)		<b>VAT</b>		13,305,643
<b>XIII</b>	Cost for environmental monitoring in construction period		<b>G</b>		146,362,075
	<b>Round number</b>				<b>146,362,000</b>

**Table 7 - 12: Calculation cost of environmental and social monitoring in operation period**

No	Estimated cost for items	Unit	Amount	Unit price (VND)	Cost (VND)
<b>1</b>	<b>Surface water analysis</b>				<b>12.300.000</b>
	pH	Sample	1	30.000	30.000
	Dissolved Oxygen (DO)	Sample	1	60.000	60.000
	Total suspended solid (TSS)	Sample	1	50.000	50.000
	COD	Sample	1	70.000	70.000
	BOD <sub>5</sub> (20°C)	Sample	1	80.000	80.000
	NO <sub>3</sub> <sup>-</sup> (according to N)	Sample	1	60.000	60.000
	PO <sub>4</sub> <sup>3-</sup> (according to P)	Sample	1	60.000	60.000
	Asen (As)	Sample	1	80.000	80.000
	Total lubricant (oils & grease)	Sample	1	300.000	300.000
	Coliform	Sample	1	60.000	60.000
	Surplus vegetable protection medicine group Clo	Sample	1	600000	600.000
	Surplus vegetable protection medicine group phosphorus	Sample	1	600000	600.000
	Cost for analysis 01 sample	Sample			2.050.000
	Total cost for analysis 3 position x 1 time/day	Sample	3	2.050.000	6.150.000
	Total cost for 1 year (6 months/time)	Time	2	6.150.000	12.300.000
<b>2</b>	<b>Monitoring landslide</b>	Time	<b>1</b>	<b>6.000.000</b>	<b>6.000.000</b>
<b>3</b>	<b>Monitoring social impacts</b>				<b>10.000.000</b>
	Total cost for 1 year (6 months/time)	Time	2	5.000.000	10.000.000
<b>4</b>	<b>Expenses 3 staffs x 2 days</b>		<b>6</b>	<b>350.000</b>	<b>2.100.000</b>
<b>5</b>	<b>Car for taking sample analysis (fixed price, estimated 2 million 1 time)</b>	<b>Trip</b>	<b>1</b>	<b>2.000.000</b>	<b>2.000.000</b>
<b>6</b>	<b>Conducting report for each time</b>	<b>Report</b>	<b>1</b>	<b>4.000.000</b>	<b>4.000.000</b>
<b>7</b>	<b>Total cost for monitoring 2 years during operation (add 1-6)</b>		<b>2</b>	<b>36.400.000</b>	<b>72.800.000</b>

No	Estimated cost for items	Unit	Amount	Unit price (VND)	Cost (VND)
8	General cost: TT*20%		C		14.560.000
9	Total cost before tax		TC		87.360.000
10	VAT: (VAT)= 10% x (TC)		VAT		8.736.000
11	Cost for environmental monitoring in operation period		G		96.096.000
<b>LÀM TRÒN</b>		<b>96.096.000</b>			

### 7.3.4 Monitoring report requirement

The reports will be developed during the time implementing monitoring programs, conducting the collection of reports on impacts or the recommendation from local residents for subproject. The effect assessment of mitigation measures was implemented.

**Table 7 - 13: The types of Environmental and Social monitoring report**

Implementation responsibility	Type of report	The content of report	Frequency for submit the report	Submit to
Execution contractor	Report on accident/risk	Collecting information on accident or unexpected problems	Within 24 hours since having problem	Subproject management committee and Execution monitoring consultation
	Infringement report	Provide information in violation acts regulations in environmental and social management	Within 01 week from the matter happens	Subproject management committee and Execution monitoring consultation
	Report	Take note and report to appropriate authorities on archaeological relics, royal tombs have been newly discovered	Within 24 hours since discovering archaeological relics, royal tombs	Subproject management committee, Execution monitoring consultation and Department of Culture, Sports and Tourism

<b>Implementation responsibility</b>	<b>Type of report</b>	<b>The content of report</b>	<b>Frequency for submit the report</b>	<b>Submit to</b>
	Report on the implementation of ESMP	The report on results of implementing measures to minimize adverse environmental and social impacts	Every month	Subproject Management Committee
Construction supervision consultant	Report on the implementation of measures to minimize environmental and social impacts	<ul style="list-style-type: none"> <li>- Assessing implementation results of measures to minimize environmental and social impacts of construction contractors</li> <li>- Results of solving and overcoming problem and shortcomings from previous report</li> </ul>	Every month	Subproject Management Committee
Independent environmental consultant	Independent monitoring report on environmental and social safety	<ul style="list-style-type: none"> <li>- The inspection result of construction site</li> <li>- Result of Community based supervision</li> <li>- Collecting and classifying the monitoring result of execution monitoring consultant</li> <li>- Result of environmental monitoring</li> <li>- Assessing the result of ESMP implementation</li> </ul>	6 months /time or 3 months/time	Subproject Management Committee and WB

Implementation responsibility	Type of report	The content of report	Frequency for submit the report	Submit to
		and the recommendation		
Subproject Management Board	Report on environmental activities of subproject	Result of ESMP implementation	6 months/time	CPO and WB

## 7.4 ESMP IMPLEMENTATION ARRANGEMENT

### 7.4.1 Agencies and responsibilities

#### *a) Responsibility of subproject owner/Subproject management Board*

Take responsibility for performing safety policy of subproject, supervising daily activities of subproject and monitor and manage the project construction quality, supervising the conformity with the environmental safety in construction activities of subproject

#### *b) Responsibility of Contractor*

Contractor has responsibility for conforming to regulations during construction process as contracted with PPMU.

#### *c) Responsibility of Execution supervision consultant*

This unit has been hired by PPMU and will be on behalf of PPMU to supervise and take note everyday about the conformity with environmental and social safeguard policies of construction contractor.

#### *d) Responsibility of independent supervision consultant on environmental and social safety*

Assist PPMU in effect assessment of mitigation measures and propose the adjustment of application environmental and social safety policy in necessary case;

- Make monthly report on the conformity with environmental and social safety policy of contractor and submit to PPMU, this report will be the basis for contractor pay environmental and social protection expenses;
- Report to PPMU “detections” during construction time.

#### *e) Responsibility of local authorities and Community*

The Community Supervision Board has been established according to “Decision No.80/2005/QĐ-CP dated 18/04/2005 of Prime Minister on investment supervision status of community”. Community Supervision Board of commune has right and responsibility for supervision construction activities and negative impacts caused by construction activities, ensure measures to minimize the potential negative

impacts must be performed effectively. In case of environmental problems arising that affects to community, they will report to construction site supervision consultant (CSC) and/or PPMU to fill in the information feedback notes on environmental safety.

*f) Responsibility of reservoir management and development agency*

Take responsibility for maintenance and periodic supervision of project works

*g) Responsibility of CPO*

Guiding provincial Project management Board to carry out environmental and social management plan of subproject. Supervising progress of subproject during construction time and the first operation year.

*h) Responsibility of Department of Natural resources and Environment*

Has responsibility to carry out environmental policies as per regulations of Vietnam Government.

#### **7.4.2 Assessment of existing environmental and social management practice and capacity for dam management**

Currently, Ban reservoir is under management of Reservoir's Management Board. However, staff in the Board are responsible for only management and operation of the work as well as detection of incidents. Environmental and social practice has not been carried out properly.

There are activities of the people can make harmful to the work such as grazing pountries on the dam slope or cultivating within safety corridor of the work. Much plants growing on the dam face slope, especially large trees, will facilitate animals burrowing, living; decayed roots leaving pores, affecting infiltration safety of the dam, increasing the risk of dam destabilization and hindering visibility when checking.

To ensure safety of the work after upgrading and improvement, it needs to enhance awareness of people and capacity of staff in reseservoir management board of environmental and social management practice for the dam.

**Table 7 - 14: The cost of capacity building and training implementation**

Content		Trainees	Quantity	Cost (VND)	Fund
Training on food hygiene, occupational safety and environmental protection		Workers and technical staff of contractors	All of workers, staff	50 people x 200,000 VND /person = 10,000,000 VND	To be included in the investor's contract with stakeholders
Training on Environmental Management	Control of emissions sources	PPMU staff	3 people	500,000 VND /person x 3 people = 1,500,000 VND	To be included in the investor's contract with stakeholders
	Impact assessment, environmental risk	PPMU staff	3 people	500,000 VND /person x 3 people = 1,500,000 VND	To be included in the investor's contract with

Content	Trainees	Quantity	Cost (VND)	Fund
control				stakeholders
Environmental Monitoring	PPMU staff CSC staff	8 people (3 PPMU staff and 5 CSC staff)	500,000 VND/person x 8 people = 4,000,000 VND	To be included in the investor's contract with stakeholders
Raising awareness and accessing to the environmental legal system	PPMU staff CSC staff	8 people (3 PPMU staff and 5 CSC staff)	500,000 VND/person x 8 people = 4,000,000 VND	To be included in the investor's contract with stakeholders
Training and capacity building for environmental monitoring	CSC staff	5 people	5 people x 1,000,000 VND/person = 5,000,000 VND	To be included in the investor's contract with stakeholders
Training for CSB	CSC staff	2 people/ 1 commune x 1 commune = 2 people	2 people x 1,000,000 VND/person = 2,000,000 VND	To be included in the investor's contract with stakeholders
Total (VND)			28,000,000	

**Table 7 - 15: Summary of total cost for conducting Environmental and Social Monitoring Plan**

No	Monitoring content/ Implementing period	Implementing responsibility	Cost (VND)
I	Construction period	The agency has sufficient legal status and hired by Project Owner	146.362.000
II	Operation period	PPMU	96.096.000
III	Training, capacity building	PPMU	28,000,000
	Total (I+II)		270.458.000

#### **7.4.3 Building capacity and improves the knowledge on the environmental and social protection training/coaching programs**

To increase the capacity and technique in environmental management for staffs of Subproject Management Board, organizations and relevant individuals, the Subproject Management Board conducts the following training contents:

- Heighten capacity in environmental management and supervision;
- Communication to increase awareness in environmental protection;

- Training in preventing and fighting fire
- Training in environment regulations and standards
- Training in environmental health and labor safety measures, environmental safety
- Training to increasing awareness in dam safety
- Training to increasing awareness in infectious disease
- Training to increasing awareness in gender equality
- Training to increasing awareness in ethnic minority development.

## **7.5 COMMUNITY DEVELOPMENT NEED ASSESSMENT**

Characteristics of community, including infrastructure, social service, economy, basic need of people, chance to approach to science- technique, willing to absorb development support policies, etc. will involve in decision of community development need.

Through the approaches to livelihood resources of households, SA of the project has made an analysis of the socio-economic characteristics of surveyed households according to the human resources (demographic and labor, education, occupation, health), natural capital (productive land: agricultural land, forest land and aquatic land, land use), physical capital (housing, property for living, property for production and business), financial capital (income, changes in living standards, poverty, loans), and social capital (community relations, relatives, authorities and their support) and consider the impact factors including the potential impacts of the project. These resources have been analyzed with the integration with elements such as Gender, ethnic minorities and vulnerability.

The average number of household members in the survey sample in the project area is 4.4, much higher than the national average demographics in households, which is 3.9 (Statistical Yearbook, 2013). There are no difference in the number of inhabitants per household between communes, ethnic groups, income groups, female-headed households and male-headed households.

The analysis of the household structure by demographic scale in the project area showed a majority of households has 3-4 person (36.2%) and 5-8 persons (33.0%); those households with 1-2 persons (22.8%) is popular in the families of communal officers, those households with 9 persons and more only accounts for 8%. Compared to the size of nuclear family in Vietnam, the rate of families with many children in Tien Luong is rather high.

Thus, the survey data shows that the model of few member family occupies higher percentage, this also make the economic conditions of surveyed households develop slowly and at average level and indicating that the development of the project area is also at average level.



Among the occupational structures of family members having jobs and income in the project area survey, agro-forestry-fishery sector accounts for 58.6% as the highest; small handicrafts have the percentage of 9.6% as the second rank; remaining are staff-officers, employees, workers with the percentage of less than 10% for each category. Thus, the agriculture-forestry-fishery is the dominant sector in the economy - society of the project area, where the majority of the workforce lives.

The rate of HHs which do agriculture-forestry-fishery of Kinh group is equal to ethnic minorities (58.0% compared to 54.2%). In addition, the rate of HHs with non-agricultural occupation of Kinh group is also equal to ethnic minorities. For Kinh households, the rate of business households accounts for 10.5% and the rate of employed people in ethnic minorities also accounts for 6.5% only.

Tien Luong commune has 1 health center, 6 staffs and 7 beds. Health center primarily perform duties of initial health care, especially immunization for children and pregnant women, as well as distribution drug under insurance. There is 01 health care staff in every neighborhood. This staff is in charge of management, reporting problems related to primary health care. In the process of preparing and implementing the project, it is possible to call for support of health center for problems related to health

There is about only 30.5% of surveyed households last month were ill. This is an average rate and this shows that the people in the commune receive rather good healthcare. There are no HIV / AIDS people in the region, and there are no people who earn money from prostitution.

There are 5 public schools, including one secondary school and 02 primary schools and 02 kindergartens in Tien Luong with a total of 560 secondary school students, 600 primary school students. Percentage of attendance of pupils is 100%. Repetition percentage of secondary school students is 0.1%.

About nearly 90.0% of the project population graduated from elementary school to college/ university or higher, in which more than 63.3% people graduated from junior high school and high school. Only 17% people graduated from college/ university or higher. The illiteracy rate is 1.0%. The rate of preschool people in communes of project areas is 8.0%, which is higher than the national average as stated in the Statistical Yearbook 2013 (6.0%). It is noteworthy that the rate of people graduated from college/ university or higher is 17%.

The rate of illiteracy in ethnic minorities is higher than that of Kinh group (4.5% compared to 0.5%) and the pre-schooling rate (8.3% compared to 6.5%). According to the standard of living, the illiteracy rate in the poorest income group (group 1) is 2.5 times as much as the richest (2.5% compared to 0.0%)

## **PART 8**

### **STAKEHOLDERS CONSULTATION AND INFORMATION DISCLOSURE**

#### **8.1 PUBLIC CONSULTATION OBJECTIVES**

- Commune People's Committee
  - Fatherland Front Board
  - Organizations (Farmer association, Woman association and Youth Union)
  - Leaders of hamlet
- The affected household in project area

#### **8.2 SOCIAL IMPACT ASSESSMENT CONSULTATION**

i) The consultation attendance:

- Commune People's committee
- The affected households

ii) The consultation's content

- Introducing the content, main works of subproject, source of capital for implementation;
- The consultant presents the policies in interests of the effected people, grievance mechanism and solution, compensation policy for each type of land, architectural works and plants, farm produce
- The consultant presents impacts forecast of subproject to resettlement, gender;
- The stakeholders discuss policies in interests and compensation to the effects on land, works, architecture, plants and farm produce.

iii) Consultation method

Immediately starting project preparation, local authorities leadership at all levels of Tien Luong commune, Cam Khe district, Phu Tho province have been reported about the subproject, the targets and proposed activities of project. The affected households had been invited to consultation meeting was held in commune office to discuss the related contents.

**Table 8 - 1: Consultation results**

<b>Participated commune</b>	<b>Location</b>	<b>Time</b>	<b>The number of participated people</b>
Tien Luong	Tien Luong CPC	29/1/2015	30

During the consultation process, there are a lot of ideas of stakeholders have been discussed broadly and freely as concluded as follows:

- The affected land area by subproject mainly is farmland.
- The land acquisition of Phu Tho subproject is very few since the upgrading and repair based in the former line; therefore the adverse impacts can be minimized and land acquisition scale is insignificant.

- The construction and upgrade project's works in order to improve dam safety stabilize life for local people.
- The affected households desire to be provided information and implementation progress of subproject.
- The affected households want to be compensated adequately and manifestly according to the replaceable price for damaged assets and the market price for temporary affected farming products.
- Both male and female participate in local organizations and propose ideas relate to subproject; hence the gender issue has been ensured.
- There is no ethnic minority living in the project area in Tien Luong commune. For this result there is no negative impact to ethnic minority.
- Woman merchandising situation does not occur in the project area.

The affected people understand positive and negative impacts of subproject to local; therefore, they get fully unanimity with the project development and they hope the subproject will be deployed soon.

### **8.3 ENVIRONMENTAL IMPACT ASSESSMENT CONSULTATION**

#### **Consultation attenders:**

- Commune People's Committee
- Fatherland Front Board
- Organizations (Farmer association, Woman association and Youth Union)
- Leaders of hamlet
- The affected household in project area

#### **The consultation's contents:**

- Introducing the contents and main components of subproject, project budget
- The consultant presents potential impacts of subproject to environment and society,
- The consultant presents environmental and social management plan includes: the mitigation measures and implementation schedule
- Consulting environmental problems and historical environmental and social impacts
- Stakeholders discuss the measures to minimize the environmental and social impacts
- Commune People's Committee and Fatherland Front Board have written ideas

#### **Consultation measures:**

Arrange the meeting with the above participant includes: local authorities, local organizations, and affected people. To create condition for the local people express their opinions, aspirations, the consultation meeting to be held expansively and under questionnaire in status and consequence of happened natural calamity phenomenon in there having expression aspiration and requirement of interviewed organization or individual with subproject.

### Consultation results:

**Table 8 - 2: The number and the component of participants and consultation before implementing the project**

N <sup>o</sup>	Date	Location	Number of participants	Component of participants
1	25/1/2015	Phu Tho Province DARD	11	Phu Tho Province DARD, Department of Natural Resources and Environment, Department of Construction, Department of Transportation, Department of Culture, Department of Health, Department of Education
2	29/1/2015	Tien Luong CPC	30	Tien Luong CPC leaders, Fatherland Front, Women's Union, Youth Union, Farmers Union, Health center, Agricultural Cooperative, Land, affected households, benefit households.

**Table 8 - 3: Consultation's content**

N <sup>o</sup>	Date	Location	Consultation's content	Responsibility for implementation
1	25/1/2015	Phu Tho Province DARD	<ul style="list-style-type: none"> <li>- Introduce the content, the main items of the project, and performing funds</li> <li>- Introduce the require of environmental and social impact assessment of WB</li> <li>- Introduce the environmental and social safeguard policies activating in the project</li> <li>- Discussion opinion of the related sectors, such as the consensus on the project, the positive and negative effects that may occur when implementing projects and the proposals of the mitigation measures of the environmental and social impacts to investors</li> <li>- Consult the incident happened in history (after the construction of the reservoir) and its impacts on the environment and society</li> </ul>	Phu Tho PMU

N <sup>0</sup>	Date	Location	Consultation's content	Responsibility for implementation
2	29/1/2015	Tien Luong CPC	<ul style="list-style-type: none"> <li>- Introduce the content, the main items of the project, and performing funds</li> <li>- Consultant showed the forecast of the environmental and social impacts of the project</li> <li>- Consultant showed the ESMP including the mitigation measures and performing plan.</li> <li>- Consult the environmental incident that has happened in history and its impacts on the environment and society.</li> <li>- Community discussed the measures to minimize the impact on the environment and social.</li> </ul>	Safeguard policies consultants.

**Summary of feedbacks received from the public consultation process of preparing esia:**

**Table 8 - 4: Summary of consultations**

Date	Location	Feedback/Arising problems	Responsibility of the owner	Proposed mitigation measures
25-1-2015	Phu Tho MARD	Most of departments and units supported the project and look forward the project will implement early. Expect the PMU and contractor execute the project with high quality	Timely update implementation of the project, especially during difficult period	Timely update implementation of the project, especially during difficult period
29/1/2015	Tien Luong CPC	The project will affect the work and life of the people. The implementation of the project should be met the schedule. Project implementation procedure will be complied strictly from the investment plan to construction activities. Implementation of environmental and social impacts assessment for the Project is very serious. There are environmental pollution	Will provide information on the progress of project implementation, and coordination with local monitoring contractor in compliance with measures to minimize the social and	Several solutions proposed by community are: - Limiting construction activities in rainy season - Construction activities should be undertaken from February to May in order not to face

Date	Location	Feedback/Arising problems	Responsibility of the owner	Proposed mitigation measures
		<p>issues caused by the project but with insignificant scale.</p> <p>Recommend Project owner to publicize information about Project, so that CPC can conduct community supervision</p> <p>Long-term objectives of the Project in comparison with temporary impacts during construction period is very huge.</p> <p>During construction process, especially transportation process, the contractor should apply measure to avoid material falling on road and damage the road</p> <p>Upon detection of the illegal problems or occurring accident, people will communicate with the investor and local authority.</p> <p>On security issues, people recommended investors to closely coordinate with the CPC to manage a team of employees working in the construction process.</p> <p>Avoid transporting materials and activities arising noise during rush hour .</p>	<p>environmental impact, and ensure work quality</p>	<p>conflict on water demand</p> <p>- Operation of overloaded trucks can damage roads social will be restricted.</p> <p>- Contractors shall declare temporary residence of workers coming to the commune</p> <p>- Watering the road with lots of dust generated by the trucks along road and in densely populated areas</p>

#### 8.4 ESIA DISCLOSURE

According to WB's policy on approaching information, ESIA draft documents of subproject must be announced widely at the local, websites of WB and these documents must be displayed at the easy view positions, succinct and easily understandable edit.

## **CONCLUSION, RECOMMENDATION AND COMMITMENT**

### **1. CONCLUSION**

- (i) The subproject belongs to Group B in environment as per environmental safety policy of WB;
- (ii) The project “repair and improvement of Ban reservoir, Tien Luong commune, Cam Khe district” has been owned by Department of Agriculture and Rural Development and managed by Project management unit of agriculture and rural development construction of Phu Tho province. The project construction can cause the potential positive and negative impacts during project implementation:
- (iii) The subproject does not locate in sensitive position with environment and it does not commit any criterion “ineligible” of WB;
- (iv) This report determines and assesses completely the significant impacts in 03 phases: before, during construction and operation phase and it also indicates measures to minimize the adverse impacts with the consultation of local authorities, affected people and vulnerable people group;
- (v) A Environmental and Social Management Plan (ESMP) and an Environmental and Social Monitoring Plan (ESMoP) to supervise the impacts have been developed to help the authorities make decision and they will be updated regularly in process of subproject;

### **2. RECOMMENDATION**

Based on the detection on environmental assessment and Environmental and Social Management Plan (ESMP) in this document, these recommendations can be proposed for subproject:

- (i) The mitigation measures mentioned in ESMP will be settled up as an indispensable part in the bid documents. The contractor will split volume of works and estimate total cost for implementing those mitigation measures. This expense is safe cost on environment and it will be paid when all measures will be performed well as committed of Contractor.
- (ii) The requirement of environmental monitoring mission (in the ESIA report) of the Unit of construction supervision consultant will be made in the package of environmental monitoring consultant.
- (iii) Based on the Environmental and Social Impact Assessment, safety policy consultant and project management Board will submit to the appropriate authorities and WB for approval ESIA of the subproject upgrading and safety guarantee of Ban reservoir project, Phu Tho province to be the basis for deploying next steps and guarantee subproject schedule.

### **3. COMMITMENT OF PROJECT OWNER**

The project management unit of agriculture and rural development construction of Phu Tho province and the contractors commit to implement the environmental management programs, environmental monitoring programs; and comply with the general provisions on environmental protection related to the phases of the project as follows:

Implement the measures to control sources of pollution arising from the activities of the Project seriously in accordance with the technical method described in the ESIA / EIA report and the requirements attaching in the decision approving the ESIA / EIA report.

Implement the environmental management programs and environmental monitoring as outlined in Part 5 of the report to ensure the environmental characteristic lower than limits that allowed by the standard and the technical regulation on the environment.



## **REFERENCES**

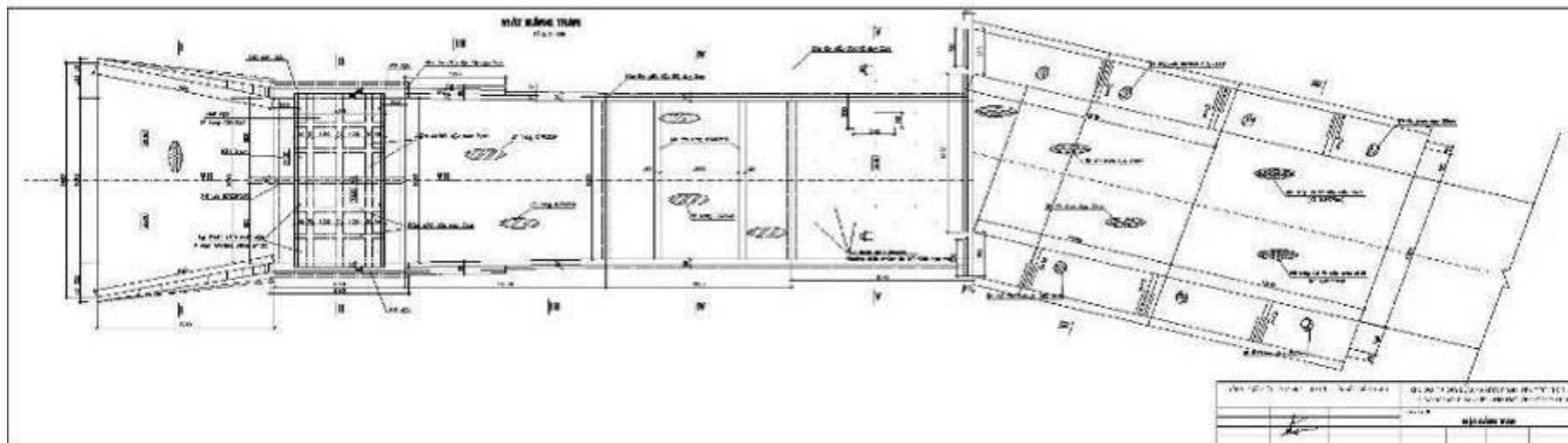
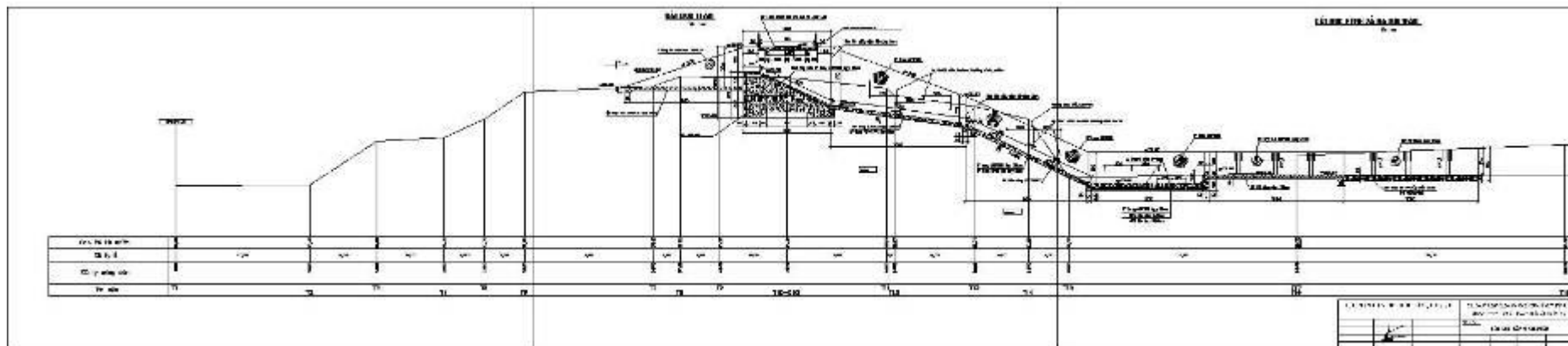
1. Summary report of social economic situation in 2014 of Tien Luong commune
2. Summary report in 2014 of the woman union of Tien Luong commune
3. Summary report in 2014 of the Health station of Tien Luong commune
4. Summary report in 2014 of the Farmers Union of Tien Luong commune
5. Summary report in 2014 of the Agricultural Cooperatives of Tien Luong commune
6. Summary report of social economic situation in 2014 of Phu Tho province
7. Summary report in 2014 of Phu Tho department of agriculture and rural development
8. Statistical Yearbook 2014 in Phu Tho province
9. New rural scheme of Tien Luong commune from 2015 to 2020
10. Feasibility study report (FS) of Repair and improvement of Ban reservoir, Tien Luong commune, Cam Khe district.

# APPENDICES

## APPENDIX A – ENVIRONMENT

### Appendix A1- DRAWINGS OF THE MAIN WORKS

Vertical cross section



CĐ: T5  
Km: 0+23

CĐ: 1B  
Km: 0+28

27.76		27.76		27.76
20.00		20.00		

29.40		29.40	29.30		29.60	75.00	28.70	27.70	27.70
20.00		1.00	13.00		2.00	5.00	5.00	10.00	

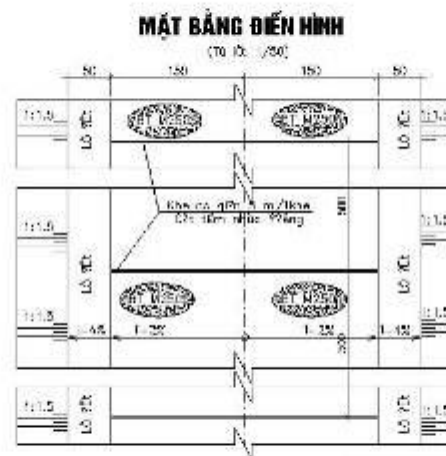
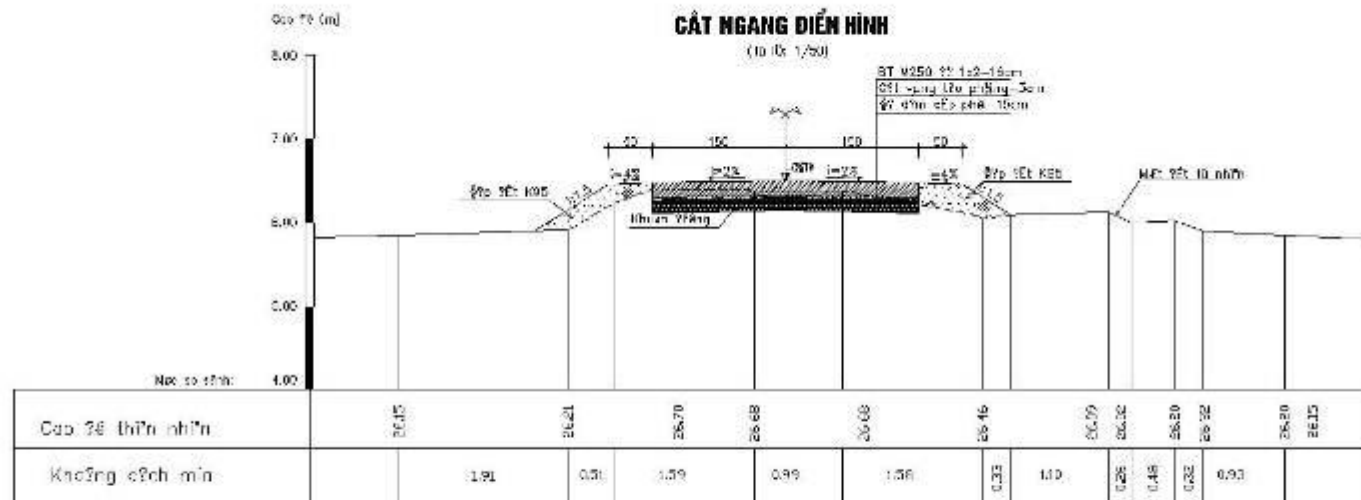
**CÔNG TY CỔ PHẦN TƯ VẤN XÂY DỰNG - THIẾT KẾ HẠNG LONG**

*(Signature)*

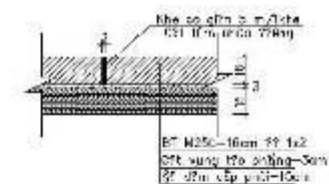
**CHỦ ĐẦU TƯ: BAN QUẢN LÝ VÀ XDCS NGÀNH NN&PTNT PHÚ THỌ**  
**CÁI LẬY, VĂN CỐP M&K S&T&N LUẬN HẠNG CỎ H&T&N M&O T&P**

**CẮT CÁT NGANG TRẦN**

129



**KẾT CẤU ÁO ĐƯỜNG**  
(Tỷ lệ 1/25)



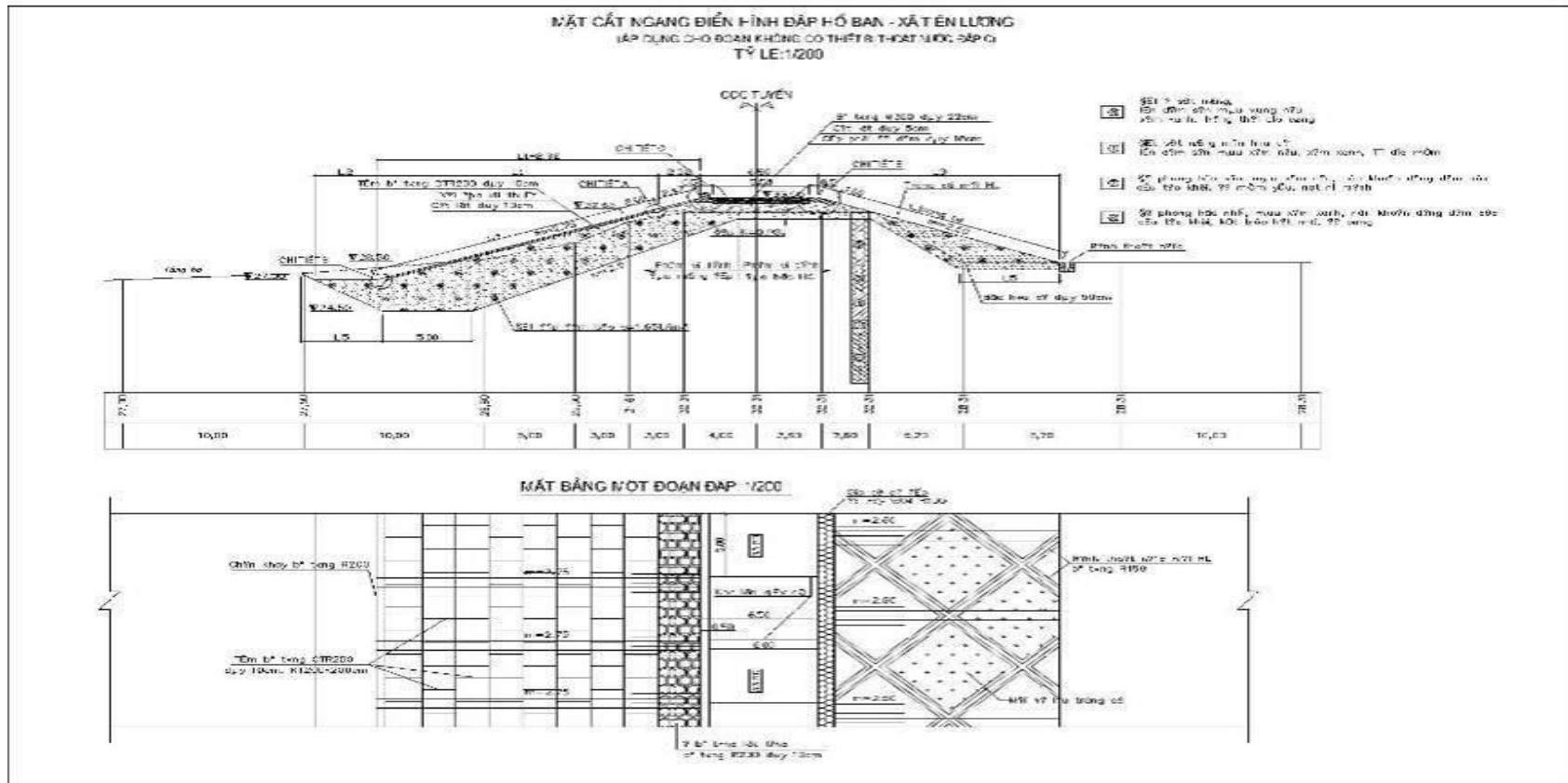
**GHI CHÚ:**

- Ghi chú: Mặt cắt ngang của đường.
- Cao độ mặt nền.

CÔNG TY CỔ PHẦN TƯ VẤN XÂY DỰNG LỢI LỢI VIỆT NAM				CHỦ ĐẦU TƯ: BAN QUẢN LÝ VÀ XÂY DỰNG HẠ TẦNG PHỐ THỊ			
Số 1 & 332, Ngõ 33, Phường GVM, Quận Gò Vấp, TP. HCM				CÔNG TRÌNH: XÂY DỰNG HẠ TẦNG PHỐ THỊ			
Email: tin@livi.vn							
ghi chú		THS. Lê Văn Anh		<b>CẮT NGANG ĐIỂN HÌNH</b>			
Chức vụ		THS. Nguyễn Văn Anh					
Thức ăn		LS. Lê Văn Anh		Cao độ	L. 10	Phạm Vi	SHĐ
Kiểm tra		THS. Nguyễn Văn Anh		Đầu tư	1/2015	2015	Đường - 01-00-1

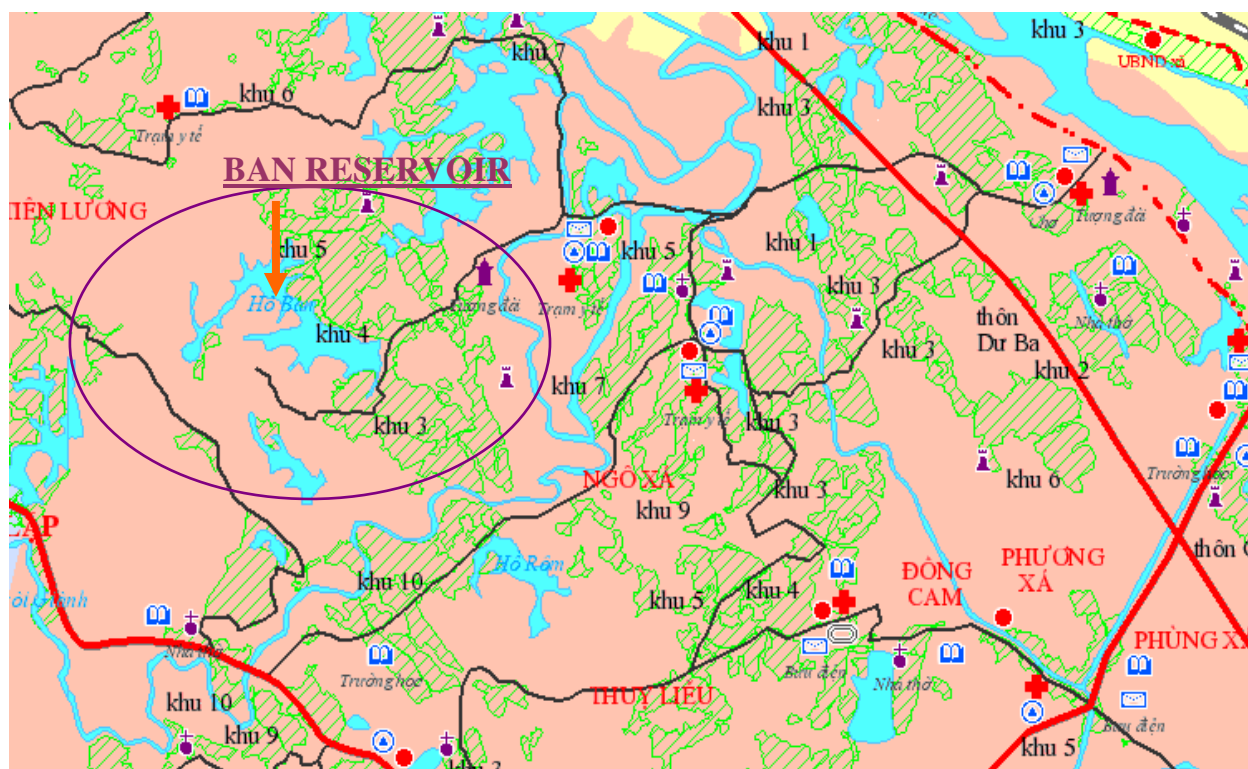


## Cross section of Dam

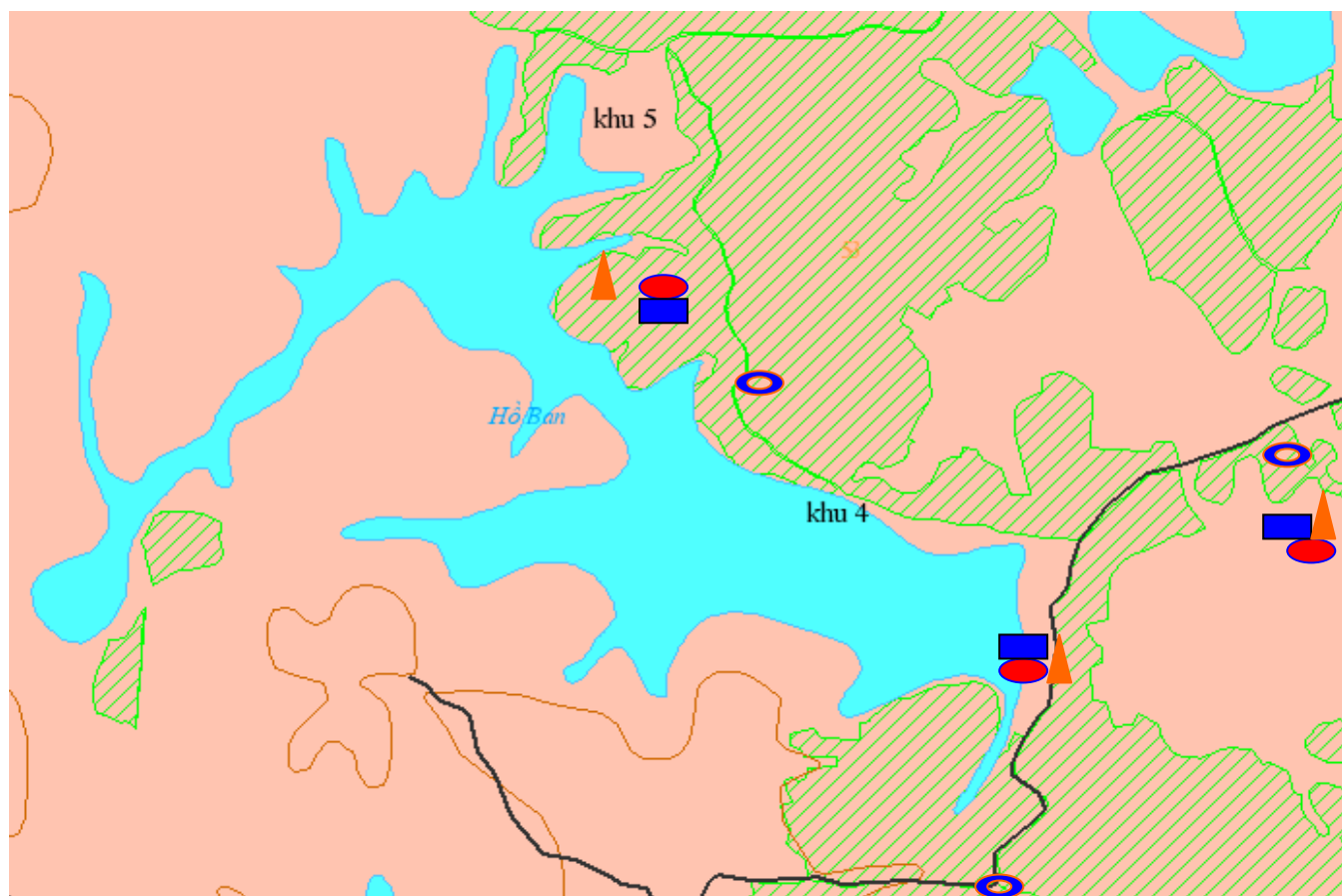


## Appendix A2 - TYPES OF MAP

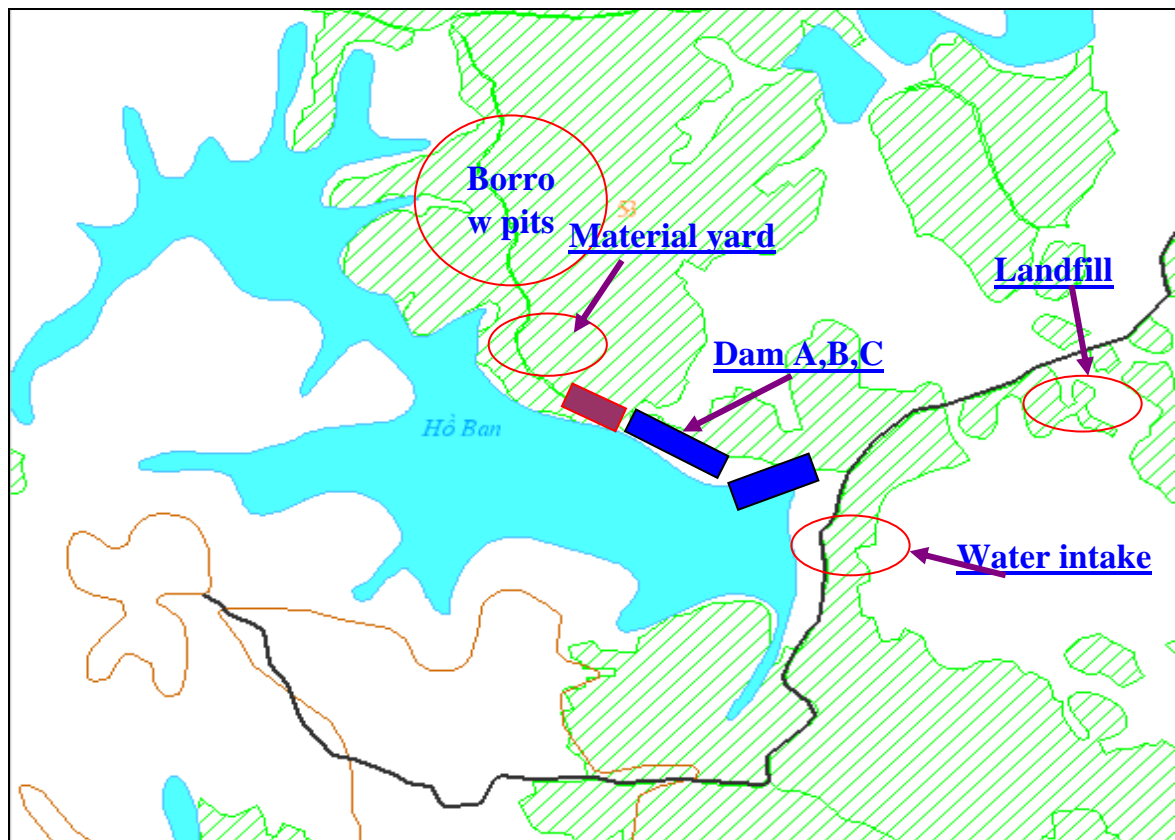
### MAP OF PROJECT LOCATION



### OUTLINE OF SAMPLING AND ENVIRONMENTAL OBSERVATION POSITIONS



## THE POSITION OF DISPOSAL, MATERIAL ACIVERMENT AND BORROW PITS





## **Appendix A3- POLICY FRAMEWORK, INSTITUTIONS AND REGULATION**

### **Legal framework related to environmental protection**

- Law on Environmental Protection 2014, No. 55/2014/QH13 regulating the issues related to Strategic Environmental Impact Assessment and commitment of Environmental protection for development activities. EIA report must be prepared during investment preparation process (feasibility study);
- Decree No. 18/2015/NĐ-CP dated 14/02/2015 regulating plan for environment protection, strategic environmental impact assessment, EIA and planning for environmental protection;
- Direction No. 26/CT-TTg dated 25/8/2014 of Prime Minister on implementing the Law on Environmental Protection;
- Circular No.01/2012/TT-BTNMT dated 16/3/2012 of MONRE regulating preparation, approval and monitoring, identifying the implementation of the detailed environmental protection project; preparation and registration of the simple environmental protection project;
- Decree No. 29/2011/NĐ-CP dated 18/04/2011 regulating strategic environmental assessment, EIA and environmental protection commitment;
- Circular No.16/2009/TT-BTNMT dated 17/10/2009 of MONRE on Regulation and Technical Standard on environment, air quality and some toxics in around air;
- Decision No. 22/2006/QĐ-BTNMT dated 25/12/2006 of MONRE on forcing Vietnam National Standards of environment application.

### **Legal framework related to land use and land acquisition of the investment projects**

- Law on Land No. 45/2013/QH13 approved by Vietnam National Assembly dated 29/11/2013;
- Decree No.44/2014/ND- CP, dated 15/05/2014 regulating the land price;
- Decree No. 47/2014/ND-CP, dated 15/05/2014 regulating the compensation, support and resettlement in cases of the land recovered;
- Decree No. 37/2014/ND-CP, dated 30/06/2014 regulating in details about the compensation, support and resettlement in cases of the land recovered;
- Circular No. 23/2014/TT-BTNMT dated 19/5/2014 regulating the Certificate of Land use right, House ownership and other assets attached.

### **Legal framework related to the use and management of the investment projects**

- Law on Construction No. 50/2014/QH13 approved by Vietnam National Assembly dated 18/08/2014;
- Decree No. 15/2013/NĐ-CP dated 06/02/2013 on managing the construction quality;
- Decree No. 207/2013/NĐ-CP dated 11/12/2013 on revising and supplement some Articles of Decree No. 48/2010/NĐ-CP dated 07/5/2010 of Government on the contract in construction activities;
- Decree No. 12/2009/ND-CP dated 10/02/2009 on managing the construction and investment projects.

**Legal framework related to integrated water resources exploitation and forest protection, cultural heritage and biodiversity**

- Law on Water Resources approved by Vietnam National Assembly dated 21/06/2012;
- Decree No.42/2012/NĐ-CP, dated 11/05/2012 of Government on managing and using of rice land;
- Decree No. 112/2008/NĐ-CP dated 20/10/2008 of Government on managing, protecting and integrated exploitation of water resources and environment of the electrical generation and irrigation reservoirs;
- Decree No. 120/2008/NĐ-CP dated 01/12/2008 of Government on River Basin management;
- Decree No. 72/2007/NĐ-CP dated 07/05/2007 of Government on Dam safety management;
- Decree No. 149/2004/NĐ-CP dated 27/07/2004 of Government regulating the licensing of exploration, exploitation and use of water resources and waste water discharge into water resources;
- Law on Culture Heritage No.28/2001/QH10 approved by Vietnam National Assembly dated 12/07/2001. Article 13 - Strictly prohibit the following acts: Appropriating and distorting the cultural heritage; destroying or risk destruction of cultural heritage; Unauthorized excavation of archaeological sites; illegal construction, encroachment of land belonging to historical – cultural and scenic areas;
- Law on Biodiversity No.28/2008/QH12 approved by Vietnam National Assembly dated 13/01/2008. Chapter III- Natural Ecosystem conservation and sustainable development, and Chapter IV- Creature Conservation and Development.

**National Policy on Dam safety**

- Decree No. 72/NĐ-CP dated 07/02 /2007 on managing Dam safety;
- Government Direction No. 21/CT-TTg dated 14/10/2013 on enhancing the management of reservoir safety;

- Circular No. 33/2008/TT-BNN dated 04/02/2008 on guiding the implementation of some Articles of Decree No. 72/NĐ-CP;
- Circular No. 34/2010/TT-BCT of Ministry of Industry and Trade dated 07/10/2010 regulating safety management of Electric Generation Reservoirs.
- Document N<sup>0</sup>1852/BNN-TCTL dated 10/06/2014 of the Minister of Agriculture and Rural Development on supporting the urgent repair funding to ensure the safety of reservoirs;

### **Resettlement policy**

- The Constitution of Vietnam Socialist Republic (1992) confirmed the people rights on house ownership and house ownership protection.
- The Constitution of Vietnam Socialist Republic 2013.
- Law on Land No. 45/2013/QH13 on administration regulations of land in general. Law on Land 2013 instead of the previous Land Laws in 1987 and 1993.
- Law on Complaints No. 02/2011/QH11 approved by Vietnam National Assembly.
- Decree No. 43/2014/ND-CP dated 15/5/2014 on the Land Law enforcement.
- Decree No.44/2014/ND-CP dated 15/5/2014 regulating the Land price assessment.
- Decree No. 47/2014/ND-CP dated 15/5/2014 on compensation and resettlement in cases of land recovered.
- Decree No. 75/2012/ND-CP dated 03/10/2012 on guiding the implementation of the Law on Complaints.
- Decree No. 38/2013/ND-CP dated 23/4/2013 on managing and use of Official Development Assistant Fund (ODA).
- Decree No. 42/2012/ND-CP dated 11/05/2012 on managing and use of rice land;
- Circular No.37/2014/TT-BTNMT dated 30/6/2014 regulating compensation, support and resettlement in cases of land recovered.
- Decision No. 1956/2009/QĐ-TTg dated 17/11/2009 of Prime Minister on approving the Overall Strategy of Career training for rural labor to 2020.
- Decree No. 197/2004/NĐ-CP of Government dated 03/12/2004 on compensation, support and resettlement in cases of land recovered.
- Circular No.116/2004/TT-BTC dated 17/12/2004 of Government on guiding the implementation of Decree No.197/2004/ND-CP, dated 03/12/2004 on compensation, support and resettlement in cases of land recovered.
- Decree No.188/2004/NĐ-CP of Government on the methods of determining land price and land price frame for each type of land.

- Circular No.36/2014/TT-BTNMT dated 30/6/2014 regulating the methods of land price assessment, construction and land price adjustment.
- Circular No. 114/2004/TT-BTC, dated 16/11/2004 guiding the implementation of Decree No. 188/2004/NĐ-CP.
- Decree No.17/2006/NĐ-CP of Government dated 27/01/2006 on revising and supplement some Articles of Decree guiding the implementation of Law on Land and Decree No. 187/2004/NĐ on the transformation of state companies into joint stock companies.
- Decree No. 84/2007/NĐ-CP of Government dated 25/05/2007 regulating the supplements of issuing the Land use rights Certificate, procedures of compensation and resettlement in cases of land recovered.
- Decree No. 123/2007/NĐ-CP, dated 27/7/2007 on revising and supplement some Articles of Decree No.188/2004/NĐ-CP, dated 16/11/2004 on the methods of determining land price and land price frame for each type of land.
- Decree No. 69/2009/NĐ-CP of Government dated 13/08/2009 regulating the additional planning regulations on land use, land price, land recovery, compensation, support and resettlement.
- Decision No. 52/2012/QĐ-TTg of Government dated 16/11/2012 on support policy of employment and career training for labors who have land recovered.

Under the guidance of Phu Tho province on implementing next steps and completing the Resettlement Action Plan in accordance with current regulations which is a basis for compensation and site clearance for the project. The policies of Phu Tho province for preparing Resettlement Action Plan is based on the following legal documents:

- Decision N<sup>0</sup> 1467/2011/QĐ-UBND dated 27/4/2011 on issuing the policies of compensation, support and resettlement in cases of land recovered within Phu Tho province
- Decision N<sup>0</sup> 13/2011/QĐ-UBND dated 17/7/2011 on revising Article 28 and Article 30 about the prices of project compensation of the decision N<sup>0</sup> 1467/2011/QĐ – UBND.
- Decision N<sup>0</sup> 40/2013/QĐ-UBND dated 20/12/2013 on issuing the regulation of prices of land types in Phu Tho province in the year 2014,
- Decision N<sup>0</sup> 3139/QĐ-UBND dated 6/10/2011 on issuing the unit price for compensation of crops in Phu Tho province.

And other legal documents related to compensation, support and resettlement of Phu Tho province.

#### **Gender policy**

- Law on Gender Equality No. 73/2006/QH11 approved by Vietnam National Assembly dated 29/11/2006;

- Direction No. 07/2007/CT-TTg 3/5/2007 of Government on the Law on Gender Equality enforcement;
- Decree No. 70/2008/NĐ-CP dated 4/6/2008 of Government regulating in detail on implementation of on Gender Equality;
- Decree No. 55/2009/NĐ-CP dated 10/6/2009 of Government on administration sanctions of gender equality;
- Decree No. 48/2009/NĐ-CP dated 19/5/2009 of Government on the measures of ensuring gender equality;
- Circular No. 191/2009/TT-BTC dated 1/10/2009 of Ministry of Finance guiding the use and management of funds for gender equality and women advancement;
- Circular No. 07/2011/TT-BTP dated 31/3/2011 of Ministry of Justice guiding the gender equality ensure in staff arrangement and legal support activities;
- Decision No. 2351/QĐ-TTg dated 24/12/2010 of Prime Minister approving the National Strategy on Gender Equality for 2011 – 2020 period.

#### **Policy for Ethnic Minority community development**

- Decree No. 82/2010/ND-CP dated 20/7/2010 of Government on teaching and learning the ethnic language in the schools.
- Decree No. 60/2008/NĐ-CP dated 9/6/2008 of Government regulating the functions, tasks, responsibilities and organization structures of Ethnic Committee.
- Decision No. 06/2007/QĐ-UBND dated 12/1/2007 of Ethnic Committee approving Communication Strategy for 135 Program – phase 2.
- Decree No. 70/2001/ND-CP: all registration documents of family assets and land use rights must be filled the names of both husband and wife.
- Decision No. 134/2004/CP dated 20/7/2004 of Government on policy of supporting productive land, residential land, house and domestic water for the poor and difficult ethnic households.
- Decision No. 03/2005/QĐ-BNN dated 07/01/2005 of Minister of MARD regulation the wood exploitation to support house construction of the poor and difficult ethnic households in line with Decision No. 134/QĐ-TTg dated 20/7/2004 of Government.
- Decision No. 33/2007/QĐ-TTg, dated 05/3/2007 of Government on the support policy on immigration and settlement for ethnic minorities;
- Decision No. 32/2007/QĐ-TTg dated 05/3/2007 of Government on the loans for production development of especial difficult ethnic households.
- Decision No. 1592/QĐ-TTg dated 12/10/2009 of Government on continuing implementation of some policies to support productive land, residential land, house and domestic water for the poor and difficult ethnic households.

- Decision No. 05/2007/QĐ-UBND dated 06/9/2007 of Ethnic Committee approving three Ethnic Minority regions and mountainous region based on the development situation.
- Circular No. 06 dated 20/9/2007 of Ethnic Committee guiding the support services for livelihood improvement of local people, technical assistant to improve knowledge on Law enforcement in line with Decision No. 112/2007/QĐ-TTg.

### **Poverty reduction policy**

- Decision No. 33/2007/QĐ-TTg dated 20/7/2007 of Prime Minister on the support policy to improve knowledge of Law enforcement within 135 program-phase 2.
- Decision No. 1956/2009/QĐ-TTg, dated 17/11/2009 of Prime Minister approving the Master Plan on career orientation training for rural labors to 2020.
- Resolution No. 30a/2008/NQ-CP of Government dated 27/12/2008 on the support program for rapid and sustainable poverty reduction for 61 poorest districts.

### **National Regulations and Standards related to environmental protection**

#### **(i) Water Environment:**

- NTR 02:2009/BYT: National technical standard on domestic water quality.
- NTR 08:2008/BTNMT: National technical standard on surface water quality;
- NTR 09:2008/BTNMT - National Technical Standard on ground water quality;
- NTR 14:2008/BTNMT - National Technical Standard on domestic waste water.
- NTR 39/2011/BTNMT - National Technical Standard on water quality for irrigation;

#### **(ii) Air Environment:**

- NTR 05:2013/ BTNMT - National Technical Standard on around air quality;
- NTR 06:2008/BTNMT – National Technical Standard on some toxics in around air.
- NTR 07:2008/BTNMT: air quality - levels of toxic substances in the air
- TCVN 6438:2001: Vehicles from the road - the maximum limit of gases emission

#### **(iii) Land Environment**

- NTR 03 : 2008/BTNMT - National Technical Standard on permitted limitation of heavy metals in the soil;
- NTR 04 : 2008/BTNMT – National Technical Standard on residue of chemical and pesticide in the soil;
- NTR 43:2012/BTNMT - National Technical Standard on sediment quality.

#### **(iv) Solid waste management:**

- NTR 07: 2009/BTNMT - National Technical Standard on thresholds of hazardous waste.
- TCVN 6696:2009: solid waste - sanitary landfill. General requirements for environmental protection
- (v) Vibration and noise:
  - NTR 26:2010/BTNMT – National Technical Standard on the noise;
  - NTR 27:2010/BTNMT – National Technical Standard on the vibration.
- (vi) Health and labor safety

Decision N<sup>0</sup> 3733/2002 / QD-BYT of the Ministry of Health dated 10/10/2002 on the application of the 21 standards of health and safety that relates to microclimate, noise, and vibration chemicals - the allowed threshold in the workplace.

## Appendix A4: ENVIRONMENTAL AND SOCIAL SCREENING

Screening questions	Yes	No	Description of impact
<b>1. Does the subproject have potential to cause significant adverse impacts on natural environment or important natural environment?</b>			
- Loss or degradation of land and water areas where (i) has the native species, and (ii) human activity has not significantly alter the fundamental ecological functions of the project area.		✓	Subproject implementation will acquire land of 15 HHs with total areas of 26.000 m <sup>2</sup> for construction, repair of dam A, B, C, spillway and management road. Affected trees area acacia, trash timber, diameter less than 5cm. No effect on indigenous species.
- Loss or degradation of natural habitats such as: important conservation areas, areas protected by traditional local communities (e.g. sacred forest), biodiversity; rare, vulnerable, migratory or endangered species.		✓	<p>Repair and upgrading is taken place in area around head-work area of Ban reservoir, including existing spillway, dam, and water intake and management road. All work items are located in zone 3, Tien Luong commune, which is agricultural production area, there is no sensitively environmental area, such as: conservation areas, areas protected by traditional local communities</p> <p>Permanently affected area of 15,000m<sup>2</sup> is vacant land, garden land. No natural living environment on land.</p> <p>Besides, auxiliary works serving for construction such as landfill, material yard, workers' camp, and construction site will occupy temporarily 1,1ha of land area in zone 3 and zone 4, zone 5 in Tien Luong. The land is mainly vacant land. They are not sensitively environmental areas.</p>
<b>2. Does the subproject have the potential to cause significant adverse impacts on physical cultural resources?</b>			
Loss or degradation of the material culture resource, structures, groups of structures, characteristics, natural landscape with importance of archaeology, paleontology, history, architecture, religion, aesthetic, or other importance of culture.		✓	There is no impact to the material culture resource, because the subproject is taken place based on existing construction. Moreover, there is no property or structure relating to archeology, religion, and aesthetics in Tien Luong commune. The nearest residential area is about 200m from the work site, in zone 3.
- May result to conflict with national law or international obligations under treaties and relating international		✓	<p>The project is undertaken for Ban reservoir, which was built in 1976.</p> <p>There is no report in on heritage, scientific value property. The implementation of project strictly complies with framework</p>



environmental agreements, including the World Heritage Convention of UNESCO or affect to the famous, scientific and important heritage worth in tourist			of national legislation and international obligations under treaties and relevant international environmental conventions.
<b>3. Does the sub-project have potential to cause significant adverse impacts on land and related natural resources by the use of ethnic minorities?</b>			
May result to impacts on land or traditionally owned territory, or used or customary tenure, and where access to natural resources, which is vital for the sustainability of the culture and livelihood of ethnic minorities. Likely to lead to impact on cultural and spiritual values symbolized for the land and natural resources or impact on management of natural resources and the long-term sustainability of resources affected.		✓	As described above, zone 3 in Tien Luong commune where upgraded, repaired works area located is agricultural area, majority of population is Kinh people. There is no land areas, and related natural resources used by ethnic minorities. Acquired land areas include permanent acquired land area – 15,000m <sup>2</sup> , temporarily acquired land – 11,000m <sup>2</sup> , are vacant land (permanent) and public land (temporary), and does not face to any objection of people during consultation and information disclosure process. No any ethnic HH among the AHs. Access of AHs is assured through an resettlement action plan, while other infrastructures are not affected.  The project does not use the lands or territories under traditional ownership, used or possessed customarily.
<b>4. Does subproject have potential to cause significant adverse impacts on displaced population?</b>			
Result to the displacement of people or land acquisition, property affecting their lives and difficulty in restoring livelihoods		✓	The project does not cause relocation effect.  Land acquisition of garden land, vacant land of HHs living along the upstream slope of the dam with total area of 1,5 ha may affect planting fruit trees, vegetable in garden of HH. However, 15 AHs have main income source from agriculture, production tool is the area of agricultural land are not affected. Therefore, the impact from the loss of land to the people is slight.
<b>5. Does subproject require construction of a large dam?</b>			
Does the subproject require construction of a large dam: - Height of 15 meters or more - 10 to 15 meters high,		✓	The largest height of dam of Ban reservoir is 11m. Design of the dam is simple. The dam does not belong to a large dam.

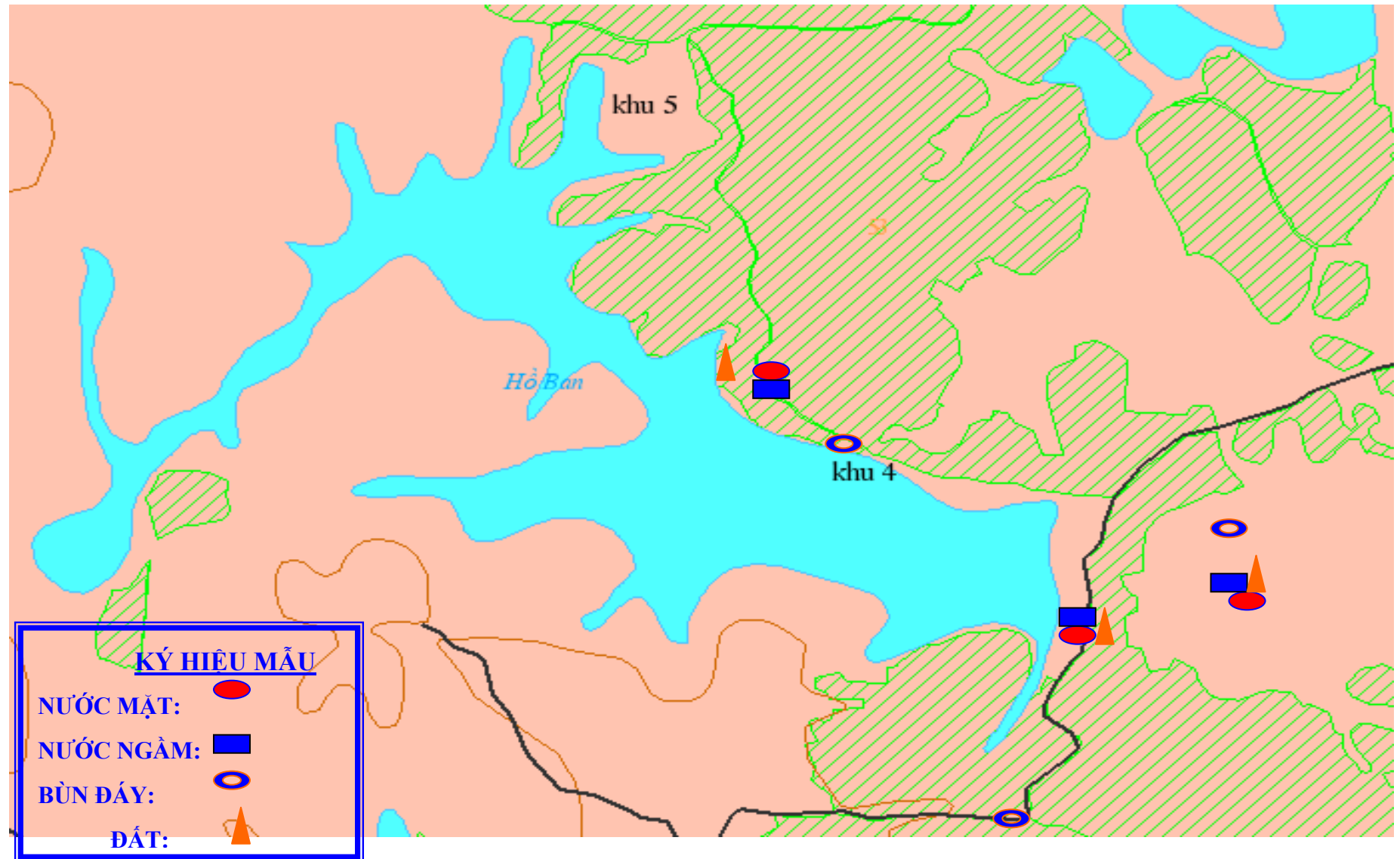
with intricate designs. - Less than 10 meters high, but is expected to become the largest dam in the operation phase of the sub-projects?			
<p>The operation of the subproject depends on the efficiency of:</p> <ul style="list-style-type: none"> <li>- Existing dam or dam under construction</li> <li>- Power station or water supply system gets water directly from the reservoir by a large dam or under control of a constructed dam.</li> <li>- Diversion dam or hydraulic structure in downstream from an existing dam or dams under construction, where every incident of upstream dam can cause enormous harm or damage to architectural and irrigation projects or water supply projects funded by the WB, the project is dependent on the capacity and performance of an existing large dam or dam being constructed to provide water and could not function if the dam was broken.</li> </ul>	✓	✓	<p>Water from reservoir is used mainly for agricultural purpose and partly for living purpose.</p> <p>Flood spillway is now earth spillway. Downstream of the spillway is not reinforced, many eroded holes in the downstream. Threshold has been filled up to the height of approximately current elevation of dam crest. Thus, the spillway no longer has function to drain floodwater. Before rainy season, local people discharge excess water through water intake.</p> <p>Implementation of the subproject will enhance capacity, ensure the safety of the dam and the people living downstream dam.</p> <p>In addition, no item of works as well as a public water supply projects by the World Bank-funded is in the project region.</p>
<b>6 . Does the subproject lead to procurement or use of pesticides?</b>			
Does formula of the product fall into IA and IB classification of WHO, or any formula of type II?		✓	The purchase or use of pesticides is not in the investment portfolio of the subproject.
<b>7. Does subproject have potential to cause irreversible effect or impact not easy to mitigate?</b>			
Lead to loss of regional recharge aquifers, affecting to quality of water storage and water storage areas responsible for providing drinking water to large		✓	There is no river in Tien Luong commune, but Gianh stream crossing with length of about 5.5km; water volume is relatively plentiful. Water is transferred from Ban reservoir to Gianh stream to irrigate for alluvial lands outside the dyke in dry season using steel pipe

population centers.			<p>diameter D=250mm, after being repaired and upgraded.</p> <p>The construction and upgrading of project categories is focused in headwork area of Ban reservoir, on a small temporarily acquired land area, will not affect to quality of water storage areas. Temporary land use for construction including land for construction site, camp, site operation house, materials yard has total area of about 11,000m<sup>2</sup> located along management route, in the bare lands.</p> <p>Moreover, the majority of the population in the project area (95%) use centralized water supply for living and drinking purpose, so it is not likely to affect containing water area for drinking water supply to residential areas.</p>
Lead to any impact occurring in relatively long period, affecting to large geographical area or intense impact.		✓	<p>Construction of the subproject will not last long, only 12 months. The construction activities including upgrading, repair lake Ngoi is calculated done in the dry season, the influence of water to benefit area during construction almost did not happen. The reservoir will be repaired to ensure the safety of the people behind the dam and provides stable, effective steps contributing to community economic development.</p>
<b>8. Does the subproject have potential to lead to a wide variety of significant adverse effects?</b>			
Many construction sites in various locations are affected, each impact cause loss of habitat, natural resources, land or significant depletion of resources quality.		✓	<ul style="list-style-type: none"> <li>- Land area acquired for construction of headworks is of 11,500m<sup>2</sup>. Land acquisition process will remove topsoil cover, cut trees, which may affect to soil, air environment, and vegetation cover.</li> <li>- Construction of 1,600m management road will permanently acquire land area of 3,500m<sup>2</sup>. Construction activities will arise noise, emission polluting environment and affecting traveling of people.</li> </ul> <p>Construction of auxiliary works will temporarily acquire 11,000m<sup>2</sup> of land area (from which: landfill – 3,000m<sup>2</sup>, bypass – 3,000m<sup>2</sup> and workers' camp, material yard, operation house – 5,000m<sup>2</sup>). Particularly, land for landfill with area of about 3,000m<sup>2</sup> is agreed by Tien Luong CPC to select the vacant land along the road leading to the reservoir. Presence with activities of workers will generate wastewater, domestic solid waste affecting living environment.</p> <p>Construction activities area taken place during a not too long period (12 months) and within a</p>

			narrow space, thus, there is no significant impact on living environment, natural resources, soil or impact significantly declining on resources quality.
The significant potential adverse effects capable to expand beyond the construction site or works.		✓	<p>- Construction activities will increase demand of using the existing road connecting national road no. 32 to the dam crest. Generation of dust spreading outside scope of the construction site may happen. The road may also be damaged by activities of large loaded vehicles. However, it happens just in narrow scope. Construction The project area is rural area with plentiful vegetation cover, so that dust and emission is easy to be diluted.</p> <p>- Construction of management road will acquire vacant land, garden land with area of 1,500 m<sup>2</sup>.</p> <p>- At peak period of construction, there may be 50 workers concentrating in construction site, from them 30% (15-20 workers) come from other localities. It may result in increase of food demand in the commune, increase of pressure on local health care service. Conflict between workers and local people may arise.</p>
The impact across the border (in addition to a small change in the waterway activities are taking place).		✓	<p>The subproject is implemented entirely in the territory of Vietnam. There is no impact across border.</p> <p>There is no waterway activities in project area.</p>
The need for public road, tunnel, canal, power transmission corridor, new pipeline, or borrowed area and disposal areas in underdeveloped region.	✓		<p>Construction of bypass crossing dam A will temporarily acquire about 3,000m<sup>2</sup> of vacant land area during bridge over the spillway construction time for travelling demand. Besides, current management road is earth road, slipper in rainy season will be invested, upgraded to become concrete road, length of 1600 m, contributing to improve travelling condition of people.</p> <p>Beside, construction activities will not affect other infrastructures.</p>
Interrupt the cycle of migration of wildlife, wild animal or grazing animal, nomads or semi-nomads		✓	<p>The subproject is carried out in zone 3, Tien Luong commune, Cam Khe district, is habitat of people. No kind of wildlife is detected at all, there are only grazing animals such as buffalo, cows, etc. The construction of subproject will not disrupt the cycle of migration of wildlife, wild animal. There is no nomad or semi-nomad living in project area</p>
<b>9. The subproject does not have precedent work, does it?</b>			

No precedent at national level?		✓	There have been many similar projects to be implemented
No precedent at provincial level?		✓	There have been many reservoirs in Phu Tho province to be repaired, upgraded
<b>10. Is subproject controversial and likely to attract the attention of NGOs and national or international social organizations?</b>			
Considered as risk and likely to have special controversial aspects		✓	Activities under project scope include only repair, upgrading of reservoir serving for production of local people and there is no negative impact to other areas.
May lead to protests of those who wish to express or prevent construction.		✓	Consultation results showed that both the government and the people fully agreed and supported implementation of subproject.

## Appendix A5: SAMPLE POSITION



## Appendix A6- RESULT OF ENVIRONMENT SAMPLE ANALYSIS

Viện nước, Tưới tiêu và Môi trường

Phòng Thí nghiệm Tổng hợp

Địa chỉ: 1/95 - Chùa Bộc - Đống Đa - Hà Nội

Tel: 844-8.539.127

Fax: 844-5.634.809

### KẾT QUẢ PHÂN TÍCH MẪU NƯỚC MẶT

Dự án : Cải tạo, nâng cấp hồ Bán  
 Địa điểm : Xã Tiên Lương – huyện Cẩm Khê – tỉnh Phú Thọ  
 Người gửi mẫu : Dương Thị Kim Thư  
 Đơn vị gửi mẫu : Phòng Kế hoạch Tài chính  
 Ngày gửi mẫu : 09/02/2015

Kết quả phân tích được thể hiện trong bảng sau:

TT	Chỉ tiêu	Đơn vị	Mẫu NM1	Mẫu NM2	Mẫu NM3	QCVN 08:2008 (A2)	QCVN 08:2008 (B1)
1	pH	-	6,9	7,1	6,8	6-8,5	5,5-9
2	Độ đục	NTU	55	67	65	-	-
3	TSS	mg/l	25	28	27	30	50
4	DO	mg/l	7,0	6,8	7,2	≥5	≥4
5	BOD <sub>5</sub>	mg/l	5	4	7	6	15
6	COD	mg/l	11	10	15	15	30
7	Pb	mg/l	0,0015	0,0040	0,0032	0,02	0,05
8	Hg	mg/l	KPH	KPH	KPH	0,001	0,001
9	As	mg/l	0,0021	0,0043	0,0020	0,02	0,05
10	Fe	mg/l	0,32	0,56	0,80	1	1,5
11	Coliform	MPN/100ml	2400	4100	3500	5000	7.500
12	E.coli	MPN/100ml	18	54	34	50	100

Ghi chú: KPH – Không phát hiện

T/M nhóm phân tích

Trưởng phòng

Hà Nội, Ngày tháng năm 2015  
 Viện Nước, Tưới tiêu và MT



Lê Văn Cư



Vũ Quốc Chính



PHÓ VIỆN TRƯỞNG

Vũ Thị Thanh Hương

Viện nước, Tưới tiêu và Môi trường

Phòng Thí nghiệm Tổng hợp

Địa chỉ: 195 - Châu Bộc - Đống Đa - Hà Nội

Tel: 844.8.539.127

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### KẾT QUẢ PHÂN TÍCH MẪU NƯỚC NGẦM

Dự án : Cải tạo, nâng cấp hồ Bán  
Địa điểm : Xã Tiên Lương – huyện Cẩm Khê – tỉnh Phú Thọ  
Người gửi mẫu : Dương Thị Kim Thư  
Đơn vị gửi mẫu : Phòng Kế hoạch Tài chính  
Ngày gửi mẫu : 09/02/2015

Kết quả phân tích được thể hiện trong bảng sau:

TT	Chỉ tiêu	Đơn vị	Mẫu NN1	Mẫu NN2	Mẫu NN3	QCVN 09:2008
1	pH	-	7,1	6,8	6,7	5.5-8.5
2	Độ cứng tổng số	mg/l	205	275	335	500
3	Chất rắn tổng số	mg/l	89	55	66	1500
4	DO	mg/l	6,6	6,5	7,0	-
5	COD	mg/l	11	15	17	4
6	Cd	mg/l	KPH	KPH	KPH	0,005
7	Pb	mg/l	0,002	0,002	0,004	0,01
8	Hg	mg/l	KPH	KPH	KPH	0,001
9	As	mg/l	0,0034	0,0020	0,0018	0,05
10	Fe	mg/l	20	18	11	5
11	Ecoli	MPN/100ml	KPH	KPH	KPH	KPH
12	Coliform	MPN/100ml	0	0	0	3

Ghi chú: KPH – Không phát hiện

T/M nhóm phân tích

Trưởng phòng

Hà Nội, Ngày tháng năm 2015

Viện Nước, Tưới tiêu và MT

Lê Văn Cư

Vũ Quốc Chính



THỦ VIỆN TRƯỞNG

Vũ Thị Thanh Hương



Viện nước, Tuổi tiêu và Môi trường

Phòng Thí nghiệm Tổng hợp

Địa chỉ: 1/95 - Chùa Bộc - Đống Đa - Hà Nội

Tel: 844-8.539.127

Fax: 844-5.634.809

### KẾT QUẢ PHÂN TÍCH MẪU ĐẤT

Dự án : Cải tạo, nâng cấp hồ Bán  
Địa điểm : Xã Tiên Lương – huyện Cẩm Khê – tỉnh Phú Thọ  
Người gửi mẫu : Dương Thị Kim Thư  
Đơn vị gửi mẫu : Phòng Kế hoạch Tài chính  
Ngày gửi mẫu : 09/02/2015

*Kết quả phân tích được thể hiện trong bảng sau:*

TT	Chỉ tiêu	Đơn vị	Mẫu Đ1	Mẫu Đ2	Mẫu Đ3	QCVN 03:2008 (Đất NN)
1	Cu	mg/kg đất khô	5	9	9	50
2	Pb	mg/kg đất khô	10	12	15	70
3	Zn	mg/kg đất khô	75	55	67	300
4	As	mg/kg đất khô	1.11	1.7	1.22	12
5	Cd	mg/kg đất khô	0.12	0.54	0.45	2

T/M nhóm phân tích

1. Trưởng phòng

Hà Nội, Ngày tháng năm 2015

Viện Nước, Tuổi tiêu và MT

Lê Văn Cư

Vũ Quốc Chính



PHÓ VIỆN TRƯỞNG

Vũ Thị Thanh Hương

Picture of sampling and field work



Surface water sampling



Ground water sampling



Soil sampling

## Appendix A7- PUBLIC CONSULTATION MINUTES

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

Phủ Thọ..... Ngày 29 tháng 1 năm 2015

**BIÊN BẢN LÀM VIỆC**

Công trình: Cải tạo và nâng cấp hồ Bùn, Phủ Thọ

Hôm nay, ngày 29 tháng 1 năm 2015, tại Xã Tiên Lương.....  
Cải Khê, Phủ Thọ chúng tôi gồm:

**I. Đại diện : UBND xã** Điền Gầy - Cải Khê, Phủ Thọ

- Ông/Bà Nguyễn Tân phúc..... Chức vụ Phó Chủ tịch.....

- Ông/Bà Đào Văn..... Chức vụ .....

đã làm việc với:

**II. Đại diện Đơn vị tư vấn đánh giá tác động Môi trường**

- Ông/Bà Dương Thị Kim Thư..... Chức vụ TP. Kế hoạch - TC.....

- Ông/Bà Phu Thị Hằng..... Chức vụ Chuyên gia Môi trường.....

**Nội dung làm việc:**

- Đem và tư vấn tư vấn cải tạo và nâng cấp hồ Bùn

- tư vấn cải tạo và nâng cấp hồ Bùn và môi trường, kinh tế

- xây dựng hồ Bùn xã và cải tạo môi trường

- UBND xã

- Đang được tư vấn cải tạo và nâng cấp hồ Bùn và môi trường

- Cải tạo hồ Bùn và nâng cấp hồ Bùn và môi trường

- Hàng năm được tư vấn và nâng cấp hồ Bùn và môi trường



- Đang được tư vấn và nâng cấp hồ Bùn và môi trường

Sau khi đọc lại biên bản, những người có mặt đồng ý về nội dung biên bản, không có ý kiến gì khác hoặc có ý kiến bổ sung khác (nếu có) như sau:

UBND xã cũng đã có rất mong muốn dự án được triển khai

Đang được tư vấn và nâng cấp hồ Bùn và môi trường

**Xác nhận của UBND** **Đơn vị tư vấn**

Nguyễn Tân phúc DƯƠNG THỊ KIM THƯ



CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM

Độc lập - Tự do - Hạnh phúc

Phước Thọ, Ngày 29 tháng 1 năm 2015

BIÊN BẢN HỌP THAM VẤN CỘNG ĐỒNG

Về các vấn đề môi trường

Công trình: Cải tạo, nâng cấp Hồ Bùn

Xã Diên Quang, Huyện Cẩm Khê, Tỉnh Phú Thọ

Hôm nay, ngày 29 tháng 1 năm 2015, tại Xã Diên Quang, Cẩm Khê chúng tôi gồm:

I. Thành phần tham dự

- |  |                               |
|--|-------------------------------|
| - Ông/Bà Nguyễn Văn Phú  | Chức vụ Phó Chủ tịch xã       |
| - Ông/Bà Lê Thị Thu  | Chức vụ KT. HT. D. xã         |
| - Ông/Bà Nguyễn Anh Hùng   | Chức vụ Phó Ban CHĐA          |
| - Ông/Bà Dương Thị Kim Thư   | Chức vụ TP. KH. DL.           |
| - Ông/Bà Phan Thị Hằng   | Chức vụ Chuyên gia Môi trường |
| - Đại diện những người bị ảnh hưởng: ..... người (chi tiết xem Danh sách tham dự cuộc họp) |                               |



II. Nội dung tham vấn

- Cán bộ giới thiệu về địa điểm, quy mô, các thông số kỹ thuật cơ bản và những tác động Dự án được xây dựng tại địa phương mang lại.
- Cán bộ tư vấn trình bày những chính sách môi trường của chính phủ Việt Nam, chính sách môi trường của Dự án và đánh giá tác động môi trường tiềm năng của dự án bao gồm các tác động đến môi trường tự nhiên và xã hội của khu vực dự án; biện pháp phòng ngừa, giảm thiểu các tác động tiêu cực và phòng ngừa, ứng phó sự cố môi trường. Qua đó đề xuất chương trình quản lý và giám sát môi trường.

III. Ý kiến thảo luận

1. Các tác động:

Đã có khi xây dựng có thể xây ra ảnh hưởng môi trường không khí, nước thải nước mưa chảy tại các khu vực

2. Những đối tượng bị ảnh hưởng

- Người dân sống trong vùng chịu ảnh hưởng
- Khu vực thiên nhiên
- Chất lượng môi trường, cảnh quan bị ảnh hưởng
- Nước sử dụng và sinh sản thủy sản

3. Đề xuất biện pháp giảm thiểu:

- Sử dụng các loại máy móc thiết bị đạt chuẩn
- Hạn chế di chuyển chỉ sát bờ giữ các điều kiện kỹ thuật để tránh ảnh hưởng đến cộng đồng
- Phun rửa máy móc, thiết bị

IV. Kết luận

- UBND xã hoàn toàn chấp thuận với các biện pháp giảm thiểu mà đơn vị tư vấn đưa ra
- Nhân dân và lãnh đạo địa phương chấp thuận với các điều kiện giảm thiểu
- Yêu cầu các đơn vị thực hiện đúng như cam kết của đơn vị tư vấn

Cuộc họp các bên thống nhất và kết thúc vào lúc: 14<sup>h</sup> giờ, ngày 23 tháng 1 năm 2015

**Đại diện Chủ đầu tư**  
  


**PHÓ TRƯỞNG BAN**  
**Nguyễn Anh Hùng**

**Đại diện cộng đồng**



**Đại diện UBND xã**  
  


**Đại diện Mặt trận Tổ quốc xã**  
  


**Lô Đại Đức**

**Cán bộ tham vấn**

  
**Phạm Thị Hằng**

**Đại diện đơn vị tư vấn**

  
**Đường Thị Kim Thoa**

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM

Độc lập - Tự do - Hạnh phúc

Phù Thới, Ngày 29 tháng 1 năm 2015

BIÊN BẢN XÁC NHẬN BÀI KHAI THÁC VẬT LIỆU ĐẤT ĐÁP

Công trình: Cải tạo nâng cấp Hồ Bàu

Xã: Tiên Lương - huyện Cẩm Khê - tỉnh Phú Thọ

Hôm nay, ngày 29 tháng 1 năm 2015, tại Xã Tiên Lương

Cẩm Khê, Phú Thọ chúng tôi gồm:

I. Đại diện đơn vị lập báo cáo ĐTM: UBND xã Tiên Lương

- Ông/Bà Dương Thị Kim Phức Chức vụ Chuyên gia Môi trường

- Ông/Bà Bạch Hùng Hoàng Chức vụ Chủ

II. Đại diện địa phương: UBND xã Tiên Lương

- Ông/Bà Nguyễn Tân Phúc Chức vụ Phó Chủ tịch xã

- Ông/Bà Lê Văn Long Chức vụ Đại diện người dân

Cùng xác nhận vị trí bài khai thác vật liệu cho công trình tại hiện trường như sau:

Vị trí: Đồi đất ở phía trên của xã

Tình trạng sở hữu:

Đồi đất ở phía trên của UBND xã quản lý

Trữ lượng: 20.000 m<sup>3</sup> → 300.000 m<sup>3</sup>

Cự li vận chuyển: Khoảng 200 → 300 m

Mô tả môi trường xung quanh bài khai thác:

Đồi đất ở phía trên của xã, cây bụi, dân cư thưa thớt, một mặt giáp đường quốc lộ, 2 phía giáp cánh đồng

Chủ sở hữu đồng ý cho khai thác vật liệu đất xây dựng dự án

Biên bản được thông qua, các bên nhất trí ký tên.



Xác nhận của địa phương

Nguyễn Tân Phúc

Đại diện chủ mô đất

Long  
Lê Văn Long

Đại diện chủ đầu tư



PHÓ TRƯỞNG BAN  
Nguyễn Anh Hùng

Đơn vị lập báo cáo ĐTM

Phức

Dương Thị Kim Phức



CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM

Độc lập - Tự do - Hạnh phúc

Phước Thọ, Ngày 29 tháng 1 năm 2015

BIÊN BẢN XÁC NHẬN VỊ TRÍ LÁN TRẠI

Công trình: Cầu kè, nâng cấp hồ bơi  
Xã: Tiến Lương huyện Cần Giờ, TP. Hồ Chí Minh

Hôm nay, ngày 29 tháng 1 năm 2015, tại Xã Tiến Lương, Cần Giờ, TP. Hồ Chí Minh chúng tôi gồm:

- I. Đại diện đơn vị lập báo cáo ĐTM: Viện Nước, Tưới tiêu và Môi trường
- Ông/Bà: Phì Thị Hằng Chức vụ chuyên gia Môi trường
  - Ông/Bà: Nguyễn Xuân Phụng Chức vụ chủ trì
- II. Đại diện địa phương: UBND xã Tiến Lương
- Ông/Bà: Nguyễn Văn Phúc Chức vụ Phó Chủ tịch xã
  - Ông/Bà: Lê Chí Cường Chức vụ Chủ tịch HĐND xã

Cùng xác nhận vị trí xây dựng lán trại thi công cho công nhân tại hiện trường như sau:

Vị trí: Đất xây dựng trên đất trống gần nhà dân

Tình trạng sở hữu:

Đất thuộc đất đai công ích thuộc lợi

Diện tích: 0,1 ha

Mô tả môi trường xung quanh vị trí xây dựng lán trại:

Đất đai ở phía giáp hồ, 1 phía giáp đường quốc lộ  
Đất đai sẵn sàng để thuê hoặc  
Đất thuộc quyền quản lý của UBND xã

Yêu cầu đơn vị thi công sau khi hoàn thành công trình hoàn trả lại hiện trạng cho khu đất mượn tạm để xây dựng lán trại thi công.

Biên bản được thông qua, các bên nhất trí ký tên.



Xác nhận của địa phương

Đại diện chủ đầu tư

Đơn vị lập báo cáo ĐTM

Phó CT. Nguyễn Văn Phúc



PHÓ TRƯỞNG BAN  
Nguyễn Anh Hùng

Nguyễn Thị Kim Tiên

ĐỒNG THỜI KIM TIÊN

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM

Độc lập - Tự do - Hạnh phúc

phi' thua, Ngày 22 tháng 1 năm 2015

BIÊN BẢN XÁC NHẬN VỊ TRÍ ĐỒ THẢI

Công trình: Cải tạo, nâng cấp Hồ Bùn

Xã Tiên Lương, Cầu Khê, phi' Th

Hôm nay, ngày 22 tháng 1 năm 2015, tại Xã Tiên Lương, Cầu Khê, phi' Th  
chúng tôi gồm:

- I. Đại diện đơn vị lập báo cáo ĐTM: Viện Nước, T. và Môi trường
- Ông/Bà: phi' Thị Hằng Chức vụ Chuyên gia Môi trường
  - Ông/Bà: Bach Huy Hoàng Chức vụ Chuyên gia xã trưởng
- II. Đại diện địa phương: UBND xã Tiên Lương
- Ông/Bà: Nguyễn Tấn Phúc Chức vụ Phó Chủ tịch xã
  - Ông/Bà: Lê Thị Liên Chức vụ Chủ tịch UBND xã

Cùng xác nhận vị trí đồ đất thải công trình tại hiện trường như sau:

Vị trí: Ven đường giao lộ tư đường UBND xã đi Vạn An

Tình trạng sở hữu:

Thuộc UBND xã Tiên Lương giao lộ

Trữ lượng: 0,2 ha

Cự li vận chuyển: 2,2,5 km

Mô tả môi trường xung quanh bãi đồ thải:

Bên trái: đường giao lộ tư đường UBND xã đi Vạn An  
phía bên cho xã phía xã

Yêu cầu đơn vị thi công khi đổ đất phải lần lượt, gọn gàng, khi đổ xong phải san gạt cho bằng phẳng.

Biên bản được thông qua, các bên nhất trí ký tên/



Xác nhận của UBND

Đại diện gia đình

Đơn vị lập báo cáo ĐTM

Phó Chủ tịch  
Nguyễn Tấn Phúc



Đại diện chủ đầu tư

PHÓ TRƯỞNG BAN  
Nguyễn Anh Hùng

phi' Thị Hằng





Pictures of stakeholder meeting



## **Appendix A8- PICTURES OF CURRENT STATUS OF SUBPROJECT AREA**



**CURRENT STATUS OF SPILLWAY**



**CURRENT STATUS OF DAM A**



**THE SLIDE POSITION TOWARDS  
UPSTREAM OF DAM B**



**THE SEEPAGE POSITION BETWEEN  
DAM A AND THE SPILLWAY**





CURRENT STATUS OF CREST OF DAM B



CURRENT STATUS OF WATER INTAKE



THE POSITION OF THE DAM AND THE  
SPILLWAY



CURRENT STATUS OF WATER INTAKE



THE POSITION OF BORROW PITS



THE CURRENT STATUS OF BAN  
RESERVOIR



THE POSITION OF DOWNSTREAM OF  
SPILLWAY



THE POSITION OF THE PROPOSED  
WORKERS CAMP



THE POSITON FOR ACHIEVEMENT OF  
MATERIAL

## **APPENDIX B – SOCIETY**

### **Appendix B1: METHODOLOGICAL NOTE**

The purpose of this social assessment (SA), conducted in an integral manner with environmental assessment for this subproject, is two-fold. First, it examined the potential impacts of the subproject –positive and adverse impact –on the basis of planned project activities. Second, its findings inform the design of measures addressing identified potential adverse impact and proposing community development activities that are relevant to the project development goal. For identified adverse impact that could not be avoided, consultation with local people, governmental agencies, project stakeholders, etc., were carried out to ensure affected peoples will be appropriately compensated for, and supported in a manner that their socioeconomic activities will be promptly and fully restored to the pre-project level, at least, and that their livelihoods will not be worsen off, in the long run, as a result of the subproject.

As part of the social assessment, where ethnic minority (EM) peoples are present in the subproject area –as confirmed by the EM screening (as per Bank’s OP 4.10), consultation with them were carried out in a free, prior, and informed manner, to confirm if there is broad community support from affected EM peoples for the subproject implementation. EM screening was conducted as per Bank’s OP 4.10, and was done the scope and coverage of the social assessment vis-à-vis the environmental assessment (OP 4.01). A gender analysis was also done as part of the SA to understand underlying gender dimensions (from project impact perspective) to enable gender mainstreaming to promote gender equality, and enhance further the development effectiveness of the subproject, and the project as a whole. Depending on the magnitude of the identified potential project impact, and the project development objective, a gender action plan and gender monitoring plan were prepared (please see these plans in the Appendix 7 of this ESIA).

To ensure all potential impact could be identified during project preparation, the SA was conducted through series of consultations with various project stakeholders. A particular focus was maintained on households who are potentially affected (both positively and adversely). The research techniques employed for this SA include 1) review of secondary data, 2) field observations; 3) focus groups discussions/ community meetings, 4) key informant interview, and 5) households survey (Please see Appendix 1 for how the Sampling Frame). A total of 177 of respondents participated in the SA exercise for this subproject, of which 128 people participated in the households survey (quantitative), and 49 people participate in focus groups discussions, community meetings, key informant interview (qualitative).

In Section 5, we will present the findings of the SA (positive and positive impact), including the result of the gender analysis. In section 4, we will present briefly the SA results, along with the recommendations on the basis of the SA findings. A gender action plan and gender monitoring plan are presented at

Appendix 7 of this ESIA, and the public health intervention plan and public consultation and communication plan were presented at Appendix 5 and 6, respectively).

## **Appendix B2: PUBLIC HEALTH INTERVENTION PLAN**

### **1. The necessity of the construction of public health management plan**

The activities of the subproject will generate impacts on the surroundings quality: air, water and soil environment, in addition it may arise disease. All these factors will affect directly 50 workers, the entire population around the project area along the transport route. The consequence of these effects lead to increase occupational accidents, traffic accidents, diseases related to respiratory and intestinal system and eyes.

There are households and 50 workers will directly contact with sources of pollution and disease from the activities of the project, although subproject have had measures to limit pollution such as dust, emissions, wastewater and epidemics, but there are potential impacts that we do not see immediately, so need to take measures for early detection of disease and sources of disease. The plan indicates the measures to minimize and prevent those impacts.

### **2. Objective**

To control and prevent diseases, raise awareness of the people and the workers to protect health yourself; help people access fully medical services. Organize regularly medical examination to detect early disease due to impacts of the subproject; to build treatment plans for incidents related to diseases, occupational accidents and traffic.

### **3. Measure and content of public health management**

- To train and raise awareness, prevent impacts on health
- Organize regularly medical examination for workers and people in the subproject region
- Build plan to minimize the impact on public health
- Build plan to prevent and treat diseases

### **4. Role and responsibility of agencies, organizations and individuals**

**Department of Agriculture and Rural Development (DARD)/ Project Management Unit (PMU):**

- DARD and PMU are responsible for building materials about public health safety training.
- Coordinate all levels of authorities in Tien Luong commune (local authorities, Fatherland Front, Women's Union, Farmers' Union, Youth Union, hamlet representative) organize propagandic activities about health safety.

#### **Department of Health, Cam Khe District Preventive Medicine Center**

- To train and raise awareness for all basic levels, contractors and residents about prevention measures and treatments of diseases;
- Check the medical examination process;
- To direct promptly when epidemics appear, resolving incidents related to public health.

#### **People's Committee, Social Organizations**

- To direct, guide and organize the health safety work; to coordinate closely with contractor, Department of Health and Preventive Medicine Center when epidemics appear.

**Health Station:** To prepare the medical examination plan and guide water pollution treatment, epidemic prevention and treatment.

### **5. Implementation Schedule**

Public Health Management Plan implemented at 3 stages of the subproject and extended 6 months at operation stage.

**Table B2-1 Implementation Schedule of “Public Health Management Plan”**

<b>No</b>	<b>Measure</b>	<b>Content</b>	<b>Responsible unit</b>	<b>Cost</b>	<b>Time</b>
1	To train and raise awareness, prevent impacts on health	<ul style="list-style-type: none"> <li>- Identify the impact of air and water environment, food safety.</li> <li>- Preventable measures (using a comforter when entering the affected area, treat water pollution by alum and chloramine B)</li> </ul>	<ul style="list-style-type: none"> <li>- Department of Agriculture and Rural Development (DARD)</li> <li>- Project Management Unit (PMU)</li> <li>- Cam Khe district Preventive Medicine Center</li> <li>- Health</li> </ul>	15.000.000 millions	2 stages in the early and the mid-stage of the project



No	Measure	Content	Responsible unit	Cost	Time
		- Cleaning household sector, ranch house	Station at commune/ward - Contractor		
2	- Organize regularly medical examination for workers and people in the subproject region	- Check the health of workers 3 months/ time, residents in the affected areas 6 months / time - The diseases related to respiratory system, intestinal tract, eyes - To consult the affected people during examination - Advise or handle when the detection of abnormalities related to the impact of subproject (timely notify to the authorities and functional units)	- Department of Agriculture and Rural Development (DARD) - Project Management Unit (PMU) - Cam Khe district Preventive Medicine Center - Health Station at commune/ward - Contractor	Budget of Cam Khe district	3 months/ time from the start of construction to 6 <sup>th</sup> month
3	- Build plan to minimize the impact on public health	- Medical staffs at commune/ward monitor regularly the implementation of the mitigation measures of construction	- Department of Agriculture and Rural Development - Project Management Unit (PMU) - Cam Khe	Budget of Cam Khe district and contractor	Continuously during the construction time

No	Measure	Content	Responsible unit	Cost	Time
		units. - To treat timely occupational accidents and traffic - To vaccinate completely children, pregnant woman	district Preventive Medicine Center - Health Station at commune/ward - Contractor - Women's Union - Fatherland Front		
4	Build plan to prevent and treat epidemic	- To spray fly and mosquito-spray in the project area with the frequency of 3 months/ time. - To guide the water sanitation; use chloramine B for pretreatment of wastewater on work site and households. - When appearing epidemic, we need localize epidemic, isolate infectious objects and spray chloramine B to disinfect.	- Department of Agriculture and Rural Development (DARD) - Project Management Unit (PMU) - Cam Khe district Preventive Medicine Center - Health Station at commune/ward - Contractor - Women's Union - Fatherland Front	Budget of Phu Tho province (Department of Health) and contractor	Continuousl y during the construction time (18 months)

## **Appendix B3: PUBLIC CONSULTATION, PARTICIPATION AND COMMUNICATION STRATEGY**

### **1. The necessity of the construction of communication plan**

The project cause impacts: (i) positive impacts: ensure safely for households in the downstream area, ensure stability source of irrigation water supply for 150ha of rices and vegetables (ii) negative impacts: acquire land and assets on land of 15 households, affect economy and public health, impact on gender equality...

The communication and public consultation plan is done throughout from the establishment of the investment project to the project operation. This helps local communities and managers to understand and visualize the entire impacts (positive, negative) to provide mitigation measures the impact on the natural environment and society, especially vulnerable objects include children, the elderly, women and sensitive ecosystem.

Information from communication and public consultation plan help managers, local authorities, monitoring unit to give decisions quickly or change timely decisions or plans during the project implementation.

### **2. Objective**

To publish information about sub-project and provide all materials on the action plan to government at various levels, social organizations, unions and resident in sub-project areas. To consult local communities and organizations for the plan will be made for each stage of the project. The feedback helps the investors and the management level to improve plans to meet practical needs prior to the implementation of the action plan.

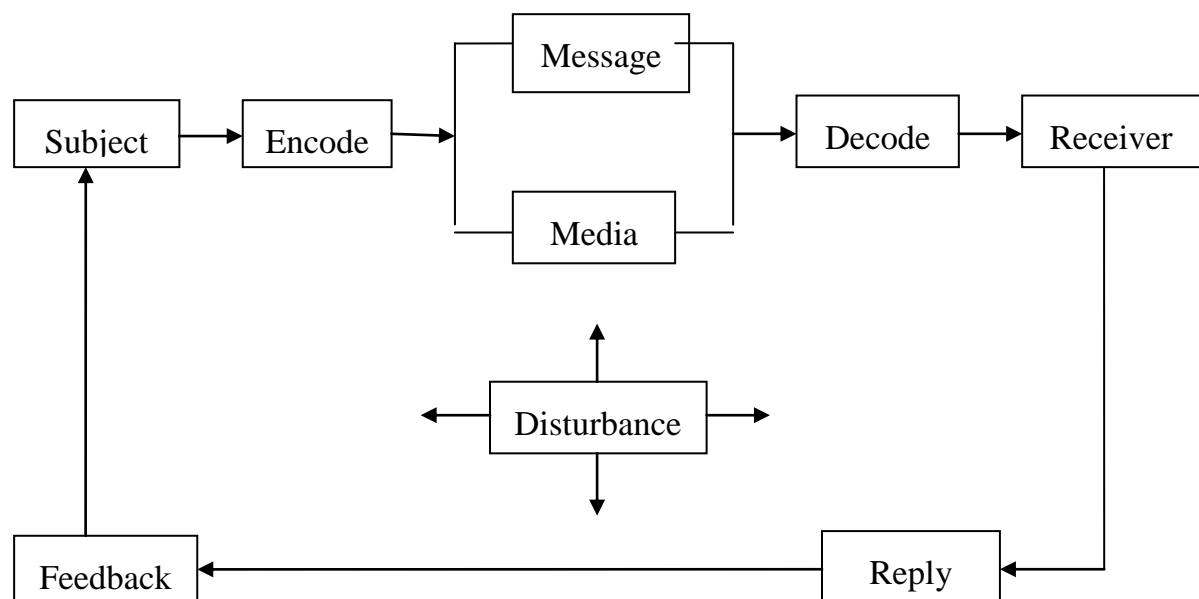
### **3. Contents**

- Information on the subproject and policies of interest will be disseminated to people by Project Management Unit (PMU);
- Environmental and Social Management Plan: (i) the PMU and consultancy units provide information of impacts and mitigation measures; (ii) To consult the local authorities and social organizations, unions, people around the project area.
- Resettlement Action Plan: Provides information about land acquisition, resettlement, compensation cost apply framework and support policies of the subproject and the provisions of Phu Tho Province and government at various levels, affected people

- Gender Action Plan: provides information about gender equality for the local authorities and social organizations, unions, people around the project area.
- Public Health Management Plan: provides information on the solutions, disease prevention plan, medical examination periodically.
- Social security, traffic safety, social evils: provide information about law, legal education for workers, people around the subproject area.
- Dam Safety: disseminate plans when occurring dam safety incidents in the construction process and the rainy season.
- Operate mining and flood discharge: provide information and detailed plans for the flood discharge to people around the project area and downstream area; make protection plan for the people, the buildings in downstream of the dam.

#### 4. Forms of communication, community consultation

In order to organize the effective communication activities, need understand the basic elements of the communication process and public relations of them.



**Diagram B3-1: The elements of the communication process**

- Organize meetings to disseminate information for local authorities, social organizations, unions, people of the subproject region (Tien Luong commune);
- Through the mass media, basis loudspeakers, commune and village boards.
- Issue brochures, consultative questionnaires to local authorities, unions, people of the subproject area;
- Through the activities of organizations and clubs;
- Training;

- Other media and information forms.

## **5. Role and responsibility of agencies, organizations and individuals**

Department of Agriculture and Rural Development represents Phu Tho province people's committee is an investor, and Project Management Unit of Phu Tho province is the project implementation unit.

### **Department of Agriculture and Rural Development (DARD)/ Project Management Unit (PMU):**

- DARD and PMU are responsible for building materials about communication plan and participatory public consultation.
- Coordinate government at various levels in Tien Luong commune, (local authorities, Fatherland Front, Women's Union, Farmers' Union, Youth Union, hamlet representative) organize propaganda activities for this plan.

### **People's Committee, Social Organizations**

- To direct, guide and organize the propaganda activities and disseminate contents of communication, participatory public consultation.
- Direct news agencies, local propaganda agencies to spend the appropriate time for disseminating plans and the impact of the subproject.

### **Land Clearance Committee**

- Provide information about land acquisition, resettlement, compensation cost apply framework and support policies of the subproject and the provisions of Phu Tho Province and government at various levels, the affected people.

Health Station: disseminate information on the disease prevention plan, medical examination periodically, solutions when having epidemic.

## 6. Implementation Schedule

The communication plan and participatory public consultation implemented under stages of the subproject; to provide completely information for local people and government at various levels.

**Table B3-1 Implementation Schedule of “Communication Plan, Consultation with Community Participation”**

No	Stage	Content	Form	Responsible unit	Receptive unit	Note
1	Preparation	Disseminate information, consult the authorities about subproject: scale, type of investment, the main works, incidence, benefits of the subproject.	Organize meeting at government at various levels, mass organizations.	DARD and PMU	Phu Tho Province People's Committee, Department of Planning and Investment, Department of Finance, Department of Natural Resources and Environment, Cam Khe district People's Committee, Government of Tien Luong commune.	
		Disseminate information about policies, compensation plan, the draft of resettlement action plan.	Meetings, leaflets, consultation votes at all government levels, the affected households around the subproject area.	PMU coordinate with design consultancy unit, resettlement action plan consultancy unit.	Cam Khe district People's Committee, Tien Luong commune, Women's Union, Fatherland Front, Farmers' Union, Cadastral Division of commune/	Perform 2 times: to prepare and present a draft of resettlement action plan

No	Stage	Content	Form	Responsible unit	Receptive unit	Note
					precinct, 60 households in the project area.	
		Disseminate information about project, present the draft of ESIA and ESMP reports, gender plan, public health, communication, etc.	Meetings, leaflets, consultation votes at all government levels, the affected households around the subproject area	PMU coordinate with design consultancy unit, ESIA consultancy unit	Cam Khe district People's Committee, Tien Luong commune, Women's Union, Fatherland Front, Farmers' Union, Cadastral Division of commune/precinct, 60 households in the project area.	Perform 2 times: to prepare and present a draft of resettlement action plan.
		Compensation and resettlement	Organize meetings to disseminate information about measure, counting, compensation plan, post information in noticeboard of commune/precinct and village/ urban groups.	PMU coordinate with Compensation, Assistance and Resettlement Board	Tien Luong commune People's Committee, Women's Union, Fatherland Front, Farmers' Union, Cadastral Division of commune/precinct and 24 affected households.	Implement according to Resettlement Action Plan report.
No	Stage	Content	Form	Responsible unit	Receptive unit	Note
2	Construction and Operation	Gender Action Plan		PMU and Social Supervising	Tien Luong commune People's	Implement in 3 phases of the
		Public Health				

No	Stage	Content	Form	Responsible unit	Receptive unit	Note
		Management Plan	Meetings, leaflets, basic broadcasting, consultation votes at government at various levels, the affected households around the	Consultant	Committee Women's Union, Fatherland Front, Farmers' Union, Cadastral Division of commune/precinct and 60 affected households.	subproject.
		Social Management Plan				
		Environmental Management Plan	subproject area	PMU and Environmental Supervising Consultant	DONRE, Tien Luong commune People's Committee Women's Union, Fatherland Front, Farmers' Union, Health Station, Cadastral Division of commune/precinct and 60 affected households.	Implement in 3 phases of the subproject
		Public order and social evils			Tien Luong commune People's Committee Women's Union, Fatherland Front, Farmers' Union, Health Station, Cadastral Division and	
		Traffic Safety and Fire Prevention and Extinction		PMU and contractor		Construction Stage.



No	Stage	Content	Form	Responsible unit	Receptive unit	Note
					Police of commune/precinct .	

Monitoring Assessment: PMU make a monitoring report of communication plan and participatory public consultation to control communication content, synthesize feedback from the Supervising Consultant Unit, local government, social organizations, unions and citizens to supplement or amend policies and measures of the management plan to suit each stage of the subproject.

### Implementation Cost

The implementation cost of this plan is integrated with other plans (communication content and methods will be acquired and build by other plans. Social Management Plan chairs other plans related to social issue. Cost of this phase focuses primarily for broadcasting and organizations, the expected cost is 50,000 million (fifty million VND) in 18 months.

## Appendix B4- GENDER ACTION PLAN

From the above analyses of gender, a gender action plan is needed to facilitate the full participation of women in the project construction stage, providing new opportunities for women to boost their income, without increased burden on their lives, and contributing to the enhancement of women's role and status in the project area. The objectives of this plan include:

- (i) The local contractors will employ at least 30% of female workers in maintenance, construction and repair works;
- (ii) For a similar type of work, female workers should be paid as much as male workers;
- (iii) Safety conditions must be equal to both men and women;
- (iv) The local contractors will not use child labor;
- (v) The use of local labors is encouraged and the establishment of labor camps will be avoided;
- (vi) The Women's Group and Union will be consulted about the design of subprojects;
- (vii) Training on gender mainstreaming will be provided for national, provincial and local authorities (i.e. PMUs, and other stakeholders);
- (viii) Training and capacity building is provided for women to engage in public decision-making and sub-projects in a way that makes the most sense (i.e. training in participation, negotiation skills, marketing skills, mathematics and literacy);
- (ix) The involvement of women in project study tours is ensured.
- (x) The agricultural extension services aimed at women are designed and delivered to women;
- (xi) The awareness enhancement campaign on HIV/AIDS will be launched before the start of civil works. PMU is responsible for monitoring and reporting of GAP key performance indicators, including the participation of women, target works and trainings, and HIV prevention campaigns;
- (xii) At least one woman shall be involved in the Supervision Board of a commune (about 1/3 of the members).

### THE PROJECT'S GENDER ACTION PLAN

Achievements	Tasks and Indicators	People in charge	Period
<b>Achievement 1: Improvement of dam safety and irrigating conditions.</b>	<p>The contractors shall prioritize unskilled labor (through subcontracting); at least 30% of the total labor force is local unskilled ones.</p> <p>Among this 30% local labor, female workers shall be prioritized; Male and female labor will receive the same wages for the same type of work;</p> <p>The Contractors shall not employ children;</p> <p>Those locals wish to work for the project shall register at their villages/hamlets. Then, these</p>	<p>PMU/Project Coordinator shall ensure the record of these terms in the Contract; the list of registered labor shall be submitted by communal officials the Contractor;</p> <p>Communal officials shall ensure the achievement of the targeted objectives.</p> <p>The communal women group shall ensure the involvement of local female workers in the Project.</p>	During construction stage

<b>Achievements</b>	<b>Tasks and Indicators</b>	<b>People in charge</b>	<b>Period</b>
	registrations shall be provided by the Head of the villages and communes to the Contractors for selection in favor of poor and vulnerable households.		
<b>Achievement 2: Enhancement of people's capacity to make advantages of the Project</b>	At least 30% of women shall participate in agricultural extension courses.	Staff of Provincial PMU, District staff, Communal staff.	During construction stage
<b>Achievement 3: Enhancement of awareness on potential social evils of vulnerable objects, especially women and ethnic minorities</b>	<p>Programmer on HIV/AIDS and human trafficking.</p> <p>Programmer on community-based risk mitigation.</p> <p>Information about risk mitigation will be transferred to the communes and villages affected by the Project using the participatory approach with a focus on the poor and vulnerable households (e.g. ethnic groups, households headed by women, households with elderly and disabled people).</p> <p>The documents and information should be appropriate in terms of language, culture and gender, and especially translated into ethnic languages in the region;</p> <p>Women's Union, the representative of Centre for HIV/AIDS prevention and communal staff shall give training to communicators in each commune/village in the project area.</p> <p>The programs will be implemented at the communes and villages by two communicators (village chief and one member of the Women's Union).</p> <p>The program will be implemented in the villages and on market-days through distribution of</p>	<p>The Provincial and Communal Women's Union shall organize and host the program (training and preparation of materials) in collaboration with the district/communal health center.</p> <p>The Village's Women's Union shall popularize and communicate information.</p> <p>The district/communal Health Centres shall support the communal Women's Union.</p> <p>Project coordinator shall provide local and international gender experts and specialists on Ethnic Minorities.</p> <p>Gender experts and specialists on EM shall review existing materials and supplement the required ones for the Program.</p>	Monthly, before and during construction stage

Achievements	Tasks and Indicators	People in charge	Period
	project/program materials and use of loudspeakers		
	<p><b>Program on risk mitigation during project construction stage:</b></p> <p>PMU and the contractor will coordinate closely with the health services in communes and districts to implement programs on awareness enhancement and education on disease prevention, diagnosis and treatment for laborers.</p> <p>All programs and documents are built with integration of gender issues, including vulnerability and needs of men and women.</p> <p>The Contractor shall:</p> <p>Implement awareness enhancement programs workers and communities, including education and communication on HIV infection and preventive measures.</p> <p>Provide free consulting services and encourage employees to do HIV tests so that they all know about their health status.</p> <p>Support the access to health services and encourage HIV-infected patients to admit their status;</p> <p>Provide medical equipment (free condoms) for workers in the camps;</p>	<p>PMU</p> <p>The Contractor</p> <p>Local Health Centre</p> <p>Communal staff</p> <p>The Women's Union shall perform general coordination for better HIV prevention.</p>	During construction stage.
<b>Project Management</b>	<p>Guidelines on Gender and Development and Education shall be provided for PMU staff, local agencies and Contractors.</p> <p>All capacity enhancement activities shall include the involvement of women and ethnic minorities.</p>	<p>- Project implementation consultant</p> <p>- PPMU</p>	During design and initial implementation stages

## **Appendix B5- GRIEVANCE REDRESS MECHANISM**

Complaints relating to any matter of the Project will be settled through negotiations aimed at achieving consensus. The complaint will pass through three stages before it can be filed to the court. The Enforcement Body will incur all administrative and legal fees relating to complaint handling.

**The first stage in the Communal People's Committee:** Households affected can file their complaints to any member of the CPC, possibly through the village chief or directly to the CPC in writing. The mission of the CPC officials or village chief is informing the entire CPC the complaint. Then, the CPC will hold a private meeting with the households affected. The duration of first-time settlement of complaints shall not exceed 5 days from the date of receipt of the complaint (In remote regions that have a difficult to travelling, the time limit for complaint settlement is no more than 15 days). The CPC secretary shall be responsible for compiling and achieving documentation that they are handling.

When the CPC issues a decision, households may appeal within 30 days. If the second decision has been issued but the household still not satisfied with the decision, they may appeal to the People's Court or the District People's Committee.

**The second stage in the District People's Committee:** When DPC receives a complaint from the household, the DPC will have 15 days (or 30 days for remote and mountains areas) after receiving a complaint. DPC have responsibility for filing and storing documents on all complaints that it handles.

When DPC issue a decision, households may appeal within 30 days. If the second decision has been issued but the household still not satisfied with the decision, they may appeal to the provincial authority.

**The third stage in the Provincial People's Committee:** When PPC receives a complaint from the household, the provincial authority will have 30 days (or 45 days for remote and mountains areas) after receiving a complaint. Provincial authorities have responsibility for the compiling and achieving documentation of all complaints that are submitted.

When the provincial authority issued a decision, households may appeal within 45 days. If the second decision has already been issued and the household still not satisfied with the decision, they may appeal to the court within 45 days. Provincial agency then have to pay compensation paid to an account.

The final stage, the provincial court. If the complaint submits to court and the court make a decision with the truth belongs to the complainant, the provincial government will have to increase the amount of compensation to the extent that the court decides. In case of the court sided with the provincial authority, the complainant will receive a sum of money that they has been paid to the court.

To ensure that the appeal mechanism described above is practical and acceptable to the PAP, the mechanism has been consulted with governments and local communities, taking into account the specific culture as well as the traditional cultural mechanisms to address and resolve complaints and disputes. The objects and efforts of the national community are needed to recognize and identify to find the solutions that are acceptable in cultural aspect.

## Appendix B6 - INFORMATION DISCLOSURE, ACCOUNTABILITY AND MONITORING

**Table annex B6.1: Arrangement implementing EMP**

Organization	Role and responsibility		
	Subproject's preparation	Subproject's construction	Subproject's operation
CPO	Guiding the policy safety staffs of Project Management Board of province during the period for preparing Environmental and Social Impact Monitoring Report Review and contribute the ideas for report submitted by Provincial Project Management Board	Guiding the staffs of provincial Project Management Board in performing Environmental management plan during the construction period; Supervising the progress of project during construction phase; Assembling 6months report on environment from provincial Project Management Board;	Guiding the policy safety staffs of Provincial Project Management Board in Environmental management plan in the first operation year; Supervising the progress of project during the first operation year; Assembling Reports on environment from Provincial Project Management Board;
Provincial People's Committee	n/a	Project Owner has highest responsibility on environmental activities during construction time;	Project Owner has highest responsibility on environmental activities in term of the performance of EMP during operation period ,
Provincial Project Management Board	Hiring consultant and take the general responsibility on preparation ESIA and submit for approval; Guarantee the officers must be trained completely in environmental issues;	Taking the responsibility on implementing (EMP) in pre-construction and construction periods; Guarantee the detail of contract and bidding documents including environmental requirements; Conducting the investigation and supervision environmental issues during construction time; Coordinating Environmental Monitoring Report to CPO;	Taking the responsibility on implementing (EMP) in the first operation year; Conducting the investigation and supervision environmental issues in the first operation year; Assist project owner in giving out environmental requirements in operation procedure and maintenance project;

Organization	Role and responsibility		
	Subproject's preparation	Subproject's construction	Subproject's operation
District People's Committee	Approve Environmental protection Commitment (CEPs) of subproject in accordance with legal regulations of Vietnam Government;	Supervising the implementation of EMP via their internal supervision system;	Supervising the implementation of EMP via their internal supervision system;
Community Supervision Board and the other members of local community (CSBs <sup>1</sup> )	Participating in consultation activities and determination, preparation for subproject; Ability to contribute the ideas to environmental assessment document when it has been introduced to them;	Participating in environmental supervision activities according to the laws of Vietnam and joint in training courses.	Participating in environmental supervision activities according to the laws of Vietnam and joint in training courses.
Construction Supervision Consultant	n/a	Undertaking training courses on environment for Supervision consultant staffs Participating in environment supervision according to approved ESMP in ESIA Preparing monitoring report and submit to Provincial Project management Board	n/a
Construction Contractor	n/a	Preparing the detailed plan on environment monitoring on the field to meet EMP requirements of subproject; Apportion sources sufficiently to meet	n/a

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<sup>1</sup> CSBs, has been established according to Decision 80/2005/QĐ-TTg dated 18/04/2005 of Prime Minister on promulgating investment supervision regulation of community. Item 8 of Decree 80/2006/NĐ-CP provides for community monitoring chance the conformity, implementation supervision and investment result assessment in commune including environmental impacts.



<b>Organization</b>	<b>Role and responsibility</b>		
	<b>Subproject's preparation</b>	<b>Subproject's construction</b>	<b>Subproject's operation</b>
		compulsory requirements and regulations of EMP on the field;	

**Table annex B6.2: Environmental Supervision Plan**

Mitigation measures	Parameters	Location	Method	Frequency	Responsibility	Expenses
<b>Pre-construction period</b>						
Implementing Resettlement Action plan	The number of affected households has been compensated Complaint arising relating to compensation and benefit	Affected area	Observation	Monthly or having the complaint from affected households	Provincial Project Management Board	A part of RAP expenses
<b>Construction period</b>						
1.1. Control water quality	Turbidity Measuring the volume of oil, odor and other waste water. Rubbish on the flow	Ban reservoir and other flow near construction site	Observation, interview	Weekly after heavy rain or when having the feedback of local people	Contractor	Involved in contract
1.2 Minimizing dust arising	The number of concentrated dust	At the nearest residential area 2, 3 and 4 Construction area	Survey, interview	Monthly or when having the feedback of local people	Contractor	Involved in execution contract
1.3 Minimizing noise arising	Noise level	- At the nearest residential area 2, 3 and 4 Construction area	Survey, interview	Monthly or when having the feedback of local people	Contractor	Involved in execution contract
1.4 Traffic safety	The number of accident and accident reason The slow traffic time that affected by construction	- The road near residential area	Survey	Weekly or when having the feedback of local people	The local road management agency	Involved in execution contract Local budget
1.5. Solid waste	Clean level of tents	Worker's tent	Observe	Monthly or when	Contractor	Involved in constructio

Mitigation measures	Parameters	Location	Method	Frequency	Responsibility	Expenses
management	The volume of rubbish			having the feedback of local people		n contract
1.6 Asset management	Complaint of local people relating to construction activities of workers	Worker's tent The residential area near construction site/tents	Survey, interview	Weekly	Contractor	Involved in construction contract
1.7. The health and safety of local residents	The number of labor accident at construction site The number of work postponed due to accident or disease	Construction site; Construction site near residential area (Hamlet 2, 3 and Hamlet 4, where having material transport lorries go through)	Observe and interview	Monthly	Contractor	Involved in construction contract
1.8. Construction rubbish management	The volume of digged soil The volume of reused digged soil The volume of digged soil has been moved to dumping yard The amount of material and other waste from construction site Rubbish from worker's tents	Construction site Worker's tent Dumping yard	Survey or interview	Monthly or when having the feedback of local people	Contractor	Involved in construction contract
<b>Operation period</b>						
2.1 Risks on dam	The leakage points of dam The number of dam	Whole dam	Observe and interview	6 months/time	Operation management unit	State's budget

<b>Mitigation measures</b>	<b>Parameters</b>	<b>Location</b>	<b>Method</b>	<b>Frequency</b>	<b>Responsibility</b>	<b>Expenses</b>
	break/overflow					
2.2 Landslide in flood season	Number of landslide point Frequency of landslide	Whole dam	Observe and interview	Monthly or when having the feedback of local people	Operation management unit	State's budget

**Table annex B6.3: Monitoring and Reporting system**

<b>Project's Phase</b>	<b>Type of report</b>	<b>Frequency</b>	<b>Responsibility</b>	<b>Agency receives report</b>
Execution	Report on implementing ESMP presents environmental activities on the field complies rightly with ESMP and supervision results	Monthly	Construction contractor	
	Report on ESMP implementation of Construction Supervision Consultant present clearly activities comply rightly with ESMP and supervision results. The report includes (i) the main impacts during construction period (ii) propose the measures to minimize adverse impacts (iii) Assessment the result of performance measures to minimize adverse impacts to environment and social of construction contractor (iv) The results of problem solving and measure to overcome shortcomings from last report; (v) Proposing activities for minimizing environmental for the next construction period	Monthly	Construction Supervision Consultant	Project Management Board
	Report on environmental activities of subproject present clearly activities comply rightly with ESMP and supervision result	6 months/time	Provincial Project Management Board	CPO and WB
	The subproject's environmental report presents all environmental activities and conformity to ESMP	When the subproject finished	CPO	WB / MONRE
	Independent monitoring report on Environmental and Social Safety states the following contents: (i) Supervision result of construction scene; (ii) Community based Supervision result; (iii) Synthesis supervision results of execution supervision consultant; (iv) Result of environment monitoring and (v) Assessment results implementing ESMP and recommendation.	6 months/time or 3 months/time	Independent Environmental Consultant	Subproject Management Board and WB

<b>Project's Phase</b>	<b>Type of report</b>	<b>Frequency</b>	<b>Responsibility</b>	<b>Agency receives report</b>
Operation	Implementation report ESMP: Present clearly activities conform to commitment on ESMP of subproject during operation time	6 months/time in the first 02 operation years	People's Committee of Cam Khe district	CPO and WB