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MINISTRY OF INDUSTRY AND TRADE

THE WORLD BANK

**RENEWABLE ENERGY DEVELOPMENT PROGRAM**

**Credit code: IDA Cr.4564-VN**

**ENVIRONMENTAL MANAGEMENT PLAN**

**SON TAY SMALL HYDRO POWER PROJECT  
QUANG NGAI PROVINCE**

*Quang Ngai, July 2015*

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## **ABBREVIATIONS**

MONRE	Ministry of Natural Resource and Environment
DSP	Dam Safety Panel
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESF	Environmental Safeguard Framework
GDoE	General Department of Energy
MOIT	Ministry of Industrial and Trade
REDP	Renewable Energy Development Project
SHB	Saigon Hanoi Commercial Bank
SHP	Small Hydropower Project
TCVN	Vietnam Standard
PPC	Provincial People's Committee
PMU	Project Management Unit
VCB	Joint stock commercial Bank for Foreign Trade of Vietnam
WB	World Bank

**SCREENING OF SAFEGUAR POLICIES FOR SUBPROJECT UNDER REDP**

**TABLE A. SON TAY HYDRO POWER PROJECT SCOPING CHECKLIST**

ISSUE	RELEVANT?	OUTCOME
Is the subproject located in or near a national park or other government designated protected area?	No	
If a dam, is the subproject more than 15 m in height?	Yes ✓	DSP has reviewed
If a dam, is the subproject more than 3 million cubic meters in capacity?	Yes ✓	DSP has reviewed
Will the subproject result in change of land use and resettlement of affected people?	Yes ✓	<ul style="list-style-type: none"> <li>- Project acquired agricultural and residential land and need to resettle people;</li> <li>- Resettlement plan has been made</li> </ul>
Do ethnic minorities live or use the area affected by the project?	Yes ✓	Ethnic plan has been made.
Will the subproject affect physical or cultural resources that may be significant?	No	
Is the subproject situated on or near to an international waterway?	No	<p>Son Tay Hydropower Project is located on the territory of the river Dakrinh belong to Son Mua, Son Tan and Son Dung Communes, Son Tay District, Quang Ngai province. Dakrinh River is the main line of the river upstream Dakrinh - Tra Khuc, derived from the high mountains of the neighboring provinces of Kon Tum and the southern of Quang Nam bordering with Minh</p>

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ISSUE	RELEVANT?	OUTCOME
		<p>Long district, Quang Ngai province. Tra Khuc River originates from the peaks of the Truong Son Mountains with an altitude of about 1000 - 1500 m. Tra Khuc River is composed by three main branches: Dakrinh, Dak Selo and Re rivers.</p> <p>Therefore, the policy of international waterway is not applicable to this project.</p>
<p>Has an EIA been completed?</p>	<p>Yes ✓</p>	<p>EIA was approved by Quang Ngai PPC by Decision No. 1226/QD-UBND dated 24<sup>th</sup> July 2015.</p>
<p>Have all Approvals from Quang Ngai Province's People's Committee been obtained?</p>	<p>Yes ✓</p>	
<p>Has public consultation of those people potentially affected by the subproject been undertaken?</p>	<p>Yes ✓</p>	<p>Consultation meetings were held by investor with participants from representatives of affected households and local authorities of Son Mua, Son Tan and Son Dung commune, Son Tay district, Quang Ngai province.</p>
<p>Has an environmental management plan been completed?</p>	<p>Yes ✓</p>	
<p>Will the subproject affect downstream flows, ecology and those living downstream?</p>	<p>Yes ✓</p>	<p>Consideration was taken during preparation of EMP</p>
<p>Have construction impacts been</p>	<p>Yes ✓</p>	<p>Consideration was taken during</p>

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<b>ISSUE</b>	<b>RELEVANT?</b>	<b>OUTCOME</b>
fully mitigated?		preparation of EMP
Will the subproject result in construction of new access roads and how will access be managed?	Yes ✓	Consideration was taken during preparation of EMP
Will the subproject result in construction of a new transmission line?	Yes ✓	Consideration was taken during preparation of EMP

**TABLE B: SON TAY HYDRO POWER PROJECT  
PRESCREENING DOCUMENT CHECKLIST**

<b>DOCUMENT</b>	<b>INCLUDED?</b>
Feasibility Study	Yes ✓
Approved EIA	Yes ✓
Environmental Management Plan	Yes ✓
Resettlement Plan	Yes ✓
EIA Approvals from Quang Ngai PPC	Yes ✓
Dam safety review by Dam Safety Panel	Yes ✓
Other approvals: if required	Yes ✓

**TABLE C. SCREENING OF WB'S SAFEGUARD POLICIES**

**Environmental Assessment (OP/BP 4.01):** potential environmental impacts of the subproject includes those relevant to land acquisition and construction activities; those relevant to conversing land to reservoir and changing flows in downstream environment; impacts at downstream on water quality and aquatic bio-diversity; those relevant to finding, collecting, transporting and storing biomass fuel; land using contradict biomass production or reservoir construction; and those in operation phase such as noise and waste management. These impacts can increase cumulative effects of the rapid development such as upstream and downstream hydropower and environmental flows. However, these impacts are mitigative.

ENVIRONMENTAL SAFEGUARD SCREENING CRITERIA	APPLIES, YES OR NO (tick ✓)	
<b>OP/BP 4.04: Natural Habitats</b>  <i>Natural habitats are defined as land and water areas where the ecosystems' biological communities are formed largely by native plant and animal species, and human activity has not essentially modified the area's primary ecological functions</i>		
1. Is the subproject located within any National Biological Conservation Areas, (NBCAs), National/Provincial/District Protected Areas (NPAS, PPAs, DPAs)? (If yes, subproject is excluded)	Yes <input type="checkbox"/>	No ✓
2. Will the subproject result in significant degradation or conversion of habitats and/or forests in protected areas, proposed protected areas or areas that are considered of special ecological significance? If yes, what is the consequence? (If yes, subproject is excluded)	Yes <input type="checkbox"/>	No ✓
3. Will the subproject aim to bring about changes to the management, protection, or utilization of natural forests or plantations, whether they are publicly, privately, or communally owned? (If yes, subproject is excluded)	Yes <input type="checkbox"/>	No ✓
4. In the case of a biomass subproject, will the subproject undertake commercial harvesting of forests (e.g., for fuel for biomass plant)?  (If yes, subproject is excluded)	Yes <input type="checkbox"/>	No ✓

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5. Is the subproject located within the buffer zone of any National Biological Conservation Areas, (NBCAs), National/Provincial/District Protected Areas (NPAS, PPAs, DPAs)? (if yes, subproject is eligible but requires permit)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
6. Will the subproject affect a forested area? (If yes, subproject is eligible but requires permit of the owner or of the district's People's Committee).	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Based on the above screening, does OP/BP 4.04 apply?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
If the answer to any of Questions 1-4 is YES, OP/BP 4.04 will apply and the subproject is NOT ELIGIBLE for refinancing.		

\* The Project will acquire permanently 37.52 ha land, in which, it is about 28.2 ha of production forest land.

ENVIRONMENTAL SAFEGUARD SCREENING CRITERIA	APPLIES, YES OR NO (tick ✓)	
<b>OP/BP 4.10: Ethnic Minorities (Indigenous People)</b>		
Are ethnic minority people present/reside in the project area?*	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
The project has prepared the Ethnic Action Plan		

ENVIRONMENTAL SAFEGUARD SCREENING CRITERIA	APPLIES, YES OR NO (tick ✓)	
<b>OP/BP 4.11: Physical Cultural Resources</b> <i>Physical cultural resources include movable or immovable objects, sites, and structures, groups of structures, natural features and landscapes that have archeological, paleontological, historical, architectural, religious, aesthetic or other cultural significance.</i>		
Will the subproject cause temporary or permanent relocation or any other type of impact on physical	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>

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cultural resources known to be of local, regional or national significance based on national or Provincial lists, proposed national or Provincial lists and/or identified during public consultation with local affected groups?		
Are any physical cultural resources considered especially important or sensitive particularly to local groups (e.g. tomb sites)?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Are chance find procedures in place?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Based on the above screening, does the physical Cultural Resources Apply?		NO <input checked="" type="checkbox"/>

<b>ENVIRONMENTAL SAFEGUARD SCREENING CRITERIA</b>	<b>APPLIES, YES OR NO</b> (tick ✓)	
<b>OP/BP 4.12 Involuntary Resettlement</b>		
<i>The Involuntary Resettlement safeguard will apply in those situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts</i>		
1. Is any land used by people/organizations likely to be acquired as a result of the subproject?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
2. Will any subproject activity involve restrictions of use on adjoining land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
3. Is land ownership affected by the subproject?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
4. Will there be a loss of housing or assets or incomes of local people/organizations?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
5. Will there be a loss of housing ?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
6. Will there be a loss of crops, trees, and other fixed assets?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
7. Will there be a loss of incomes and livelihoods?	Yes	No

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	✓	□
8. Will there be a loss of infrastructure, services and resources?	YES □	NO ✓
9. Will there be a loss of job or business?	YES □	NO ✓
10. Will any social or economic activities be affected by land use related changes?	Yes ✓	No □
11. Will there be a loss of common land, grazing land, fishing area of local community?	YES ✓	No □
12. Will there be a loss of medical stations, cemeteries, pagodas, community center or local traffic roads?	YES □	NO ✓
13. Will local people's access to drinking water source, water supply system, internal roads, power source and other energy sources be affected?	YES □	NO ✓
14. Based on the above screening, does OP/BP 4.12 Apply and is a Resettlement Plan required?*	Yes ✓	No □

*\*The Resettlement plan was prepared.*

<b>ENVIRONMENTAL SAFEGUARD SCREENING CRITERIA</b>	<b>APPLIES, YES OR NO (tick ✓)</b>	
<b>OP/BP 4.37 Dam Safety Policy</b>		
1. Is the dam height is 15 meters or greater?	Yes ✓	No
2. Is dam storage 3 million cubic meter or more?	Yes ✓	No
3. The dam height is between 10 and 15 meters but the dam presents special complexities (for example large flood-handling requirement, location in a zone of high seismicity, foundations that are complex and difficult to prepare, or retention of toxic materials)?	Yes	No ✓
4. Is the dam is expected to become a large dam during the operation of the facility?	Yes □	No ✓
5. Based on the above screening is the REDP subproject	Yes	No

considered to be a large dam and will a Dam Safety Assessment be required?	✓	
<b>ENVIRONMENTAL SAFEGUARD SCREENING CRITERIA</b>	<b>APPLIES, YES OR NO (tick ✓)</b>	

<b>OP/BP 7.50 Projects on International Waterways</b>		
<i>The objective of OP/BP 7.50 is to ensure that World Bank-financed projects affecting international waterways would not affect relations between the World Bank and its Borrowers and between states and also not affect the efficient utilization and protection of international waterways. It applies to projects that involve the use and/or potential pollution of international waterways. OP/BP 7.50 does not apply to run of the river projects.</i>		
Is the subproject the first subproject downstream of a river that flows from another country?	YES	NO ✓
Is the proposed subproject the last project on a river that flows into another country?	YES	NO ✓
Will the subproject utilize water from or into a river or river tributary that flows to or through or forms a border with a neighboring country?	YES	NO ✓
Will the subproject discharge water from or into a river or river tributary that flows to or through or forms a border with a neighboring country?	YES	NO ✓
If a biomass subproject, does the subproject utilize or discharge water from, or into a river or river tributary that flows to a neighboring country, or that forms a boundary with a neighboring country.	YES	NO ✓

*Son Tay Hydropower Project is located on the territory of the river Dakdrinh season belonging to Son Mua, Son Tan and Son Dung communes, Son Tay district, Quang Ngai province. Dakrinh River is on the main line of the upstream of Dakdrinh River - Tra Khuc, derived from the high mountains of the neighboring locals, Kon Tum, Quang Nam and southern borders with Minh Long district, Quang Ngai province. Tra Khuc River originates from the peaks of the Truong Son Mountains with an altitude of about 1000 - 1500 m. Tra Khuc River is composed by three main branches: Dakdrinh, Dak Re Selo and rivers. Therefore, the policy of international waterway are not applicable to this project.*

<b>Overall Safeguard Compliance</b> Does the subproject comply with the aforementioned World Bank Safeguards?	YES	✓
	NO	<input type="checkbox"/>

**Conclusion:** potential environmental impacts of the subproject includes those relevant to land acquisition and construction activities; those relevant to conversing land to reservoir and changing flows in downstream environment; impacts at downstream on water quality and aquatic bio-diversity; those relevant to finding, collecting, transporting and storing biomass fuel; land using contradict biomass production or reservoir construction; and those in operation phase such as noise and waste management. These impacts can increase cumulative effects of the rapid development such as upstream and downstream hydropower and environmental flows. However, these impacts are mitigative. Therefore, Son Tay Hydro Power project is categorized B level of WB environmental safeguard policy.

**TABLE D: ENVIRONMENTAL CONCERNS AND EMP REQUIREMENTS**

Issue or Environmental Concern (Note: Social issues and concerns are dealt elsewhere)	Is Issue or Concern Addressed in EIA? Yes or No (tick ✓)		Is Issue or Concern Addressed in EMP? Yes or No (tick ✓)		Required Action or Follow-up
	YES	NO	YES	NO	YES
Air quality impacts on local communities?	✓		✓		✓
Noise?	✓		✓		✓
Dust?	✓		✓		✓
Is in a Seismically Active or Geotechnical Unstable Area?		✓		✓	
Affects Integrity of Protected Areas?		✓		✓	
Impacts on Migratory, Rare, Threatened or Endangered Species?		✓		✓	
Impacts on Biodiversity?	✓		✓		
Considers Downstream Impacts?	✓		✓		✓
Affect Environmental Flows?		✓		✓	
Affect Downstream Water Quality?	✓		✓		

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<b>Issue or Environmental Concern</b> (Note: Social issues and concerns are dealt elsewhere)	<b>Is Issue or Concern Addressed in EIA? Yes or No</b> (tick ✓)		<b>Is Issue or Concern Addressed in EMP? Yes or No</b> (tick ✓)		<b>Required Action or Follow-up</b>
	YES	NO	YES	NO	
Affects Fish or Fisheries?	✓		✓		
Considers Off-site Impacts (e.g. Borrow Pits and Aggregates)?	✓		✓		✓
Aesthetic and Visual Impacts?		✓		✓	
Impacts Cultural Property or Resources?		✓		✓	✓
Causes Increased Erosion and Sedimentation During Construction?	✓		✓		✓
Involves Construction of New Access Roads?	✓		✓		✓
Involves Construction of Worker Camp(s)?	✓		✓		✓
Has Chance Find Procedures In Place for Physical and Cultural Resources?		✓	✓		
Has Waste Management Plan (Solid and	✓		✓		✓

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<b>Issue or Environmental Concern</b> (Note: Social issues and concerns are dealt elsewhere)	<b>Is Issue or Concern Addressed in EIA? Yes or No</b> (tick ✓)		<b>Is Issue or Concern Addressed in EMP? Yes or No</b> (tick ✓)		<b>Required Action or Follow-up</b>
	YES	NO	YES	NO	YES
Liquid Wastes) in Place?					
Is there a Reclamation Plan In Place?	✓		✓		✓
Have Subproject Contingency and Notification Plan in case of Accident or Event (e.g. Release)?	✓		✓		✓
Has Included EMP and Environmental Protection Measures as Part of Contract Provisions?	✓		✓		✓
Has EMP Monitoring and Supervision Procedures in Place?	✓		✓		✓
Includes Costs and Timeline for EMP?	✓		✓		✓
Are there any other issues of concern about the subproject that is listed in the EIA over and above the aforementioned issues that should be addressed?		✓		✓	

## **1. INTRODUCTION**

### **1.1. Project background**

Son Tay Hydropower Project is built on the river Dakdrinh administrative position of Son Mua, Son Tan and Son Dung communes, Son Tay district, Quang Ngai Province by Quang Ngai SOVICO Energy Company Limited as an investor.

Dakdrinh River is the first level tributary of Tra Khuc River, flows in the southwest - northeast, with major slope, the whole terrain is hilly, covered with vegetation mainly forest regeneration. This is a hydroelectric projects exploiting the natural flow of the river Dakdrinh, external power output of about 65.02 million KWh/year connected to the system of national power grid and supply directly to the mountainous area of Son Tay district.

Son Tay Hydropower project is 3km away from Son Tay district, is about 60km skyway from the west of Quang Ngai City, near the traffic road and dam area coordinates 108°21'39 "east longitude, 15°00'33" north latitude. In the north of project are Tra Vinh and Son Bao communes, Tra Bong and Son Tay districts, and in the south of project are Son Dung and Son Tan communes, Son Tay district, and in the east of project is Son Ha district, and in the west of project is Kon Tum province. It is possible to come to main construction site following the NH1 from Quang Ngai City to Son Tinh Town, and then to provincial road 623 through Son Ha Town to Son Tay Town.

Son Tay Hydropower with an installed capacity of 18 MW, yearly average power output of approximately 72.85 million KWh, is the kind of diversion hydropower plants with reservoirs to regulate. Cluster head construction including concrete gravity dam rising 211.64 m long and 3 m wide, 120 m wide spillway. Online channels BxH = 3x3,3m border area, length L = 3715,6m water. The catchment area of 186 km<sup>2</sup>, the entire capacity of 535,000 m<sup>3</sup>. Design flow through the mill of 22.2 m<sup>3</sup> / s, calculate the water column 97.1 m high.

Son Tay Hydropower Project, belongs to the small hydropower planning of Quang Ngai province has been approved by PPC in Decision No. 2848/QD-UBND dated 07/12/2007. Quang Ngai province has also approved investment policy of Son Tay Hydropower in Document No. 1283/UBND-CNXD 9/5/2008.

### **1.2. Project Donor and Participating Bank**

Son Tay small hydropower plan project expects to be refinanced from REDP funded by WB through the Joint Stock Commercial Bank for Foreign Trade of Vietnam (VCB), Quang Ngai branch.

### **1.3. Project objectives**

The main objective of subproject is to exploit effectively the water resource and natural topographical features of the local area to produce electricity with its annual average power generation up to 72.85 million kWh. It supports to increase power generation of the national power system, it helps to meet local electrical power demand and to improve the local budget.

The project also brings great significance to improve infrastructure, life quality for the local people in the remote area of Son Tay district, Quang Ngai province that is facing many difficulties due to its poor infrastructure and backward customs.

#### **1.4. Project management & EMP implementation**

Investor: SOVICO Quang Ngai Energy one member CO., Ltd

Feasibility Study consultant: Power No. 1 Consultant JSC (PECC 1)

The investor assigned for SOVICO Quang Ngai Energy one member CO., Ltd to manage and supervise the project implementation. An environmental and social staff has been assigned by project management unit to manage all projects' environmental activities.

According to the WB regulations, investor is responsible for preparing and complying to EMP. The environmental consultant supports investor to prepare EMP following ESF under REDP which was approved by MOIT and no objection by WB.

According to the Vietnamese regulations, the reservoir's gross storage corresponding to the normal water 535,000 m<sup>3</sup> so the Environmental Impact Assessment Report was prepared by investor and it was approved by Quang Ngai PPC by the decision No. 1226/QD-UBND dated 24/7/2015.

#### **1.5. Legal documents of Vietnam Government on EIA**

##### ***Government legal framework***

- The Law on Land approved by National Assembly of the Socialist Republic of Vietnam dated 29/11/2013
- Law on Water resources passed on June 21, 2012, by the 13th National Assembly of the Socialist Republic of Vietnam at its 3rd session
- The Law on Environmental Protection approved by the National Assembly of the Socialist Republic of Vietnam dated 23<sup>rd</sup> June, 2014
- The Law on Forest Protection and Development approved by the National Assembly of the Socialist Republic of Vietnam dated 3/12/2004
- The Law of Construction approved by the National Assembly of the Socialist Republic of Vietnam dated 18/6/2014
- The Electricity Law approved by the National Assembly of the Socialist Republic of Vietnam dated 03/12/2004
- The law on amendment and supplement some articles of Electricity law approved by the National Assembly of the Socialist Republic of Vietnam dated 20/12/2012
- The law on amendment some articles of Law of Construction approved by the National Assembly of the Socialist Republic of Vietnam dated 19/6/2009
- Decree No. 106/2005/ND-CP date 17/08/2005 regulation on detailing and

guiding the implementation of a number of articles of the electricity law on protection of safety of high-voltage power grid works

- Decree No. 18/ND-CP date 14/2/2015 on the regulation of environmental protection plans, strategic environmental assessment, environmental impact assessment and environment protection plan
- Decree No. 23/2006/ND-CP date 3/3/2004 on the implementation of the law on forest protection and development
- Decree No. 21/2008/ND-CP dated 28/02/2008 on amendment and supplement some articles of Decree No. 80/2006/ND-CP dated 09/08/2006
- Circular No.27/2015/TT-BTNMT dated 29<sup>th</sup> May, 2015 of the Ministry of Natural Resources and Environment, on strategic environmental assessment, environmental impact assessment and environmental protection plan.
- Decision No. 186/2006/QD-TTg dated 14/8/2006 of Prime Minister to approve the Forest Management Regulation
- Decision No. 2848/QD-UBND dated 07/12/2007 of Quang Ngai PPC to approve the master plan of small hydropower plants in Quang Ngai province
- Letter No. 8716/BCT-TCNL dated 2/9/2011 of the MOIT to approve the amendment of small hydropower plants master plan in Quang Ngai province
- Decision No. 4404/QD-BCT dated 03/8/2012 of the MOIT to approve the master plan of electricity development in Quang Ngai for period 2011 - 2025
- Letter No. 73/UBND-CNXD dated 08/01/2014 of Quang Ngai PPC's chairman about the forest plant when change the purpose of land using
- Letter No. 4064/UBND-CNXD dated 11/9/2014 of Quang Ngai PPC's chairman about the management of construction investment and operation of hydro power plants.

***Technical standards***

- QCVN 05:2013/BTNMT - National technical regulation for ambient air quality.
- QCVN 40:2011/BTNMT - National technical regulation on industrial wastewater quality
- QCVN 26:2010/BTNMT - National technical regulation on noise
- QCVN 27:2010/BTNMT - National technical regulation on vibration
- QCVN 19: 2009/BTNMT - National Technical Regulation on Industrial Emission of Inorganic Substances and Dusts.
- QCVN 02 : 2009/BYT- National technical regulation on domestic water

quality.

- QCVN 03:2008/BTNMT - National technical regulation on the allowable limits of heavy metals in the soils.
- QCVN 08:2008/BTNMT - National technical regulation on surface water quality.
- QCVN 09:2008/BTNMT - National technical regulation on underground water quality.
- QCVN 14:2008/BTNMT - National technical regulation on domestic wastewater quality.
- QCVN 02:2008/BCT - National technical regulation on safety in the storage, transportation, use and disposal of industrial explosive materials
- TCXDVN 33:2006 Water supply - Distribution System and Facilities Design Standard
- World Bank Group Guidelines on Environment, Health and Safety.

## **2. PROJECT DESCRIPTION**

### **2.1. Location of project**

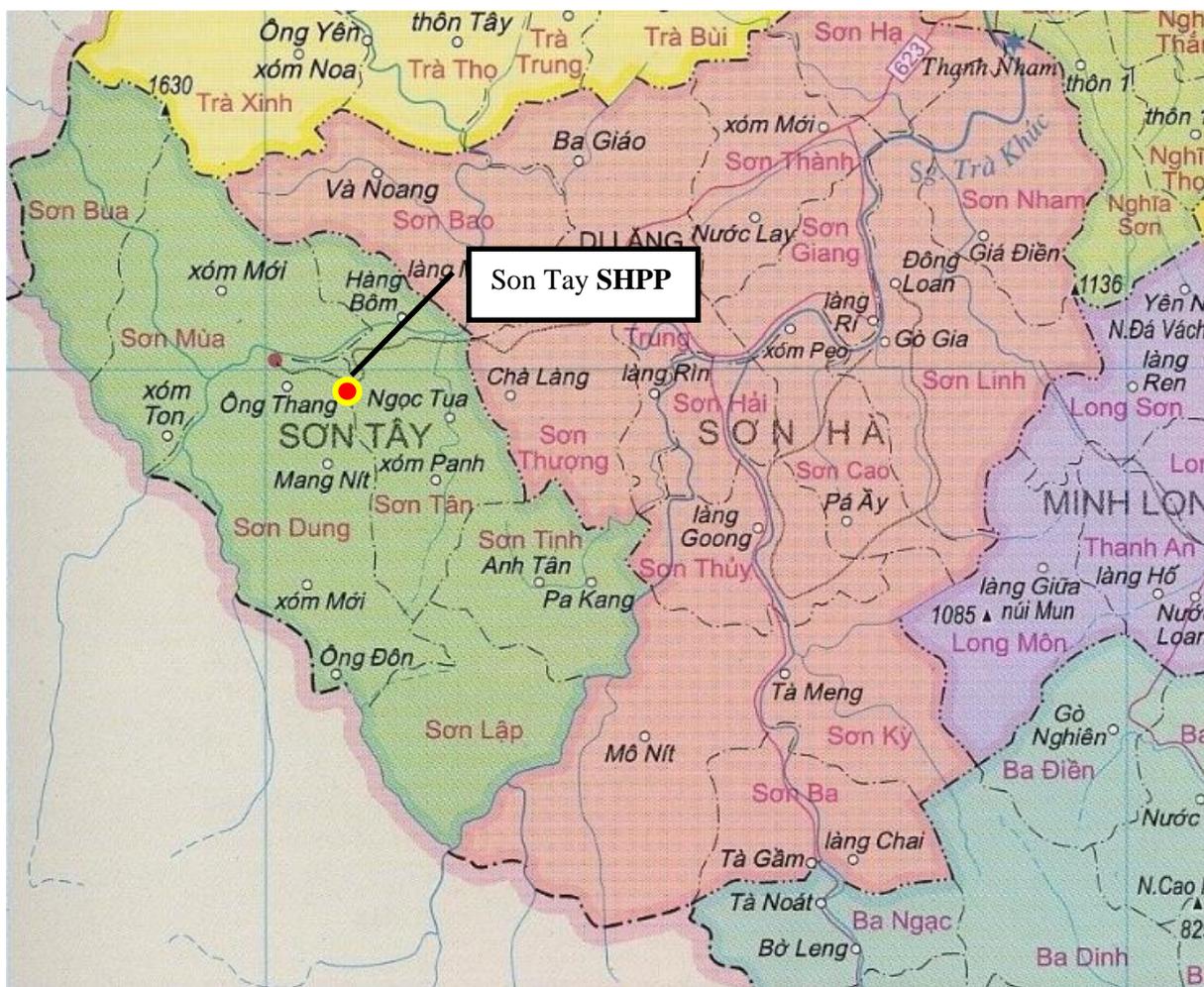
Son Tay Hydropower Project is located on the Dakdrinh River in the territory of Son Mua, Son Tan and Son Dung communes, Son Tay district, Quang Ngai province. Dakdrinh River is the main line of the river upstream Dakdrinh - Tra Khuc, derived from the high mountains of the neighboring provinces of Kon Tum and the south of Quang Nam is Minh Long district, Quang Ngai province. Tra Khuc River is an average river belonging to our country's territory and is the largest river in the Quang Ngai province. Tra Khuc River originates from the peaks of the Truong Son Mountains with an altitude of about 1000 - 1500 m. Tra Khuc River is composed by three main branches: Dakdrinh, Dak Re Selo and River, at the confluence of the three branches above the town of Son Ha, creating river network with radial form.

Dakdrinh River is the first level tributary of Tra Khuc River, flows southwest-northeast, large river bed slope, the entire terrain is hilly. There are many hydropowers on the Dakdrinh River Systems such as Dakdrinh 1 hydropower, Dakdrinh 2 hydropower. In these hydropower, Darkdrinh 1 hydropower has the greatest impact to the Son Tay hydropower, mining flow between area of Dakdrinh 1, mainly Dak Ba basin stream covers an area of 178 km<sup>2</sup>.

Son Tay Hydropower project is 3km away from Son Tay district, is about 60km skyway from the west of Quang Ngai City, near the traffic road and this area has many natural conditions for construction layout. The dam site is located at the geographic coordinates 15°00'31" North latitude, 108°21'34" East longitude. The factory is located at the geographic coordinates 15°01'16" North latitude, 108°23'02" East longitude.

The main works include keyworks and power lines. The keyworks include the dam, flood discharge spillway. The power lines include water intake, connection concrete pipe with tunnel, water tunnels, extra tunnels, surge tank, penstock, power plants, out flow canal. The whole works are located on the territory of Son Mua, Son Tan and Son Dung communes, Son Tay district, Quang Ngai province.

Reservoir area and all the main works include headworks and power lines of Son Tay Hydropower projects and reservoirs are far from the residential areas of the Tan Son, Son Mua and Son Dung communes, Son Tay district, Quang Ngai province. There are not any houses and public buildings, including irrigation or traffic works in the construction sites.



**Figure 1: Location of Son Tay Hydro Power Plant in Quang Ngai Province**

2.2. Project description

Table 2-1: Parameters of main components of Son Tay Hydro Power Project

No.	Parameter	Unit	Value
1	2	3	4
<b>I</b>	<b>Catchment characteristics</b>		
1	Catchment area	km <sup>2</sup>	186.00
2	Annual average rainfall	mm	3,510.00
3	Evaporation losses	mm	459.00
4	Flow module	l/s/km <sup>2</sup>	83.30
5	Annual average flow rate (Q <sub>0</sub> )	m <sup>3</sup> /s	15.53
6	Gross storage	10 <sup>6</sup> m <sup>3</sup>	489.00
<b>II</b>	<b>Reservoir</b>		
1	Flood water level corresponding to P=0.2%	m	202.75
2	Flood water level corresponding to P=1%	m	201.03
3	Normal water level	m	192.50
4	Death water level	m	183.00
5	Total reservoir capacity (W <sub>tb</sub> )	10 <sup>6</sup> m <sup>3</sup>	535.00
6	Useful capacity (W <sub>hi</sub> )	10 <sup>6</sup> m <sup>3</sup>	397.00
7	Death capacity (W <sub>c</sub> )	10 <sup>6</sup> m <sup>3</sup>	138.00
8	Area corresponding to normal water level	km <sup>2</sup>	0.06
<b>III</b>	<b>Water flow through powerhouse</b>		
1	Assurance water flow	m <sup>3</sup> /s	3.15
2	Maximize water flow Q <sub>max</sub>	m <sup>3</sup> /s	22.20
3	Minimize water flow through 1 turbine	m <sup>3</sup> /s	4.44
<b>IV</b>	<b>Water volume</b>		
1	Max height of water level (H <sub>max</sub> )	m	117.80
2	Designed height of water level (H <sub>tt</sub> )	m	97.10
3	Min height of water level (H <sub>min</sub> )	m	96.00
<b>V</b>	<b>Capacity, electricity</b>		
1	Installed capacity (N <sub>lm</sub> )	MW	18.00
2	Assuranced Capacity	MW	2.92
3	Annual electricity production	mil. kWh	72.85
<b>VI</b>	<b>Grade of headwork</b>		

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<b>No.</b>	<b>Parameter</b>	<b>Unit</b>	<b>Value</b>
<b>1</b>	<b>Right bank Spillways</b>		
	Crest elevation	m	203.50
	The length crushed to top	m	45.50
	Crest width	m	3.00
<b>2</b>	<b>Left bank Spillways</b>		
	Crest elevation	m	203.50
	The length crushed to top	m	41.00
	Crest width	m	6.00
<b>3</b>	<b>Spillway</b>		
	Overflow chamber	Chamber	1.00
	Width overflow chamber	m	120.00
	Overflow threshold elevation	m	192.50
<b>4</b>	<b>Concrete pipes connecting water intake gate with basement</b>		
	Concrete pipes length	m	200.00
	Concrete pipes dimensions	m	3x3
<b>5</b>	<b>Water tunnels</b>		
	Tunnel length	m	2,990.00
	Tunnel inside diameter	m	3.00
<b>6</b>	<b>Pressurized-water tower</b>		
	Crest elevation	m	209.00
	The bottom elevation	m	163.00
	Tower diameter	m	7.50
<b>7</b>	<b>Penstock</b>		
	Length	m	231.80
	Diameter	m	2.50
<b>8</b>	<b>Power house</b>		
	Quantity of engines	engine	2.00
	D1 impeller diameter	m	1.20
	Size factory AxB	m x m	21.3 x 24.4

*Source: Technical design report of Son Tay Hydropower subproject*

### **2.3. Construction method**

**Material, equipments:**

Quang Ngai SOVICO Energy one member CO., Ltd will hire contractors to implement the construction of major works such as dams, plants, water tunnels, substations, transmission lines, operation roads. The contractors will purchase materials at the mines or the distribution agents.

Stone used for construction were taken from the quarry is located about 25km from the project to the east. This quarry is now being under exploited for traffic and civil construction, ensuring sufficient quantity and quality requirements. Besides, it is possible to take advantage of local stone using in the construction phase.

Sand and gravel taken from the sand and gravel mines in the alluvial along the Rin river at downstream near the Rin - Son Ha Bridge, ensuring sufficient volume and meet the quality requirements. These sand and gravel mines is about 25km away from the project location to the east - southeast.

These materials are transported from Quang Ngai City to the construction site, the length of transporting routes averaging about 75km.

***Transportation:***

*Construction - operation route:* is the road serving construction in the construction phase. When construction is completed, the main works, roads will be restored, renovated and improve of the surface layer operation activities, including three main routes:

- As the roads to the plant and distribution station from Provincial Road 623 on the basis of upgrading people's concrete roads along the right bank of Dakdrinh river. It is arranged 1 bridge over the canal to Dakdrinh Hydropower Plants.
- Road VH2: is the road come in to the surge tank from Provincial Road 623.
- Road VH3 and VH3a: is the route of headworks operation. VH3 road from Provincial Road 623 come in to foundation pit of hatch No.1. VH3a links VH3 foundation pit of hatch No. 1 to the dam right shoulder.

*Construction Road:* is the temporary road serving construction of the major works, exists in the construction phase and terminate the mandate at the end of the construction phase. The construction roads include:

- Temporary underground: is built at the dam upstream, to serve traffic between the two banks of the dry season, and the construction of the items on the left bank.
- TC1: Derived from the operation construction road VH3 down to the foundation pit of the hatch No. 1.
- TC2: Starting from the right bank of the dam foundation pit (height abutments) to temporary underground in upstream.
- TC3: Derived from Road TC2 to the foundation pit of diversion canal.
- TC4: Derived from temporary underground up to foundation pit of the left bank of the dam (height abutments).

- TC5: Derived from road TC4 down to foundation pit bottom of the left bank of the dam.
- TC6: Derived from the road VH3 into foundation pit of sub-basement.

***Swichtyard and transmission line:***

Currently, there is Dakdrinh 1 hydropower plant about 500m away from Son Tay hydropower plant area. Son Tay hydropower plant is expected to connect to the national grid by 110kV line through 110kV substation of the Dakdrinh 1 hydropower plant. Under this plan, the 110kV line, AC-185/29 conductor, with the length of 0.5 km to connect to the 110kV substation of Dakdrinh hydropower plants will be built from the Son Tay hydropower plants. Dakdrinh 1 hydropower plant will connect to the national grid by 220 kV double circuit line, with the length of about 15 km to the 110 / 220kV Son Ha substation.

***Construction organization:***

The project is carried out in 03 years. It is expected to conduct electricity generation of Unit 1 in July - August/2017 and electricity generation of Unit 2 in August - September/2017.

- 2015: Commencement of items: dam, water tunnel, the operation management area
- 2016: Continue to build the items were started in 2015 and commenced other items: water intake gate, concrete pipe, pressure pipe, hydroelectric plants, canals, OPY station , 110kV line.
- 2017: Completion of the project and put into operation

***Water sources:***

There are many streams on the right bank flowing to Dakdrinh River in the construction area. These artesian water source can provide for the production at the ancillary items and in the area of main construction.

Daily water is taken from construction water which is treated through processing system to ensure water quality requirements.

***Water supply system:***

- Water dam: Stone building by M100 cement mortar in a position of favorable terrain on the streams, to ensure a high enough level to be able to put pressure on water consumption sites.
- Water Pipelines: using steel pipes for construction water pipelines, and using galvanized pipe for water of life. Along the main pipeline at the locations near the water consumed households courses awaiting disposition. The remaining branch pipelines will be calculated to install suitably to the needs of water using by the Contractor to suit the needs of their water use.
- Cluster Processor: Water taken from the weir is led to the cluster for processing before consumption sites. The construction water must be through clarifier

system. Water used for living through the filtration system after passing through the system clarifier.

- Water container: Water containers are laid out in the water consumption area to ensure water regulation for each cluster. Capacity tank depends on water demand of each cluster.

***Campsites and auxiliary facilities:***

At the peak time there are about 300 workers in site. 2 camps are arranged with a total area of 2,700m<sup>2</sup>. The first campsite is near the surge tank, approximately 200m upstream with area of 1,500m<sup>2</sup>. The second campsite locates along the VH3, an area of about 1,200m<sup>2</sup>.

*Items camps:* includes 02 houses applying for working, housing, dining halls,

- Plaited housing type: Wall, plaited bamboo walls, wooden rafters, roof, floor cement mortar, plaited bamboo ceiling, using time is under 1.5 years
- Constructed housing type: brick walls, steel trusses, roofing, cement mortar floor, ceiling plaited, using time is over 1.5 years

*The auxilliary items:*

- Large-scale warehouses and workshop: steel frame, corrugated iron roof, walls covered with corrugated walls or in combination with + cover sheet
- Small warehouses and factories: brick constructed, steel trusses, roof
- Closed Storage: Using to contain valuable materials, strongly affected by temperature, light, humidity, such as cement, electrical equipment, supplies replacement parts for construction machinery and equipment.
- Covered storage: Using to contain material not affected by moisture, but is influenced by temperature and light products such as wood, steel, clean aggregates before moving into the concrete mixer.
- Specialized Storage: is designed with professional standards for preservation and using for special materials such as petroleum depots, storage of explosives ...
- Open outdoor yard: Using to contain material not affected by temperature, humidity and light as sand, stone, brick ..

***Stockpiles and waste landfill***

Stockpiles locates close to route VH3, next to facility construction No.1, approximately 30m from utilized rock stockpile to the south.

There are total six landfills with an area of 37,500m<sup>2</sup>.

- Landfill No.24.1 and 24.2 shall be located at focal area on the river bank, located adjacent to the downstream main dam. The area of the landfill 24.1 is 4,000m<sup>2</sup> and landfill 24.2 is 2.500m<sup>2</sup>.
- Landfill No.24.3: Located on the right bank, at the intersection of routes TC6 and VH3. The area of landfill 24.3 is 3.500m<sup>2</sup>.

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- Landfill No.24.4: Located on the right bank, about 100 meters from the hatch side, near Ta Muc stream ran into Dakdrinh River. The area of landfill 24.4 is 6.500m<sup>2</sup>.
- Landfill No.24.5: Located near VH2 line, about 300 meters from surge tank upstream. The area of landfill 24.5 is 6.500m<sup>2</sup>.
- Landfill No.24.6: Located on the right bank, near the factory location. The area of landfill 24.6 is 14.500m<sup>2</sup>.

The landfills are all located in Tan Son commune, just only landfill 24.1 is located in Son Mua commune. Landfill locations are shown and approved in the general ground projects.

#### ***Power supply for construction***

Power supply for the construction site is taken from 22 kV line Son Tan runs along inter-district roads passing through the construction site which is operated and managed by Quang Ngai Power. Power supply system from Tan Son 22kV line to the substation at the site:

- 22 kV line and transformer stations 250KVA - 22/0.4 kV plant area
- 22 kV line and transformer stations 180KVA - 22/0.4 kV focal area
- 22 kV line and transformer stations 320KVA - 22/0.4 kV sub hatch area

### 3. KEY ENVIRONMENTAL AND SOCIAL ISSUES

#### 3.1. Environmental issues

**Table 3-1 Environmental issues of project**

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
<b>PREPARATION AND CONSTRUCTION PHASE</b>		
1	Land acquisition	<ul style="list-style-type: none"> <li>▪ Total area of acquired land for project is 51.64 ha</li> <li>▪ Permanent acquired land: 37.52 ha of which:               <ul style="list-style-type: none"> <li>- Production forest land: 28.2 ha</li> <li>- Paddy land: 12.9 ha</li> <li>- Annual crops and perennial land: 4.7 ha</li> <li>- Rural residential land: 0.8 ha.</li> <li>- Alluvial land (along rivers, streams): 7.2 ha</li> <li>- Transport land: 1.5 ha</li> <li>- Hilly, mountain lands (unused): 0.1 ha</li> </ul> </li> <li>▪ Temporary acquired land: 14.1 ha (production forest land) in which, 1.1 ha to build up worker camps, disposal sites and materials field. Whole temporary acquired land is within Son Tan, Son Mua and Son Dung communes, Son Tay District, Quang Ngai province.</li> </ul> <p><i>(Refer Table 3-2 for more details).</i></p> <p><b>Impact assessment:</b> moderate negative impact, a RAP will be prepared to ensure safeguard policies application for APs.</p>
2	Remained bombs and unexploded ordnance after war	<p>Due to the implementation of the project area is one of the areas affected by the war, plus many items need be dug, digging reservoir, dam up that causes the risk of collision mines and explosives remaining in the construction project. The impact can cause harm to human life and damage the machinery construction on the site.</p> <p><b>Impact assessment:</b> moderate negative, it must be disarm before start construction.</p>
3	Landslide, erosion and sedimentation	<ul style="list-style-type: none"> <li>▪ Cause of landslide/erosion:               <ul style="list-style-type: none"> <li>- Dismantling partial dam, construct canal, water intake gate, channel, powerhouse, discharge channel must perform excavation activities with a</li> </ul> </li> </ul>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
		<p>high risk of landslide at this location.</p> <ul style="list-style-type: none"> <li>- When doing dam, impoundment, in the soft soil area will increase further the process of erosion. Especially if done dam, impoundment in heavy rain or prolonged rainfall led to flooding rises new lands further irritate the partial erosion.</li> <li>- Serving the construction needs to open and new 4 building construction-operation routes and 5 temporary construction roads, including one main line about 4 km connected to PR 623 at Son Tan commune people committee, due to geological features of project area is hilly so required blasting, prone to landslides. <ul style="list-style-type: none"> <li>▪ Geological features of project site: <ul style="list-style-type: none"> <li>- Dakdrinh river basin limited by Tra Bong deep faults in the north, Ba To - Kon Tum faults in the south, KonPlong fault in the east and Po Co fault in the west. These deep faults correspond to the quadratic according to geological standards. The study area has two major fault systems: the northwest - southeast fault system and northeast - southwest fault systems.</li> <li>- The whole area of the dam is located in the distribution of the stone magna belonging to Bana complex intrusion and to have many 2 - 10cm thick quartz circuit penetration.</li> <li>- The whole project area has the developed primarily geological phenomenon of rock slides, roller stone and weathering phenomena.</li> <li>- Geological conditions of the dam are relatively favorable. The river bed is wide and balanced development, with thin layers of alluvium, multi-part exposed bedrock. The phenomenon of sliding and rolling stones thrive on both flanks will affect the stability of the project.</li> <li>- The entire project area layout alternatives of energy average high mountain terrain, strong degree of cleavage.</li> <li>- There has been not discovered valued mineral in reversoir area yet.</li> </ul> </li> <li>▪ Impacts of landslide/erosion: <ul style="list-style-type: none"> <li>- Sedimentation of Dakrinh River and the Reservoir</li> </ul> </li> </ul> </li> </ul>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
		<ul style="list-style-type: none"> <li>- Reduce surface water quality</li> <li>- Changing of water flow in downstream</li> <li>▪ Features of project:               <ul style="list-style-type: none"> <li>- The river flows through the dam follow southwest - northeast, river from the water edge of the water from the river is about 15 - 25m. River flows straight, little rapids, there is one waterfall of 1 meter high at the passage ways heartbeat 5m downstream. 1 fault riverbed level IV - 3 cut along the river, the water from the upper permeable faults to downstream.</li> <li>- Son Tay hydropower construction area locates at transition between the low mountains along the edge of the plain to the high mountains of Truong Son Mountains. The terrain is divided by many small streams in the network, the ridge has an average slope of 30<sup>0</sup>-50<sup>0</sup>.</li> <li>- The process of sliding along the reservoir shoreline and reconstruction are small scale. Alluvial deposition rate expected is at low levels.</li> <li>- According to the evaluation, the process of natural sedimentation occurs in reservoir stages along the Dakdrinh river is low. Reservoir length is short, the reservoir area is average, mainly flood in riverbed, steps, little hillside.</li> <li>- When the reservoir impoundment, material deposition process is predicted to occur at a slower rate due to Dakdrinh1 hydropower projects in the upstream of reservoir.</li> <li>- The discharge of water through the spillway is capable of causing local flooding and landslides in this area, but the area behind the spillway is empty hills, far away from the residential area at least 3 km, so not affect people living near project area.</li> </ul> </li> </ul> <p><b>Impact assessment:</b> Negative impact is moderate so it is need to implement measures to control erosion and maintain vegetation cover.</p>
4	Impacts on surface water quality	<ul style="list-style-type: none"> <li>▪ The main seasons cause to water surface pollution in the construction phase:               <ul style="list-style-type: none"> <li>- Domestic waste water from 300 workers in project site (at peak time). This type of waste water contains BOD<sub>5</sub>, residue, TSS, and organice substance... If it is average 40litre/day.night per</li> </ul> </li> </ul>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
		<p>person then the discharge waste water of 300 workers will be 18 m<sup>3</sup>/day.night.</p> <ul style="list-style-type: none"> <li>- Constructed waste water from auxiliary facilities such as machine repaired workshop, concrete mixed stations, rock washed grounds etc. This waste water contains mainly TSS, oil and grease, organic substances, metals etc ...</li> <li>- Runoff rainy water: Runoff rainy water over the whole of project site will be sweeps out impurities, especially splattered oil, grease and dust which come from the stone and concrete batching plants, fuel storages, vehicles park, machinery, construction equipment ... this is an important source affecting water quality in the river and downstream.</li> <li>- Scattered gasoline: it is estimated to serve the construction, needs to import 1,500 liters of petrol /oil types from the tank to machinery everyday, losses of about 7.5 liters/day (norm deficit of 0.5%)</li> <li>- Domestic and constructed solid waste: in case of uncontroll well, this waste impacts remarkable to surface water when solid waste is discharged directly into streams, reservoir.</li> <li>- Organic waste from the decomposition of plants and animals during reservoir. <ul style="list-style-type: none"> <li>▪ Impacts of surface water pollution: <ul style="list-style-type: none"> <li>- Increasing of turbidity, reducing water quality at Dakrinh River</li> <li>- Affecting to life of aquatic species;</li> <li>- Impact on occuring activities on the river on downstream communities (such as harvesting, bathing, catching fish;</li> <li>- The operation of hydroelectric power in the downstream (planned Dakdrinh 2 hydroelectric and DakBa hydropower).</li> <li>▪ Project features: <ul style="list-style-type: none"> <li>- The survey shows that project area with steep terrain, sparsely populated, with no industrial production and aquaculture of the people around the area.</li> </ul> </li> </ul> </li> </ul> </li> <li>- Geology, Soils of the project area has rock hard</li> </ul>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
		<p>durable surface that will help prevent erosion, weathering during project implementation when vegetation has not been recovered.</p> <ul style="list-style-type: none"> <li>- Due to Son Tay hydropower hydropower is located in the middle of the terrace hydropower systems on the Dakdrinh river, so the impact of water quality deterioration to local communities downstream area is significantly reduced.</li> <li>- Customary practices of people in this region often leads underground water taken from above the hills, high mountains down to use as a drinking water so project construction will not affect the drinking water of indigenous.</li> </ul> <p><b>Impact assessment:</b> Moderate negative impact, so need to implement appropriate measures.</p>
5	Impact on air quality	<ul style="list-style-type: none"> <li>▪ Cause of air pollution: i) Blasting for construction of internal road, digging of foundations, exploding partial of Son Tay dam ii) excavation and backfilling; iii) Material transportation, loading and unloading; iv) Operation of rock grinded/screened stations and v) Vehicles, constructed machines/equipment.</li> <li>▪ For above items, estimated quantity of main works are: <ul style="list-style-type: none"> <li>- Blasting: As calculated by the investor, total amount of dynamite needs for the project is about 200,431.7 kg</li> <li>- Excavation/back filling of rock and soil: 658,176 tons</li> </ul> </li> <li>▪ Estimated dust quantity is emitted in excavation: <ul style="list-style-type: none"> <li>▪ Blasting: with 160,206 m<sup>3</sup> estimated blasting will cause 64,082 kg of dust (averagely blasting 1m<sup>3</sup> of rock will cause 0.4kg of dust).</li> <li>▪ Quantity of excavation/back filling of rock and soil is 658,176 tons. The distance of truck which transport soil/rock will be 37.2 km/day, dust emitted averagely is 0.03kg.</li> <li>▪ Travel distance for transporting materials (cement, steel) from Quang Ngai City to the site: travel distance is 1,050 km/day, emitted 0.945 kg of dust.</li> </ul> </li> <li>▪ However, as calculation and compare with QCVN</li> </ul>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
		<p>QCVN 05:2013/BTNMT, the concentration of dust generated in the project site is not exceed the allow limit, however, it will higher than normal due to the resonance with other vehicles on road.</p> <ul style="list-style-type: none"> <li>▪ In addition, other air pollutants such as CO, NO<sub>2</sub>, SO<sub>2</sub>... will be emitted due to activities of construction machines.</li> <li>▪ Materials, equipments for project will be transported on the provincial road 623, Dakdrinh Powerplant operation road, inter-communes road then to the project site.</li> <li>▪ Almost the project components including headwork, pressure tunnel, power house are located quite far away from the residential area. The only one group of residential near the project site is a group of Son Tan commune living along PR 623, about 1.6 km away.</li> <li>▪ The project site is about 1.6km away from inter-commune roads. There is no residential house and public building within project site.</li> <li>▪ Sand will be exploited from sand mine along Rin River at downstream area near the bridge Rin - Son Ha river with enough capacity and good quality. Those gravel and sand mines are about 25km away from the site at the East-Southeast; 4-5km away from the nearest residential group. Those material mines are separated with surrounding areas by hills, mountains with vegetable cover thus, impacts of dust will be mitigated.</li> <li>▪ Dust and toxic gas pollution which emit in the construction phase only affect to narrow, partly areas and in short term depending to the construction time.</li> <li>▪ Air pollution affects directly to workers who are working in constructed site if without appropriate mitigation measures.</li> <li>▪ Dust and toxic gas generated during transportation of materials/equipments may affect to local people who live along two sides of PR 623.</li> </ul> <p><b>Impact assessment:</b> Moderate negative, it is needed to implement mitigation measures.</p>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
6	Noise	<ul style="list-style-type: none"> <li>▪ Main causes of noise pollution:               <ul style="list-style-type: none"> <li>- Blasting;</li> <li>- Construction equipments;</li> <li>- Materials/equipments transported vehicles;</li> <li>- Operation of concrete mixed stations, rock grinded/screened workshops;</li> </ul> </li> <li>▪ The noise causing by blasting will create large tremors in the construction area, the instantaneous intensity noise can blast up to 95-115 dBA at 15m distance. If this magnitude is more over than permitted limit of QCVN 26: 2010/BTNMT (National Technical Regulations of noise) many times. Compared with TCVN 3985-1999 noise exposure time per day must be shorter than 5 seconds for each explosive. Affected radius of the blast is 30m.</li> <li>▪ According to statistics, 8-12 ton truck has 91-98 dBA noise level, excavators has 90-96 dBA noise level, pneumatic drill has 94 dBA noise level. According to calculations, the average noise level of the machinery, equipment about 72-80 dBA at a distance of 120-200 m. According QCVN 26: 2010/BTNMT, this noise will affect directly to workers on the site.</li> <li>▪ The blasting area should be far from residential area at least 1km and Dadrinh hydropower plant at least 700 m, the impact of noise levels compared to the distance from the noise source is negligible.</li> <li>▪ Noise pollution is particularly serious for blasting workers without labor protection equipment.</li> <li>▪ Due to these works locate in the hilly area, away from the nearest residential group is 1.6km. Therefore, the noise generating activities on the site does not affect the community. However, operation of the vehicle may cause an impact on the communities living along the provincial road 623.</li> </ul> <p><b>Impact assessment:</b> minor negative and in short time, the impact could be managed with an appropriate management plan.</p>
7	Pollution cause by solid waste	<ul style="list-style-type: none"> <li>▪ Sources of solid waste:               <ul style="list-style-type: none"> <li>- Scattering rock/soil from quarries, material transportation and discarded rock/soil from</li> </ul> </li> </ul>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
		<p>excavation, drilling, blasting etc...</p> <ul style="list-style-type: none"> <li>- Scattering concrete: from concrete mixed stations, constructed sites, concrete scattering in transportation process</li> <li>- Steel: from constructed sites and productive workshops</li> <li>- Domestic solid waste: from campsites, constructed sites.</li> <li>- Hazadous waste.</li> <li>▪ During the construction stage, it must generates waste rock from the surface coating removal, but as calculation, excavation during the construction will be fully utilized for backfilling works on the site. The volume of the remaining land is disposed of <math>156,610\text{m}^3 \approx 258,406</math> tonnes of waste to be dumped at the landfills which agreed with local authorities.</li> <li>▪ Volume of all kinds of building materials splatter in transport including soil, rock, sand, cement... is estimated at 2619.7 tons.</li> <li>▪ Domestic waste: With 300 staff and workers, the amount of solid waste discharged daily activities in the project area would be 150 kg/day at peak times.</li> <li>▪ Domestic solid waste includes many different components, from organic materials such as food scraps to paper, cans. If they are not treated in time causing unpleasant odors, air and water pollution.</li> </ul> <p><b>Impact assessment:</b> Moderate negative and in short time, impact could be minimized with an appropriate management plan.</p>
8	Loss of partly vegetation cover	<ul style="list-style-type: none"> <li>▪ The project will acquire permanent total of 37.52 ha in which there are 28.2 ha of productive forest land, and there are 9.7 ha hills annual crop, and 12.9 ha for paddy land. Almost permanently acquired land is not cultivated regularly due to the terrain with full of obstacle and difficult to access.</li> <li>▪ The fauna and flora in the project area is evaluated less abundant. The forest here is mainly forest restoration mixed cork forest and production forests of people. Hence the using switch in these areas will lead to loss of vegetation cover causing much</li> </ul>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
		<p>risk to erosion and landslides.</p> <ul style="list-style-type: none"> <li>▪ In addition, the development activities in this area will lead to a high risk of promoting opportunities for logging excessive ecosystem degradation.</li> <li>▪ Therefore, measures to restore vegetation cover, especially liable to reimburse ecosystem need to be carried out immediately after construction activities finish.</li> </ul> <p><b>Impact assessment:</b> minor negative due to poor vegetable cover and low value around the project area.</p>
9	Impacts of mining for construction	<ul style="list-style-type: none"> <li>▪ The total volume of sand needed for construction is about 37,367 m<sup>3</sup>.</li> <li>▪ Total volume of stone needed for construction is about 69,953 m<sup>3</sup>.</li> <li>▪ Sand and stones using to construct are transported from the mine to the construction site with the largest transport distance of 25 km.</li> </ul> <p><b>Impact assessment:</b> Minor negative and totally controlled with an appropriate management plan.</p>
10	Impacts due to construction of transmission line and access road	<ul style="list-style-type: none"> <li>▪ Currently, there is Dakdrinh hydropower plant about 500m from Son Tay hydropower plant in this area. Son Tay hydropower plant with a capacity of 18MW is expected to connect to the national grid by 110kV line through 110kV substation of the Dakdrinh hydropower plant. As designed in this option, the 110kV line of wire AC-185/29 with the length about 0.5 km will be built from Son Tay hydropower plant, connect to the 110kV substation of Dakdrinh hydropower plants. Power source from Dakdrinh hydroelectric plants will be connected to the national grid by double-circuit 220kV line, a length of about 15 km to the Son Ha 110/220kV substation.</li> <li>▪ Transmission lines will be built in the area of land where has been acquired permanently for plants and land belonging to Dakdrinh hydropower plant. Thus, impacts from constructing and operating the tranmission line arising from the operation of the project will be limited.</li> </ul> <p><b>Impact assessment:</b> No negative, however it should have safety operation plan at connection point.</p>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
11	Effect to terrestrial ecosystem	<ul style="list-style-type: none"> <li>▪ During the construction phase, the following activities will affect the lives of terrestrial fauna:               <ul style="list-style-type: none"> <li>- Acquire production forests and vegetation cover will risk losing the residence of terrestrial animals;</li> <li>- Construction workers and serviced force will be mobilized with high density in the project area</li> <li>- Develop construction service roads, operating routes serving to project will creat favorable conditions for entering the neighborhood area.</li> <li>- Use of motorized vehicles with large-scale and continuously</li> <li>- The impact of the blasting</li> </ul> </li> <li>▪ The project implementation area is poor of vegetation cover so there are not any rare animal species, only a few species, such as birds, reptiles and amphibians. These above referred activities will temporarily impact on the few of animals in the area, they may move away from the scope of the project.</li> </ul> <p><b>Impact Assessment:</b> Minor negative</p>
12	Impacts on fish and aquatic life	<ul style="list-style-type: none"> <li>▪ The project will have two reversoir clusters: reversoir cluster 1 (main dam locates on the Dakdrinh river, catchment area of 178 km<sup>2</sup>): There is diurnal regulation reversoir, which supplies the major water for the hydropower plant and reversoir cluster 2 (the dam side locates on Ta Muc stream - branch level I of the Dakdrinh river, catchment area of 8.0 km<sup>2</sup>. Due to prevention of water volume flow, the project would cause major changes to the flow regime in the Dakdrinh river and Ta Muc streams.</li> <li>▪ Beside that, water in the reservoir will not be discharged directly into the river which led to the canal, through the tunnel to created pressurize wells in order to ensure the pressure of the water flow. This will lead to the depletion of water resources in 3km river behind the dam, causing major changes to the flow regime and affect aquatic life and fish in the river, this change takes place not only in the construction phase but in the operational phase also, so it is required regulatory logical flow to ensure minimum water level in this canal segment during the project operation phase.</li> </ul>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
		<ul style="list-style-type: none"> <li>▪ In addition, the aquatic ecosystem will be affected temporarily causing by the deterioration of water quality due to increased turbidity, accidental spills or stormwater runoff entrainment of water pollutants such as cement, gasoline, oil, grease , soil, rocks ....</li> </ul> <p><b>Impact Assessment:</b> Moderate negative impact causing impacts on river flows, it should be reasonable calculated and logical solution to maintain a minimum flow in the sections behind the dam.</p>
13	Traffic disturbance	<ul style="list-style-type: none"> <li>▪ Construction site of the project keep a distant of 1.5km from provincial road 623, and it is expected to build two operating routes connecting to the provincial road into the site. Provincial Road 623 will be an important transport route of the project, the traffic volume is not quite high currently here, but there are many locations of densely populated. Therefore, it is available of high risk of collision, traffic safety at intersections and in residential areas;</li> <li>▪ The project will open the 6 construction service routes and 4 operating routes, in which two routes will be upgraded on the basis of the existing road systems, that would lead to the risk of losing public safety in using of these route in the production.</li> <li>▪ Increasing the number of workers and individual traffic on the route will cause the risk of traffic collisions with local communities if workers are not educated about traffic safety.</li> <li>▪ <b>Đánh giá tác động:</b> Tác động tiêu cực trung bình và có tính chất ngắn hạn.</li> </ul> <p><b>Impact Assessment:</b> Moderate negative impact and in short-time.</p>
14	Effect on cultural/historical properties	<ul style="list-style-type: none"> <li>▪ There are not any ranked cultural or historical properties which are managed by district, provincial or national authorities in the project area ... and there are no cultural and non-culture assets related to people ethnic minorities, were identified during the investigation and consultation with the community at all levels.</li> <li>▪ As survey results show that there is no concentrated tomb or graves in the project area.</li> <li>▪ Chance finds procedure has been prepared in case if</li> </ul>

<b>No.</b>	<b>Impacts</b>	<b>Impact description</b>
		<p>cultural or historical properties are discovered during construction phase.</p> <p><b>Impact assessment:</b> Minor Negative Impacts.</p>
15	Effects to natural preservation area/national park	<ul style="list-style-type: none"> <li>▪ The project site is located far from the preservation. The project activities do not impact to natural preservation parks.</li> <li>▪ However, there are 28.2 ha of productive forest land have to be recovered, acquired by project. Although the value of biodiversity conservation in the occupied forest area are not great, but acquisition forest are production forest, there are no more economic value, habitat for fauna terrestrial weathering resistant surface .... project owners should take measures to ensure reimbursement rule "does not cause total loss of face" of the ecosystem.</li> </ul> <p><b>Impact assessment:</b> Minor Negative. It should be prepared the mitigation measures for occupied forest land.</p>
16	Risks of mine and underground works	<ul style="list-style-type: none"> <li>▪ During construction phase, it may expose risks of mine or bomb that may be left after the war, incase do not detect carefully.</li> <li>▪ It is forced to blasting for construction such kind of works due to both sides of the stream are mountainous with high slope terrain.</li> <li>▪ Blasting is mainly used for the excavation, destruction of surrounding dikes which needs to appropriate calculation and management to avoid any impact to main dam, and to ensure the safety for construction workers and communities</li> </ul> <p><b>Impact assessment:</b> Moderate Negative and in the short time in case the proposed mitigation measure will not be strictly compliance.</p>
<b>OPERATION PHASE</b>		
17	Environmental flow in downstream	<p>Operation of reservoirs and plant will make significantly changes in the flow regime of the Dakdrinh river, causing the appearance of 02 different flow regimes in the upstream and downstream of the dam on the Dakdrinh river, the boundary of 02 these flow regimes is the dam of the reservoir.</p> <ul style="list-style-type: none"> <li>▪ The upper dam (reservoir area):</li> </ul> <p>When the reservoir put into operation, the water level</p>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
		<p>ranges from high level at 183m to the normal level 192.5m depending on the operating mode of the plant in different seasons. The water level will always be at the low level in the first months of flooding season and the volume of water storage reaching to normal level at the end of the flooding season. During the dry season, the water level of reservoir decreased to high level. Thus, during the year, fluctuation of the water level will be 9.5m. The water depth at approximately normal level will maintain for a period of 2-3 months in flooding season. In the months of the dry season, the water level fluctuation is greater than the natural river level. Compared with the natural river water level, water level in reservoir is at the lowest level which is higher than about 20.5 m at the main dam site.</p> <p>River water level in this area develops following rainfall regimes. Along with the regulatory impact of the buffer basin leading to huge differentiation of seasonal flow. The flow for hydropower line here is divided into 02 seasons: the flood season from October to December, the dry season from January to September. Thus, flooding in this area is short, only 03 months, but the average flow years accounted to 65-75% of the annual average flow.</p> <ul style="list-style-type: none"> <li>▪ The downstream dam: the downstream area is divided into 02 different sections:</li> </ul> <p>+ The downstream from the dam to the plant:</p> <ul style="list-style-type: none"> <li>- After the dam, there is one section of Dakdrinh River with a total length about 3km will be dry (from the dam to the plant).</li> <li>- Due to the type of project is water hydropower, using reservoirs to regulate day water in the dry season, water from the upper Dakdrinh river and Ta Muc stream will be stored in the reservoir. Then be led through the underground water channels in the mountains to the penstock and go through the generator turbines. So this 3 km stream after the dam may experience the loss of water due to local non-regulated water from upstream.</li> <li>- The initial area of lake water can cause water shortages downstream, but just for a short time, after sufficient volume of water, the lake will operate normally and maintain drain down to the downstream.</li> </ul>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
		<ul style="list-style-type: none"> <li>- In addition, a further limitation is Son Tay hydropower project is within the energy system of Dakdrinh hydropower project also influenced of the flood control of Dak Ba and Huy Mang hydropower reservoirs, that means the volume of water in Son Tay reservoir may influence of 03 hydropower system on the upstream.</li> <li>+ The downstream of Son Tay hydropower plant:               <ul style="list-style-type: none"> <li>- The difference in flow through the plant in flooding season averagely reduces of 12.1%, 4.05% in dry season. Compare the above ratio can see reservoirs have better flooding control. The average flow in the dry season due to reduced volume of water reservoirs for power generation, the flow fell only 4.05%, or about 0.27 m<sup>3</sup>/s, no significant impact on saving the average volume of the river is 15.5 m<sup>3</sup>/s. Thus, the negative impact due to the volume of water reservoir in the dry season does not greatly affect the downstream of Son Tay hydropower plant.</li> <li>- The change in the flow regime will cause the impacts on the ecosystems, flora and fauna in the area, especially areas stretch from the dam to the plant.</li> <li>- Ecosystem in the reservoir area will be changed during the water storage period, after storage finishing, the ecosystem will grow better when the plant is operating normally.</li> <li>- Ecosystem in area of section stretch from dam to plant will form a new ecosystem, more adapted to dry environments as showing in experience from the similar projects.</li> <li>- In summary, the changes in flow, flow regime, water levels and the impact on the environment take place in the following stream section from behind the dam to the plant, the changes in downstream are not remarkable due to mode to regulate water follow day so water flow will be returned to the river.</li> </ul> </li> </ul>
18	Impairment on water quality	<ul style="list-style-type: none"> <li>▪ Water quality in the reservoir area of the early water storage stage: In the early water storage operation stages, water quality have been changed by biomass plants in the flooded area not collected.</li> </ul>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
		<ul style="list-style-type: none"> <li>▪ According to the land use data, the flood area of the reservoir follows normal level = 192.5m is 96,699.5 m<sup>2</sup> ≈ 9.67 ha, this whole area of land are productive forests. However, in the process of land acquisition, most of biomass and branches will be collected and used in different purposes by the people or the project contractor such as: camping, flooring, fuel,... Thus, the remaining biomass is about 58.02 tons of leaves, roots.</li> <li>▪ The amount of biomass in the lake is closely related to the concentration of nutrients and eutrophication in lakes, affecting to the life aquatic fauna in the downstream behind the dam.</li> <li>▪ Domestic solid waste and waste water discharged from operation workers, sewage workers (about 15 people per shift), industrial waste water containing oil or grease from maintaining machines or vehicles is not well controlled it will lead to pollution water of the Dakdrinh river. However, this effect is small and can be minimized.</li> </ul> <p><b><i>Impact assessment:</i></b> Moderate negative impact and can completely control.</p>
19	Impact on flora	<ul style="list-style-type: none"> <li>▪ Flora system within project area might change due to change in landscape of powerhouse, intake and discharge canal, but it will be positive changes.</li> <li>▪ Flora in the downstream and around reservoir will not be changed due to prject will not create any impacts on environmental flow and hydrology in the project area.</li> </ul> <p><b><i>Impact assessment:</i></b> Moderate negative impact, it is needed to have solution to maintain the flow and environmental restoration.</p>
20	Impact on fauna	<ul style="list-style-type: none"> <li>▪ Improvement of landscape and flora system within reservoir area will be attracted animals (such as small mammals, birds, reptiles and frog... tend to go back to living in the area near the reservoir.</li> <li>▪ The fauna in other areas are little impacted, changed causing by the change of the project is limited in small areas so the fauna here will be less disordered or disturbed</li> </ul> <p><b><i>Impact assessment:</i></b> No negative impact.</p>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
21	Impact on fish and aquatic species	<ul style="list-style-type: none"> <li>▪ Refer to the other hydropower study having the similar characteristics with Son Tay hydropower area (Krong Hnang hydropower, Dakdrinh hydropower) showed that, in the early submerged years, aquatic fauna of the reservoir where Son Tay hydropower locates basically consists of biological indicator group for Vietnamese reservoir as algae, diatoms, golden algae (phytoplankton), crustacean antennae sector, crustaceans foot oars ... will appear with large density of plankton dominated of reservoirs.</li> <li>▪ The number of fish species decline, in which, herbivorous fish and organic humus adapt to vertical water environment life, fish species adapt to running water environment will be decreased in both species and numbers.</li> <li>▪ During the dry season, plankton density is the lowest in the upstream area, the highest density concentrates at the middle area near the upperstream, and lower density toward downstream.</li> <li>▪ During the flood season, plankton density is the lowest in the upstream area and gradually towards downstream, the highest density is in area near the dam.</li> <li>▪ Besides the different distribution follow widesurface, plankton has vertically distributed characteristic in number: the highest density at the surface, lower in the deeper water</li> <li>▪ Fish species and aquatic organisms habitually living follow migration flows will be affected, however, according to a survey showing the flow regime of Dakdrinh river has been altered by the formation of Dakdrinh and Huy Mang hydropower in upstream area;</li> <li>▪ Fish species and aquatic plants in the river section from the dam to the plant will also tend to reduce causing by the flow change towards dry more.</li> <li>▪ <b>Impact Assessment:</b> Minor negative impact, there should be mitigate measures.</li> </ul>
22	Reduce sediment, erosion of river bank,	<ul style="list-style-type: none"> <li>▪ Before project, in flood season, sediment is increased causing by the river basin erosion, this</li> </ul>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
	downstream river bed	<p>sediment after flood will be deposited both river banks. When the reservoir is stored and operated, there will be approximately 90% of the sediment retaining in the reservoir and deposited in the dead volume of the reservoir, only about 10% of the sediment is moved to downstream;</p> <ul style="list-style-type: none"> <li>▪ The amount of sediment towards downstream reduces synonymously with the nutritional content brought by silt to the downstream decreases annually, it will be only added in flood discharge and/or groundwater discharge (discharge of sand);</li> <li>▪ The greatly reduced amount of sediment towards downstream increases sediment carrying capacity of river water flow, causing increasing erosion the banks and riverbed in the power house area, and decreasing towards downstream</li> </ul> <p><b>Impact assessment:</b> Moderate negative impact, it needed to have appropriate mitigation measures</p>
23	Noise	<ul style="list-style-type: none"> <li>▪ The operation of two units with installed capacity of 9 MW/unit and other machines such as lubricant pumped equipment will cause noise</li> <li>▪ As experience from other small hydro power plants, Son Tay power plant is categorized impoundment power plant but not type of high water column so the noise is not very high. This value of noise meets the National standard QCVN 26:2010/BTNMT on noise.</li> <li>▪ Power house is located far from residential and other sensitive areas, thus noise only affects on workers who work inside the powerhouse.</li> </ul> <p><b>Impact assessment:</b> Minor negative impact, only affects on workers if not follow safety regulation.</p>
24	EMF	<ul style="list-style-type: none"> <li>▪ The 110kV line operation of Dak Drinh - Doc Soi hydropower plant causes impacts mainly from electromagnetic fields formation from the line: (1) The effects of electromagnetic fields in the corridor and surrounding areas of 110kV line, (2) Restrict the ability to use land under the lines and in the safety corridor. (3) Impact of telecommunication lines and radio equipment.</li> <li>▪ However, 110kV grid of Son Tay Hydropower Plant will be connected to the power distribution station of Dakdrinh hydropower plant, with length</li> </ul>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
		<p>110 kV line from Son Tay hydropower plant to the distribution station of Dakdrinh hydropower plant is only about 500m, there is no inhabitation in this area so causing no any effects.</p> <ul style="list-style-type: none"> <li>▪ Project may affect to the use of land below the transmission line. However, the 110kV line from Son Tay hydropower plant to the power distribution station of Dakdrinh hydropower plant belongs to acquisition land area of 02 hydropower plant, does not belong to local people, there is no residential, buildings or crops below the line area and in safety corridor (4m) so causing no affect.</li> </ul> <p><b>Impact assessment:</b> Minor negative impact on workers if labour safety requirements is not strictly complied with.</p>
25	Emergency case	<ul style="list-style-type: none"> <li>▪ During the construction phase, some important environmental problems can occur if the safety measures of labor is not strictly complied, as: <ul style="list-style-type: none"> <li>- Occupational accidents: in the area of rugged and mountainous construction site, there must have the labor accidents at high risk, such as foot slipped on the slopes during the construction and operation of transportation, stone and materials sliding... thay may affect the health and lives of workers;</li> <li>- Fire and explosion risks: there is high explosion risks in the storage area of explosives and fuel on site. There is commonly stored fuel (such as FO, DO), that is inflammable or explosive source to, so it is required to take measures to ensure safety;</li> <li>- Construction fuel and materials spill: the risk of spillage of building materials and fuel into the Dakdrinh river causing serious impact on water quality in the downstream area is very large if material, waste and fuel management on the site are bare not strictly carried out;</li> <li>- The risk of levee breach: During construction, there are possible causes that will make levee breach include the following main reasons: i)the highest flow and water level of flood construction is over than the highest water level of flood in design; ii) the risk of breakage levees due to material cofferdam does not guarantee standard quality; iii) In the construction phase designed</li> </ul> </li> </ul>

<i>No.</i>	<i>Impacts</i>	<i>Impact description</i>
		<p>altitude has not reached as required meets freshes over as designed; iv) The risk of levees breach causes by construction not properly designed. This risk will cause serious consequences for the safety of workers, communities downstream and the whole quality of the construction.</p> <ul style="list-style-type: none"> <li>▪ During the operation phase environmental incidents can be: <ul style="list-style-type: none"> <li>- Incident of dam break: is caused mainly by i) the flow and water level of the reservoir are higher than the maximum flow and water level in design; ii) due to problem of the floodgate system: stuck floodgates; iii) due to flood forecasting is not exactly so the operation of the plant is not timely when flood happens. There will be injury or killing workers in site, people live in the village on two river banks and land, works in downstream if the dam breaks.</li> <li>- Emergency case in the power house: the hydropower plant operation can causes power accidents such as electric shock, fire, if the operation is not in compliance with the procedures and rules of the power plant operation. These accidents may cause affection to the operation of the plant.</li> <li>- Accident at transformer station: The fire accidents caused by electric shock often occur if the construction and operation are not in compliance with the technical design. Electrical grid safety is an important task, workers are required to obey techniques and procedures, and regulations seriously and properly.</li> </ul> </li> </ul> <p><b>Impact Assessment:</b> Moderate negative impact. However, the action plan must be prepared carefully and training plan should be done annually.</p>

**Table 3-2 Land acquisition by main components in detail**

<b>No.</b>	<b>Item</b>	<b>Acquired land</b>	<b>Unit</b>
A	Permanent acquisition	37.52	ha
B	Temporary acquisition	14.12	ha

	Total A + B	51.64	ha
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*Source: Technical design report of Son Tay Hydropower subproject*

**Table 3-3 Permanent acquisition by land use in detail**

No.	Type of land	Area (ha)
<b>1</b>	<b><i>Permanent acquisition land</i></b>	
1.1	Forest production land	28.2
1.2	Paddy land	12.9
1.3	Land for planting annual and perennial trees	4.7
1.4	Rural residential land	0.8
<b>Total</b>		<b>37.52</b>
<b>2</b>	<b><i>Temporary acquisition land</i></b>	
		<b>14.12</b>

*Source: Technical design report of Son Tay Hydropower subproject*

### 3.2. Key Social Issues

**Table 3-4 Key Social Issues**

No.	Social issues	Information
<b>PREPARATION AND CONSTRUCTION PHASE</b>		
1	Impacts to communities	<ul style="list-style-type: none"> <li>▪ 51.64 hectares of land were occupied by project in Son Tan, Son Mua and Son Dung communes, in which 37.52 ha is the permanently occupied land.</li> <li>▪ Most of the acquired land belongs to ethnic minorities, the major land is not cultivated regularly and now is abandoned the secondary forests is developing in this area because of marginal terrain, far from inhabited areas. The land near inhabited by people more and more rugged terrain, it is at Acacia, cassava (noodles), areca and some terraced paddy area.</li> <li>▪ One positive aspect of the project brought: the infrastructure is upgraded, built for transporting and gathering of materials, equipment, communications ...</li> <li>▪ The process of transporting materials and machinery for media serving to projects do not cause significant impact to the community.</li> </ul>

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<i>No.</i>	<i>Social issues</i>	<i>Information</i>
		<ul style="list-style-type: none"> <li>▪ Most of the local people are desired the construction of project will attract a large number of people to the site, leading to increased commodity demand, contributing to increased income, helping them finish promote production, improve their material and spiritual life.</li> </ul>
2	Labor influx due to construction workers and conflict between workers and communities	<ul style="list-style-type: none"> <li>▪ It is estimated that at the peak of construction there will be about 300 staffs and workers will be mobilized.</li> <li>▪ The concentration of workers and free migrant will increase demand for food, fuel in the local area.</li> <li>▪ Relationship of project owners and the people living in the affected area of the project is quite good.</li> <li>▪ Security situation in Son Mua, Son Tan and Son Dung communes, Son Tay district is quite good, there are a few social evils like drugs, steal, fight... so the possibility of conflict between workers and local residents is low.</li> </ul>
3	Increase income sources for the local people	<ul style="list-style-type: none"> <li>▪ At the beginning of construction phase, a large amount of workers will be gathered, thus a part of local residents will get jobs and stable income.</li> <li>▪ To ensure the demand for foodstuff and a series of other products for construction site will give a chance in developing of production and trading of the local people.</li> </ul>
<b>OPERATION PHASE</b>		
4	Positive impacts on the local socio-economic development	<ul style="list-style-type: none"> <li>▪ When finishing, project will supply stable power with high quality for the local people, it will support to develop industrial, handicraft and traditional sector in the local area.</li> <li>▪ Local people will get jobs during construction and operation phase.</li> <li>▪ Income from tax of water resource usage will support to provincial budget.</li> <li>▪ Take advantage of excess water resources, favorable for transmission lines to develop renewable energy.</li> </ul>



#### **4. MITIGATION MEASURES FOR NEGATIVE IMPACTS**

During construction phase, the contracts will be signed between investor and contractors who construct internal roads, switchyard and transmission line, main components such as dam, powerhouse etc. These contractors will sign the subcontracts with the sub-contractors who provide material/equipment. The responsibilities of developer/contractors/subcontractors who must comply with mitigation measures are presented in Table 4.1.

The mitigation measures must be put into the bid documents/contractors by investor/contractors as requested conditions to the material provided/constructed contractors. SOVICO Quang Ngai has responsible to integrate the EMP into the detail design and bidding contracts. SOVICO Quang Ngai assigned one staff who is in charged in environmental management for Son Tay Hydropower plant. This staff presides and coordinates to the relevant agencies to: (i) Monitoring the implementation of mitigation measures following EMP and EIA; (ii) Supervising, suggesting measures to deal with negative impacts on environment (if any); (iii) Making report on environmental management implementation and submit to the Son Tay's Department of Natural resource and Environment and leaders of SOVICO Quang Ngai, VCB bank (Quang Ngai Branch); (iv) Participating courses on environmental management which are held by GdoE PMB and WB.

**Table 4-1 Key Mitigation and Management Measures**

Issues/Responsibilities	Mitigation and Management Measures
PREPARATION PHASE (SOVICO Quang Ngai is responsible for implementation of mitigation measures)	
1. Selection of project location	<ul style="list-style-type: none"> <li>▪ Son Tay Hydropower location has been studied and approved in the planning supplementary on the hydropower system on Dakdrinh river of Quang Ngai province, this is a terrace between two hydropower projects Dakdrinh No.1 (present Dakdrinh hydropower) and Dakdrinh No.2 (planned, not built yet) to take advantage of the remain unexploited basin of Dakdrinh hydropower (the works of Son Tay hydropower is fully located in the energy routes of Dakdrinh hydropower).</li> <li>▪ The main dam is located far from Ta Do bridge and Dakdrinh hydropower plant about 3km in the west (upstream), both abutments of the dam are located partially on both river banks and forest land, there is no residential living around the dam site, there is just only a few temporary camps of people; water transferring channel and auxiliary dam which is located on the right abutment of the main dam.</li> <li>▪ The reservoir is located in Son Mua and Son Dung communes, about 3km away from the cultural house of Nuoc Min village. It consists of two lake clusters: Cluster No.1 (main dam is located on the Dakdrinh river, the catchment area of 178 km<sup>2</sup>): includes day and night regulating lake which is the mainly water supply for the hydropower plant (NMTD). Cluster No.2 (the auxiliary dam located on Ta Muc stream - the branch level I of Dakdrinh river, catchment area of 8.0 km<sup>2</sup>).</li> <li>▪ The above selected project location will be limited impact on the environment because of reducing the amount of land at least, minimize the loss of vegetation; no deforestation, with the disposition favorable construction etc ... and limited impact on the social life of the people in the region (minimizing agricultural land acquisition, far from inhabited areas).</li> <li>▪ Aucillary area location of the projects was selected on principles of surface water away from at least 100 m; Storage of industrial explosives away from residential areas with a minimum radius</li> </ul>

Issues/Responsibilities	Mitigation and Management Measures
	<p>of 500 m.</p> <ul style="list-style-type: none"> <li>▪ Location substation was selected follow the current transformers and power grid safety corridors standards under Decision 34/2006/QD-BCN regarding safe techniques of rural low voltage network.</li> </ul>
2. Affected people	<ul style="list-style-type: none"> <li>▪ Public Consultation with authorities of Son Mua, Son Tan and Son Dung communes, Son Tay district and affected households to propose the appropriate compensation plan which should meet expectation of affected people;</li> <li>▪ The investor co-ordinate with local government to conduct survey, investigate affected land (includes production forest land); to propose compensation plans, assistant plans (includes compensation, assistant in cash and assistant to change jobs); Investor reports to local authority to issue the acquiste land decision; co-ordinate with local authority to withdraw land; co-ordinate with local authority to organize public consultation to answer and respond to enquiries and petitions of local people; the payment for compensation plans will be made according to laws, regulations and agreements between local authority and affected households;</li> <li>▪ Consultation with representative of local authorities and households of Son Mua, Son Tan and Son Dung communes, Son Tay district on the location of disposals to negative impacts to the public health;</li> <li>▪ To minimize the acquisition of cultivated land and public roads when arrangement of campsites, material temporary loading or during construction of transmission line</li> </ul> <p>(See reports of Resettlement plan for more details)</p>
3. Risk of bombs and mines	<ul style="list-style-type: none"> <li>▪ Coordinating with Quang Ngai Military Steering Committee to detect bombs and mines at the following sites</li> <li>- Area of all project component sites such as powerhouse, dam, internal channel, discharge</li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
		channel, spillway, operation road... - Auxiliary facilities (campsites, quarries)
CONSTRUCTION PHASE (Investor/contractors/material, equipment provided sub-contractors are responsible for implementation of mitigation measures)		
4. Risk of mine	Investor	<ul style="list-style-type: none"> <li>▪ Coordinating with constructed contractors to arrangement of appropriate blasting plan;</li> <li>▪ Responsible for informing of blasting plan to local authorities and residents that aims to avoid transportation and animal grazing at blasting areas;</li> <li>▪ Coordinating with constructed contractors to assigning the guard, using the warning alarm and traffic arrangement when blasting;</li> <li>▪ Monitoring safe measures relating to management and using explosives which are done by contractors.</li> </ul>
	Contractors	<ul style="list-style-type: none"> <li>▪ To discuss and inform to investor on blasting plan so that Investor can inform to local authorities and communities on time;</li> <li>▪ To comply strictly with current regulations on explosive safety;</li> <li>▪ Workers using explosives must be trained and certificated by the relevant authorities;</li> <li>▪ To prohibit strictly person who do not have certification handing with the explosives;</li> <li>▪ To disseminate frequently to workers on safe regulations in handing with explosives;</li> <li>▪ Blasting should be conducted at fix time to create watchful habit for local people. The time of blasting should be arranged at low density of traffic so that it can mitigate impacts to local transportation. The best is lunch time (from 11 am to 1 pm);</li> <li>▪ To coordinate with Investor for assigning the guard, using the warning alarm and traffic</li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
		arrangement when blasting.
5. Mining of quarries	Investor	<ul style="list-style-type: none"> <li>▪ Coordinating with contractors to inform to local authorities the plan of investigating materials (sand, stone...)</li> <li>▪ Supervising safety of contractors in mining of materials</li> <li>▪ Supervising environmental recovery of material mines after exploited by contractors.</li> </ul>
	Contractors	<ul style="list-style-type: none"> <li>▪ Propose the plan of mining that provides in detail technologies and machines as well as apply to get permission from local authorities.</li> <li>▪ Implementing environmental protection fund signing before exploitation.</li> <li>▪ During exploitation, it should be compliance with technical regulations and labor safety as well as environmental standards and progress under current regulations.</li> <li>▪ To ensure taking full advantage and saving environmental resource</li> <li>▪ Environmental recovery should be implemented after exploiting completion (grading, compaction, planting trees recover mines....)</li> </ul>
6. Management of construction & solid waste	Investor	<ul style="list-style-type: none"> <li>▪ All excavated soil will be used to embank the operation/access road and to take advantage for other embankment. About <math>156,610\text{m}^3 \approx 258,406</math> tons of spoil disposal will be taken to dumping sites, as survey, there are six dumping sites around project site which are conducted application agreements with local authorities (in details: dumping sites No.24.1 and 24.2 are arranged at two banks in the focal area, near the main dam in downstream, dumping site No.24.3 is in the right bank, at intersection of TC6 and VH3, dumping site No.24.4 is at the right bank, far from auxiliariary door 100m; dumping site No.24.5 is near VH2, far from the surge tank 300m in the upstream, dumping site No.24.6 is in the right bank, near plant area).</li> <li>▪ Dumping sites must meet the following criteria: far from surface water source 100m at least,</li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
		<p>without affecting the flows, cultivated land, not in the high risk of landslide. (Location of dumping sites is presented in general site plan)</p> <ul style="list-style-type: none"> <li>▪ Dump spoil and solid waste are strictly prohibited to discharge to improper places especially to ravine or positions where it can easily sweep out in to surface water flows by officials, workers;</li> <li>▪ Disinfected waste is treated by septic tanks which are built in all the worker camps and inhabited areas. After project completion, the contractor is responsible for landfills, septic tank treatment as prescribed hygiene;</li> <li>▪ Solid waste is collected and gathered to dumping sites. The dumping sites are arranged in accordance with regulations, located in unflood areas and no impacts of inundation. Investors has responsibility to coordinate with Department of Environment of Quang Ngai province and Son Tay district about the dumping sites. The average volume of each dumping sites is about 20m<sup>3</sup>, with estimated dimension per each dumping site of 5mx2mx2m (5m depth). Each dumping site is lined by anti-penetrative-material called HDPE, with 1.5mm thick. Spraying daily EM bio-product on the surface of waste, covering on the waste surface by the 3-5 cm thick soil layer with frequency 2-3 days to avoid odor and insects. Isolation dumping sites by gutter, cover is arranged to prevent run-off water when raining. Ramming, filling up the soil, planting the tree on the top when finishing;</li> <li>▪ In case there are local urban environment companies, the investor or contractor may sign a contract to collect, transport and treat solid waste;</li> <li>▪ Monitoring the solid waste management of contractors which is presented in article No. 5 below;</li> <li>▪ Prohibiting strictly to burn solid waste to precause risk of fire the vegetable cover.</li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
	Contractors	<ul style="list-style-type: none"> <li>▪ Top soil layer which is generated in process of excavation, road/transmission line construction is kept in rock/soil storage sites and reused for planting trees after construction phase;</li> <li>▪ Soil/rock which is generated from excavation, blasting, penstock construction etc is kept in rock/soil storage sites and reused to backfilling the foundation of main components as well as borrowed pits (material loadings, concrete mixed stations, campsites etc);</li> <li>▪ The land, excess stone is disposed at 6 landfill disposals was mentioned above, the contractor should carry out environmental protection measures at the landfill during specific disposal: Create the foot trench landfill to collect stormwater runoff; tailings disposal area will gather in tightly compacted to prevent erosion when it rains; While full dump will conduct tree planting to improve the region's environment. Disposal method: dumping ground was leveled, the disposal of waste in each class, then proceed carefully compacted. After dumping Bulkheads finished conducting combined with tree planting surrounding surface to prevent bank erosion, surfacing and plant trees on the land.</li> <li>▪ Prohibiting workers to discharge the domestic and constructed solid waste into non-permitted places especially where it can easily sweep out into surface water;</li> <li>▪ Prohibiting to burn solid waste to precause risk of fire.</li> </ul>
7. Vegetation clearance of the reservoirs and construction sites	Investor	<ul style="list-style-type: none"> <li>▪ According to calculations, there are about 9.67 ha of reservoir area, these total area is the forest production land. Therefore, before the volume of water, the reservoir area will be cleaned up to reduce eutrophication, minimizing water quality deterioration.</li> <li>▪ Before conducting the clean-up the reservoir, the investor coordinates with authorities, after that calculate the area needed to clean ensuring water quality at water area.</li> <li>▪ Demarcation of boundaries reservoir to determine the scope of the lake and the area outside.</li> <li>▪ Strictly prohibition of cutting trees in border areas outside the reservoir;</li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
		<ul style="list-style-type: none"> <li>▪ To remove vegetation</li> <li>- Taking all agricultural products prior to flooding</li> <li>- The big trees are cut down at roots and are used as timber formwork in construction. The small shrubs, underbrush is cleared and eradicated from the rest shall not exceed 20 cm.</li> <li>- Local people are allowed to come in to take free artisanal plants, the products which can be used for the purpose of people in allowable conditions and the safety is guaranteed (no construction activities, no traffic in the area, no blasting activity, no water restoring, not in the flood season etc .. ).</li> <li>- Investor coordinates with local authorities and local people in the process of cleaning the reservoir. Investor has responsibility for checking the safety conditions before allowing people to conduct artisanal.</li> <li>▪ The excess biomass burning is done according to the plan established by investors and ensure compliance with existing regulations on prevention of forest fires. Position the combustion point away from each other to at least 500 meters, before burning to ensure the isolation is not burning biomass and wind at the time to prevent the risk of spread to the neighboring areas.</li> </ul>
8. Erosion and sedimentation	Investor	<ul style="list-style-type: none"> <li>▪ Construction work, excavation and embankment will be arranged preferentially performing in the dry season</li> <li>▪ Do not exploit and cultivate in submerged lake areas</li> <li>▪ After construction complete, quarries, disposal sites... are backfilled by soil then rammed, pressed and planted the trees on the on the top avoid erosion and leaching;</li> <li>▪ Planting trees and managing well vegetation cover at surrounded areas of reservoir especially at semi-flooding areas to stabilize the foundation of the reservoir bank, main components and the</li> </ul>

<b>Issues/Responsibilities</b>		<b>Mitigation and Management Measures</b>
		<p>new sedimentation areas;</p> <ul style="list-style-type: none"> <li>▪ To coordinate with local authorities to manage watershed upstream of the reservoir to prevent flash floods, to avoid landslides causing sedimentation of reservoirs;</li> <li>▪ To dredging reservoir bed periodically to coordinate with with terraced hydropower in determining cycle time and perform dredging to ensure effectiveness.</li> <li>▪ To prohibit exploiting of rock/soil or cultivation in the semi-flood areas within reservoir;</li> <li>▪ Monitoring compliance of landslide/erosion mitigation measures of contractors.</li> </ul>
	Contractors	<ul style="list-style-type: none"> <li>▪ It is necessary to describe foundations, monitoring blocks of rock which are exposed to risk of landslide so that could provide warning and suggest the dealing measures during excavation of foundation;</li> <li>▪ It should not drill, blast with large amount of rock. The excavation should blast oriently to create border of excavation;</li> <li>▪ It should have the measures to prevent landslide/erosion of rock which may be rolled from the top to constructing foundation. The gutters that discharge water from the top should be digged to prevent water run into the foundation. The gutters which could discharge water rapidly in the foundation area should be created;</li> <li>▪ It must consolidate the embankments at the sites that are exposed to high risk of landslide/erosion at the beginning of construction of new roads;</li> <li>▪ The isolated gutters are built at material temporary loadings, concrete mixed stations, rock grinded/screened workshops etc to prevent run-off water which can sweep out rock/soil into stream;</li> <li>▪ After construction phase, the borrowed pits are backfilled by soil then rammed, pressed and planted trees on the top to avoid erosion;</li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
		<ul style="list-style-type: none"> <li>▪ Activities of construction/excavation/backfilling are priority done in dry seasons.</li> </ul>
9. Traffic and transportation	Investor	<ul style="list-style-type: none"> <li>▪ Monitoring implementation of mitigated measures which are done by contractors;</li> <li>▪ Coordinating to the contractors has responsibility to ask permission of using the local roads, repairing damaged roads due to overload transportation and reimbursement status quo as road conditions before the project construction when finishing;</li> <li>▪ Periodically check the certificate, license registration, safety of vehicles, machines are mobilized on site;</li> <li>▪ Propagandize to improve awareness of compliance with traffic safe regulations for drivers.</li> </ul>
	Construction/materials, equipment supplied contractors	<ul style="list-style-type: none"> <li>▪ Develop traffic management plan and ensure traffic safety during construction phase, submit the plan to the investor for approval and monitoring the implementation;</li> <li>▪ To ensure all vehicles that use for transportation in project site have to meet standards of technical safety and emission which are applied for vehicles;</li> <li>▪ Provide Project Site Signs at area near roads on both sides of the river;</li> <li>▪ Uphold red light on the project site during night time;</li> <li>▪ Appropriate regulation of vehicles during construction phase to avoid traffic obstacles for local people;</li> <li>▪ Due to sloping terrain with quite a lot of bends so contractors should consider carefully in case sending vehicles in the night time to ensure safety for drivers and local people;</li> <li>▪ To ensure all vehicles meeting loaded permission so that it could mitigate the damage of road. Responsible for repairing the damaged road in case the road is damaged by contractors because of overload transportation;</li> <li>▪ Propagandize to improve awareness of compliance with traffic safe regulations for drivers.</li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
10. Construction of access road and transmission line	Contractors	<ul style="list-style-type: none"> <li>▪ The roads which will be newly built must meet the designed standards of road presented in TCVN 4054-2005 (width of surface/foundation, slope, radius, visibility, angle of rotation, gutter etc);</li> <li>▪ Transmission line and swichyard are complied with the regulations and standards presented in Decision No. 34/2006/QD-BCN on safety of low voltage works;</li> <li>▪ Application of safe constructed measures and prevention of traffic obstacles to local people;</li> <li>▪ Priority to reuse topsoil from excavation process to backfilling the foundation, do not use new soil for that work;</li> <li>▪ Topsoil must be kept and stored in the right of way then reused to recover vegetation;</li> <li>▪ To backfill the borrowed pits, creation of the embankments, planting trees on the surface to prevent erosion/landslide and landscape after construction phase.</li> </ul>
11. Management of hazardous materials (fuels, lubricants, explosives etc.)	Contractors	<ul style="list-style-type: none"> <li>▪ Ensuring of safely hazardous materials storing was agreed by the Employer and was approved/licensed by Department of Quang Ngai Natural Resources and Environment and by Local Government;</li> <li>▪ 01 fuel/lubricant storehouse is arranged at construction phase to ensure at least 300 m far from surface water and residential areas;</li> <li>▪ Storehouse floor must be lined by anti-seepage materials (thick nylon) or 5 cm thick concrete layer to avoid contamination of oil and grease into ground and underground water;</li> <li>▪ Gutter to collect oil/grease is designed surrounding storage in case of oil spilling;</li> <li>▪ To prepare the extinguishers and oil suction apparatus in case of happening incidents;</li> <li>▪ Hazardous chemicals (gasoline, diesel...) must be stored in the tanks with their volume must be 110% of volume as required, in good conditions with labels;</li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
		<ul style="list-style-type: none"> <li>▪ To comply strictly with regulations of storage, transportation and usage of hazardous chemicals and explosives as regulated in Vietnamese Standard 5507:2002 Hazardous Chemicals - Safety Regulations in production, business, usage, storage and transportation;</li> <li>▪ Labors who work directly with fuel, explosives must be trained on safety technique relating to chemical, explosive, fire precaution, oil spilling etc;</li> <li>▪ To minimize storage of explosives at most on the construction site. In case of explosives are used and stored in the short term, explosive storage must be located more than 100 m far from surface water sources and 500 m from residential area;</li> <li>▪ Disseminating safety procedure to labors who hand directly with hazardous chemicals. To mark warning notices and regulations of safety on site when handling with hazardous chemicals;</li> <li>▪ It is compulsory for workers to use the labor safe equipments when handling with hazardous chemicals;</li> <li>▪ Refueling operation and construction equipment maintenance must be conducted in the area which was approved in case of oil and material spilling;</li> <li>▪ Collection, transportation and disposal must be carried by the company who was licensed in dealing with hazardous waste as regulated in Circular 12/2011/TT-BTNMT dated April 14 2011 of MONRE.</li> </ul>
12. Noise	Investor	<ul style="list-style-type: none"> <li>▪ Monitoring implementation of mitigated measures which are done by contractors;</li> <li>▪ Propagandizing to improve drivers' awareness to avoid impact of noise to local people;</li> <li>▪ Investor must coordinate to contractors for consulting Son Mua, Son Tan and Son Dung commune authorities and local people in case of necessary to blasting or construction in night time.</li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
	Constructed/material supplied contractors	<ul style="list-style-type: none"> <li>▪ Noise control planning in construction stage should be built and submitted to investor for approval and management;</li> <li>▪ Requesting to check regularly on technical status of machines and equipments to ensure they meet the noise standards which are presented in QCVN 26:2010/BTNMT to mitigate impacts to workers;</li> <li>▪ The appropriate working time should be arranged, avoiding to blasting and construction in night time;</li> <li>▪ Must coordinate to investor for permission of Son Mua, Son Tan and Son Dung commune authorities and related local people in case of necessary to blasting or construction in night time;</li> <li>▪ Vehicles that transport the materials, machines have to use the horn with noise level meeting the standards of noise for transportation;</li> <li>▪ Propagandizing to improve drivers' awareness so that they do not make impact of noise to local people;</li> <li>▪ To avoid sending vehicles during night time to mitigate noise that affects to local people living along roads.</li> </ul>
13. Dust	Investor	<ul style="list-style-type: none"> <li>▪ Monitoring in order to ensure that mitigate measures be fully carried out by the Contractors;</li> <li>▪ Personnel and budget resources for conducting and monitoring EMP of project must be allocated sufficiently.</li> </ul>
	Contractors	<ul style="list-style-type: none"> <li>▪ Machines and equipment in compliance with the national standards of emission as regulated in 249/2005/QD-TTg issued by Prime Minister of Emission Regulations for transportation vehicles;</li> <li>▪ Humidifier should be applied 2 times/day on materials transported roads, especially the route pass through auxiliary facilities, residential area in dry season, water is taken from Dakrinh</li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
		<p>River;</p> <ul style="list-style-type: none"> <li>▪ Material should be mobilized reasonably in order to mitigate stagnant in the site causing traffic congestion and dust;</li> <li>▪ Transported trucks must be covered by tarpaulin to avoid scattering and dust. All transported trucks' sizes must be matched and not over loaded in transportation;</li> <li>▪ Trucks' Wheels must be washed before leaving the site at car washing stations supplied at the site's entrances in order to mitigate dust in transportation roads;</li> <li>▪ Roads should be clean up immediately if there are any scattering.</li> </ul>
	Material Supply contractors	<ul style="list-style-type: none"> <li>▪ Material transported trucks must be covered by tarpaulin to avoid scattering and dust.</li> <li>▪ During transportation along the roads or through the residential areas, drivers should give up way for local people to prevent dust for them.</li> </ul>
14. Domestic waste water management	Investor	<ul style="list-style-type: none"> <li>▪ Each worker camp is arranged septic tanks to collect and treat domestic waste water of workers. The waste water must meet the permission standards before discharging into the environment.</li> </ul>
	Contractor	<ul style="list-style-type: none"> <li>▪ Providing a full range of equipment such as mobile toilets, rubbish bins, waste must be collected and disposed appropriately or through contracts with local environmental company;</li> <li>▪ Propagandizing to improve workers' awareness on environmental hygiene;</li> <li>▪ To prohibit workers discharging waste into streams Son Tay dam, Dakrinh river which lead to contaminate domestic water of the local people;</li> <li>▪ Punishing workers who do not comply with the above regulations.</li> </ul>
15. Constructed waste water	Constructed contractor	<ul style="list-style-type: none"> <li>▪ To collect grease and oil generated from car parking and equipments/machines maintenance stations then sell to companies who is allowed to treat the hazardous waste as regulated in</li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
		<p>Circular 12/2011/TT-BTNMT dated April 14 2011 issued by Ministry of Natural Resources and Environment;</p> <ul style="list-style-type: none"> <li>▪ Cover dump material when it rains, the dump pits are not to exceed more than 24 hours;</li> <li>▪ It is prohibited to washing construction equipments/machines directly on Dakrinh River and Son Tay reservoir to prevent oil discharged and pollution into the environment;</li> <li>▪ To build the pits which collect mud/sand in the following sites before discharging waste water in to environment;               <ul style="list-style-type: none"> <li>- Concrete mixed station;</li> <li>- Cement waste water contained grounds.</li> </ul> </li> </ul>
16. Chance find of cultural artifacts, and areas/structures of local cultural value	Investor	<ul style="list-style-type: none"> <li>▪ To prepare the procedure in case of finding historical/cultural/archeological artifacts and request constructed contractors must to comply during construction phase;</li> <li>▪ If main components (transmission line, internal road, etc) go through or locate in the areas that have tombs, the investor must cooperate closely with consultant to adjust design;</li> <li>▪ Beside, the investor consults authorities and local people to find suitable solutions to move ashes following the local customs.</li> </ul>
	Contractor	<ul style="list-style-type: none"> <li>▪ In case of any historical/cultural/archeological artifacts that may be encountered during excavation: excavation works must be stopped and the Investor, Son Mua, Son Tan and Son Dung Commune People Committees, Son Tay District, and Quang Ngai Department of Culture, Sport and Tourism must be immediately informed; the locale must be guarded to solve by local authorities;</li> <li>▪ Prohibiting workers to remove any historical/cultural/archaeological artifacts. This is supposed to be illegal actions;</li> <li>▪ Construction work will only be continued after being permitted with notice in writing from the</li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
		authorities.
17. Water supply for workers	Contractor	<ul style="list-style-type: none"> <li>▪ There are several streams flowing down the Dakdring river within the powerplant area, this is a good supply of water for domestic workers during construction</li> <li>▪ To build water tanks which use to filter for domestic usage of workers.</li> </ul>
18. Safety issues in the construction process	Investor	<ul style="list-style-type: none"> <li>▪ Coordinating with constructed contractors to establish labor safe regulations which force workers to comply;</li> <li>▪ Assigning 01 staff to supervise labor safe issues of contractors;</li> <li>▪ Coordinating with contractors to solve on time the risks/accidents which happen during construction.</li> </ul>
	Contractors	<ul style="list-style-type: none"> <li>▪ The contractors are responsible for ensuring work safety for the whole engineers and workers on the construction site as in details:                             <ul style="list-style-type: none"> <li>- It is mandatory for workers to attend training courses on labor safety before they are recruited to work for the project;</li> <li>- Supervise periodically on compliance to labour safe measures of workers at project sites;</li> <li>- Training courses on labor safety for workers are held periodically to improve their knowledge and awareness in term of compliance with safety measures;</li> <li>- To provide necessary safety facilities for workers;</li> <li>- A person will be assigned to work as safety staff. He/she is responsible for supervising and speeding up the compliance with regulations of labor safety of workers;</li> <li>- To have timely measures in the event of happening accidents;</li> <li>- Do suspend all work absolutely during heavy rains or emergencies of any kind in</li> </ul> </li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
		<p>anticipation of landslide, accidents caused by open circuit that may lead damage for worker's health and lives.</p> <ul style="list-style-type: none"> <li>- To equip fully fire extinguishers in the worker camps and the construction sites.</li> </ul>
19. Management of sanitary and safety and prevention of disease infection in campsites	Investor	<ul style="list-style-type: none"> <li>▪ Assign 01 staff responsible for health care of workers in the project site;</li> <li>▪ Coordinating with constructed contractors to make plan of workers' health care during construction phase;</li> <li>▪ Coordinating with contractors to establish the precautionary program of sexual transmitted diseases, especially HIV/AIDS precautionary program, among labors;</li> <li>▪ Supervising the implementation of mitigation measures in term of food safety, environmental sanitation, disease transmitted precaution which must be done by contractors.</li> </ul>
	Contractors	<ul style="list-style-type: none"> <li>▪ 01 staff who is responsible for health care of workers in the project site will be assigned by contractors;</li> <li>▪ A first aid kit will be provided at each construction site to ensure patients can receive first aid timely before transporting them to the medical station/hospital;</li> <li>▪ Monitoring regularly to keep sanitary in campsite, construction sites in order to precaution of pathogenesis/disease transmission relating to digestive and respiratory system. To require workers using mosquito nets to prevent petechial/marsh fever;</li> <li>▪ To propagandize food safety and hygiene for workers;</li> <li>▪ To build toilets in campsite which must meet environmental standards. To prohibit discharging of domestic solid waste directly in to the environment. Domestic solid waste must be hygienically collected, stored, transported and treated;</li> <li>▪ Carrying out the precautionary program of sexual transmitted diseases, especially HIV/AIDS</li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
		<p>precautionary program, among labors;</p> <ul style="list-style-type: none"> <li>▪ Coordinating with Investor to make and implement plan of workers' health care during construction phase;</li> <li>▪ Provide communication/entertainment facilities for workers.</li> </ul>
20. Worker regulation	Investor	<ul style="list-style-type: none"> <li>▪ Coordinating with contractors to establish worker regulation and manage them during construction phase;</li> <li>▪ If constructed contractors recruiting workers who come from the other regions, they must be informed investor to register temporary residence with the Son Mua, Son Tan and Son Dung commune authorities;</li> <li>▪ Investor is responsible with the Son Mua, Son Tan and Son Dung commune authorities for all issues relating to worker management during they stay in locality for project construction;</li> </ul>
	Contractors	<ul style="list-style-type: none"> <li>▪ Coordinating with investor to set up worker regulation;</li> <li>▪ Responsible for worker management during construction phase;</li> <li>▪ Informing to investor in case the workers coming from other regions to register temporary residence with the Son Mua, Son Tan and Son Dung commune authorities;</li> <li>▪ The following activities are prohibited on and near project site: <ul style="list-style-type: none"> <li>- Cutting of trees for any reason outside the approved construction area;</li> <li>- Hunting, fishing, wildlife capture, or plant harvest;</li> <li>- Disturbance to anything with architectural or historical value;</li> <li>- Building fires outside camp areas;</li> <li>- Use of firearms (except authorized security guards);</li> </ul> </li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
		<ul style="list-style-type: none"> <li>- Use of alcohol by workers during working hours;</li> <li>- Use of drugs and stimulants which are prohibited;</li> <li>- Washing car, motorbikes or machinery in streams or creeks.</li> <li>- Doing maintenance (change of oils and filters) of cars and equipment outside authorized areas.</li> <li>- Disposing trash in unauthorized places;</li> <li>- Driving in an unsafe manner in local roads;</li> <li>- Having caged wild animals (especially birds) in camps;</li> <li>- Working without relevant safety equipment (including boots and helmets);</li> <li>- Creating nuisances and disturbances in or near communities;</li> <li>- Disrespecting local customs and traditions.</li> </ul>
21. Rehabilitation of all Project sites after construction phase.	Investor	<ul style="list-style-type: none"> <li>▪ Recover vegetation in all project components to prevent erosion in rainy season;</li> <li>▪ After construction phase, planting trees/grass in the surface of all borrow pits (disposal sites, campsite, material temporary loadings etc);</li> <li>▪ Planting in combination of 3 types of trees including long term trees, grass, and shrub with priority of indigenous plants especially in re-vegetation areas;</li> <li>▪ Landscaping at project site after construction phase.</li> </ul>
22. Affected people	Investor	<ul style="list-style-type: none"> <li>▪ Upgrading/Repairing water supply pipeline for affected households or irrigation system to ensure supplying fully water for agricultural activities of local communities incase if is damaged by project;</li> <li>▪ Coordinating with local authorities to provide documents on compensation of land and property</li> </ul>

Issues/Responsibilities		Mitigation and Management Measures
		<p>on land, EMP to affected households within project area;</p> <ul style="list-style-type: none"> <li>▪ Preparing and implementing the awareness raising program in traffic safety for relevant stakeholders to minimize the risks of traffic accidents.</li> </ul>
OPERATION PHASE (SOVICO Quang Ngai is responsible to implement mitigation measures of environmental affects in operation phase)		
23. Noise (from the powerhouse)		<ul style="list-style-type: none"> <li>▪ Turbines and/or associated rotating equipment should be designed to meet international standards of noise (85~90 db at 1 meter) comply with QCVN 26:2010/BTNMT National Standards of noise;</li> <li>▪ Design and procurement of equipments should specify requirements to meet standards of noise;</li> <li>▪ It needs to have measures of machinery maintenance, regular lubrication of the joints, the moving parts of machinery to reduce noise, vibration, ensure productivity and health of workers, simultaneously resistant to abrasion by friction.</li> <li>▪ For the adherence to the standards and maintenance schedule to ensure the best operational capability;</li> <li>▪ Increase weight of machine foundation and noise reduction, ranging through equipment layout reasonable noise in the area will reduce the resonance noise;</li> <li>▪ For equipment operates too loudly, it can use sound-absorbing material wrapped cover;</li> <li>▪ Workers working in high noising area must be equipped the personal anti- noise tools such as earplugs and earcovers;</li> <li>▪ Monitoring periodically the noise level outside the fence of hydropower plant. To implement the measures of noise reduction in case it exceeds the standards.</li> </ul>
24. Labor safety issues and worker regulations		<ul style="list-style-type: none"> <li>▪ To arrange fire-extinguishers at necessary places;</li> </ul>

Issues/Responsibilities	Mitigation and Management Measures
	<ul style="list-style-type: none"> <li>▪ To set up the procedures of safe operation;</li> <li>▪ To arrange the first aid cabinet so that it can carry out the first aid measures on site;</li> <li>▪ To assign a staff in each shift who is responsible for labor safety;</li> <li>▪ Labor regulation is defined similar to the construction phase.</li> </ul>
25. Change in downstream flows	<ul style="list-style-type: none"> <li>▪ The investor is committed to strictly comply with reservoir operating rules and regulations regarding the discharge of water, discharging, and always timely inform to local authorities on water level fluctuation after the downstream dam to minimize damage of person and assets.</li> <li>▪ In case of discharging that causes damage to crops or assets of people, the investor is responsible for compensation.</li> <li>▪ The project owner is responsible to supervise bank sliding in residential area and bank river in the downstream. Detecting position potentially large landslides to have remedies in place as of coast, trees, moving people out of hazardous areas (if any)</li> <li>▪ For the downstream distance after the powerhouse: developer commits to comply strictly the approved operation procedures of reservoir. During operation phase, developer will regularly coordinate with hydropower plants in the hydropower terrace system on Dakdrinh river (Dakdrinh hydropower plant (capacity 125 MW) in operation, Huy Mang hydropower plant (capacity 1.8 MW) under constructed and Dakdrinh 2 and DakBa hydropower plants already planned), with the local authorities in monitoring water level and erosion to provide suitable mitigation measures.</li> </ul>
26. Impairment of water quality	<ul style="list-style-type: none"> <li>▪ Embankments are build at locations which are exposed to danger of landslide;</li> <li>▪ To built separated systems of domestic and industrial waste collection and treatment which meet permitted standards prior to discharge into the environment;</li> <li>▪ Domestic solid waste is hygienically managed then transported to the dumpsite for treatment by</li> </ul>

Issues/Responsibilities	Mitigation and Management Measures
	<p>Son Tay sanitation team;</p> <ul style="list-style-type: none"> <li>▪ Firewood, twigs is on going with the flow upstream but trash remained, was daily collected for local people;</li> <li>▪ Recovering vegetation at construction sites to mitigate erosion and water resource protection.</li> </ul>
27. Reservoir sedimentation	<ul style="list-style-type: none"> <li>▪ Prohibition of cultivated activities in the semi flood area;</li> <li>▪ To reduce sedimentation in the upstream reservoir, developer cooperate with the local authorities to plan, protect and develop forests, especially to protect and develop the semi-submerged forest vegetation in the coastal areas (especially residential areas), the plants have good soil retention capacity such Luong trees;</li> <li>▪ Planting trees at the construction site after the construction phase to mitigate erosion and sedimentation of reservoirs;</li> <li>▪ To coordinate for dredging, discharging sediment through bottom culvert if necessary;</li> <li>▪ To mitigate erosion of the river banks behind power house, the energy eliminated hole is designed to reduce flow rate after discharging canal of power plant so that the flow returning to original flow of river.</li> </ul>
28. Monitoring and maintaining the replanted vegetation cover	<ul style="list-style-type: none"> <li>▪ Investors should perform biological liability indemnification for forest loss area during reservoir filling in the principle of "no loss of total improvement or increase in total number"</li> <li>▪ Plantation biological reimbursement shall be encouraged to implement in proportion 1/3 (a forest tree is cut, there trees will be replanted) to ensure the survival level of trees planted, in many case they may reimburse through payment activities of ecosystem services, management capacity building for forest management units in the region, raising awareness of the efficient use of resources in the region. Project owners need to build biological reimbursement plan as one of the requirements of security policy.</li> </ul>

Issues/Responsibilities	Mitigation and Management Measures
	<ul style="list-style-type: none"> <li>▪ Annual inspection, monitoring and implementation of the support needed to maintain vegetation is replanted to recreate the landscape and limit erosion.</li> </ul>
29. Management of hazardous substances ( fuel, lubricant, etc)	<ul style="list-style-type: none"> <li>▪ Similar to the measures presented in item No. 11.</li> </ul>
30. EMF	<ul style="list-style-type: none"> <li>▪ To provide facilities of EMF protection and request staffs/workers who work directly in the EMF arised areas comply strictly rules on labor safety.</li> <li>▪ The statistics show that, with safety distance of power grid corridors, electromagnetic field intensity will be less than 5kV/m, to meet the WHO standards. Therefore, people who are living and working under the transmission lines within the grid safety corridor is not affected by electromagnetic fields.</li> <li>▪ Periodically check the power line (check minimum deflection of the line) to ensure the lines are always comply with safety grid corridors.</li> </ul>
31. Emergency cases	<ul style="list-style-type: none"> <li>▪ To prevent, protect and reduce impacts due to dam broken of hydropower plants in the upstream, the powerhouse management board has to control and manage the communication among the hydropower plants system in Dakdrink River (especially in discharge flood - operating the system in flooding season).</li> <li>▪ To coordinate with local authorities to establish warning system when discharging water, flood and make alarm when dam is accidently broken (provide regulations about alarm bell to inform when is discharging water, flood; alarm when risk happens; combine to announce on the voice system of village, commune...). Build up warning measures to local people for daily life and fishing in area before and after the out going gate of powerhouse (there are sign boards, protecting net in danger area to keep the local people not access,...).</li> <li>▪ Prepare the risk responding plans for Son Tay Hydropower, the investor must comply with</li> </ul>

Issues/Responsibilities	Mitigation and Management Measures
	<p>measures from designing to construction and operation phase, as following:</p> <ul style="list-style-type: none"> <li>- Comply with standard, regulations on design and manage construction works in domestic and international.</li> <li>- Comply with standard, regulations, technical measures when construct channel, water intake gate and powerhouse.</li> <li>- Strictly comply rules when explode mine, excvate foundations as approved design document</li> <li>- Comply operation procedure which approved by MOIT</li> <li>- Comply safety regulations during operation process</li> <li>- Establish flooding prevent sterring committee (24/24h) on site and at the high risk area.</li> <li>- Water level and flood volume at the reservoir and downstream will be monitored and regularly informed to Operation management unit of Son Tay hydropower plant and related agencies to prepare measures.</li> <li>- Timely announce to workers and surrounding people to move out of dangerous area.</li> <li>- Urgently announce to local authorities at downstream to move people out of flooding area to reduce assets and human losses.</li> <li>- Keep regularly communication with Hydropower Plant Management Unit of upstream hydropowers to get update information about problem, solutions related to discharging flooding water then coordinate to solve problems.</li> <li>- In case the broken dam causes land, assets, vegetation losses of local people, the investor must coordinate with Son Tay's management board, related agencies to find the reason and compensate (in case the reason is identified from Son Tay Hydropower).</li> </ul>

***Chance finds procedures***

If the Contractor discovers archeological/historical sites, monuments and objects, including graveyards and / or individual graves unearthed during construction, the contractor will be responsible for:

- To stop the construction activities in the chance find area.
- To delineate the location or found area.
- To protect the area to prevent the object from being damage and lost. For artifacts or remains, the night guard will be allocated directly until the local government has the responsibility or the Department of Culture and Information takeover.
- Inform the Investor to notify for the local government or the nations undertaking the cultural heritage of Viet Nam (within 24 hours)

Relevant local/central authorities will be responsible for the area protection and conservation before providing the decision on the later appropriate procedures. Then they will implement the preliminary evaluation on the excavated findings. The significance and importance of these findings should be evaluated according to various criteria relevant to cultural heritage, including aesthetic value, historical or scientific research, economic and social values

The decision of findings treatment will be made by the responsible agency. This decision covers the layout (such as in case of detecting the rest of the cultural or archeological importance cannot be moved) conservation, preservation, restoration and salvage.

If the cultural area and/or heritage evaluated by the experts and the Cultural Relics Management agency's regulation are valuable and should be preserved, the developer have to change the design in accordance with the required conservation of the area

The decisions of findings management will be notified in writing by the related agency.

## 5. ENVIRONMENTAL MONITORING PLAN

Table 5-1 Parties involved in environmental monitoring

<i>No.</i>	<i>Agency</i>	<i>Main Responsibility</i>	<i>Content and form of report</i>	<i>Frequency</i>
1	Contractor	<ul style="list-style-type: none"> <li>▪ To carry out the proposed mitigation measures in EMP</li> <li>▪ To report to investor the implementation of mitigation measures.</li> </ul>	Refer to the table 5.3	Submitting report to Investor monthly
2	The Participate Bank - VCB (Quang Ngai Branch)	<ul style="list-style-type: none"> <li>▪ The PB review the EMP and ensure that EMP commitments form part of the loan agreement.</li> <li>▪ During subproject implementation, each PB will supervise subproject implementation to ensure that the responsibilities and protocols specified in the EMP are being properly followed and document their findings as part of their overall reporting of subproject supervision.</li> <li>▪ PB will submit quarterly progress reports on ESF compliance of REDP developers to the Administrative Unit (AU).</li> </ul>		Every 6 months, submit report to PMU
3	Investor	<ul style="list-style-type: none"> <li>▪ To join EMP into detail technology design and construction bidding contractors.</li> <li>▪ To carry out the proposed mitigation measures in</li> </ul>	Refer to the table 5.3	Submitting quarterly reports to VCB (Quang Ngai

		<p>EMP</p> <ul style="list-style-type: none"> <li>▪ To monitor construction activities and ensure that the contractors comply to environmental requirements in the contracts and EMP (Terms of reference for environmental staff in monitoring EMP is presented in the Annex 2).</li> <li>▪ To report to VCB (Quang Ngai Branch)/GDoE PMB the implementation of mitigation measures.</li> </ul>		Branch)/GDoE PMB
4	Independent Monitoring Consultant	<ul style="list-style-type: none"> <li>▪ To monitor (by observation) and assess environmental quality based on parameters suggested by this EMP report.</li> <li>▪ To conduct public consultation to received comment, assessment of local people on environmental management of the Project.</li> </ul>	Refer to the table 5.4	Submitting bi-annual reports to VCB (Quang Ngai Branch)/GDoE PMB

**Table 5-2 Environmental monitoring plan**

<i>Parameters</i>	<i>Monitoring Measure</i>	<i>Monitoring location</i>
<b>1. CONSTRUCTION PHASE</b>		
Selecting of campsites and supplementary areas	Visual observation the following issues:	
	Location of campsites: <ul style="list-style-type: none"> <li>▪ How far from them to surface water and residential areas?</li> <li>▪ How investor arrange water supply?</li> <li>▪ Does investor build tanks to filter water?</li> </ul>	<ul style="list-style-type: none"> <li>▪ Camp sites</li> <li>▪ Water supply resources</li> </ul>
	Location of supplementary areas: <ul style="list-style-type: none"> <li>▪ How far from them to surface water and residential areas?</li> </ul> Location of disposals/dumpsites: <ul style="list-style-type: none"> <li>▪ How far from them to surface water/worker's camps?</li> </ul>	<ul style="list-style-type: none"> <li>▪ Concrete mixed stations</li> <li>▪ Vehicles, machines parking</li> <li>▪ Material yards</li> <li>▪ Equipment/machine repaired workshops</li> </ul>
Vegetation clearance and topsoil stripping	Check and visual observation the following issues:	<ul style="list-style-type: none"> <li>▪ The flora gathering area after its cut-off;</li> </ul>

<i>Parameters</i>	<i>Monitoring Measure</i>	<i>Monitoring location</i>
	<ul style="list-style-type: none"> <li>▪ Vegetation clearance plan</li> <li>▪ Measures of vegetation clearance</li> <li>▪ Topsoil stored areas (disposal sites) are applied measures of protection from erosion/run-off water?</li> <li>▪ Does project build holes/gutters/embankments?</li> </ul>	<ul style="list-style-type: none"> <li>▪ Topsoil temporary stored site</li> <li>▪ Work with investor</li> </ul>
	Does project has landscape rehabilitation plan/Does it implement?	Work with investor
Detect bombs and mines	Checking bomb and mines disarming document proposed in the project	Work with investor
Domestic and constructed solid waste management	<p>Visual observation the following issues:</p> <ul style="list-style-type: none"> <li>▪ Does project generate discarded rock/soil?</li> <li>▪ Do discarded rock/soil affect on water quality or flow of water?</li> <li>▪ How to collect domestic solid waste?</li> <li>▪ How to treat domestic solid waste?</li> <li>▪ How to manage dump sites?</li> </ul>	<ul style="list-style-type: none"> <li>▪ Disposal sites</li> <li>▪ Dump sites</li> <li>▪ Topsoil storage sites</li> <li>▪ Camp sites</li> </ul>
Removal of discarded vegetation out of reservoir area	<p>Visual observation the following issues:</p> <ul style="list-style-type: none"> <li>▪ Checking the plan of vegetation clearance</li> <li>▪ Is it correct to cut off trees in the required areas?</li> <li>▪ Does collection of valuable wood out of the reservoir implement?</li> </ul>	<p>Work with investor</p> <p>Check the reservoir bed.</p>

<i>Parameters</i>	<i>Monitoring Measure</i>	<i>Monitoring location</i>
	<ul style="list-style-type: none"> <li>▪ Is burning the remaining tree leaves/wood well done?</li> </ul>	
Erosion and sedimentation	Visual observation the following issues:	The construction sites
	Do construction activities carry out in dry season?	
	<ul style="list-style-type: none"> <li>▪ Are measures to mitigate erosion/landslide applied at construction sites?</li> <li>▪ Are holes/ditches/embankments built at danger sites of landslide in construction areas?</li> </ul>	The sites expose risk of high erosion/landslide
Transportation and traffic management	<p>The following issues should be checked:</p> <ul style="list-style-type: none"> <li>▪ Certification of vehicles that serve for project meet technological/emission standards</li> <li>▪ Attested document of vehicles/machine periodic maintenance</li> <li>▪ Do transportation cause traffic jam or damage the road?</li> <li>▪ Contracts signed with contractors supplying materials/equipments</li> </ul>	<ul style="list-style-type: none"> <li>▪ Dam area</li> <li>▪ Powerhouse</li> <li>▪ Working with investor</li> </ul>
Management of hazardous substances	<p>The following issues should be checked and assessed:</p> <ul style="list-style-type: none"> <li>▪ Hazardous substance storage: <ul style="list-style-type: none"> <li>✓ Is it lined by anti-seeped ground?</li> <li>✓ Is it protected with protected roof?</li> <li>✓ Is it locked and isolated with surrounding area?</li> </ul> </li> <li>▪ Check permission of Quang Ngai Province's Department of Industry and Trade if explosives is stored;</li> </ul>	<ul style="list-style-type: none"> <li>▪ Work with investor</li> <li>▪ Check the storage</li> </ul>

<i>Parameters</i>	<i>Monitoring Measure</i>	<i>Monitoring location</i>
	<ul style="list-style-type: none"> <li>▪ Check dissemination and material supply about toxicity, safe manual with hazardous substance;</li> </ul>	
Noise	<p>The following issues should be checked and assessed:</p> <ul style="list-style-type: none"> <li>▪ Does noise level at the construction sites impact on the nearest residential area?</li> <li>▪ Interview local people and leaders living in the nearest area whether the project makes noise in rest time, evening time?</li> <li>▪ Interview local people whether investor asks their permission to work in evening time?</li> <li>▪ If there is any claim about the noise, request investor to measure the noise level and give appropriate measures to mitigate its impact</li> <li>▪ Contracts signed with material supplied contractors.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Project area,</li> <li>▪ The nearest residential area</li> <li>▪ Interview the local people and authorities</li> <li>▪ Working with investor</li> </ul>
Dust	<p>The following issues should be checked and assessed:</p> <ul style="list-style-type: none"> <li>▪ Is water sprayed fully in dry season at sensitive sites?</li> <li>▪ Does trucks used for transport material covering by tarpaulin?</li> <li>▪ Contracts signed with material/machine supplied contractors</li> <li>▪ Interview with local people about dust pollution</li> </ul>	<ul style="list-style-type: none"> <li>▪ The construction site</li> <li>▪ Material transported trucks</li> <li>▪ Working with investor</li> </ul>

<i>Parameters</i>	<i>Monitoring Measure</i>	<i>Monitoring location</i>
Water quality management	<p>The following issues should be checked and assessed:</p> <ul style="list-style-type: none"> <li>▪ How does sewage collection and treatment system implement at campsites? Are there septic tanks?</li> <li>▪ Does sewage discharge directly into environment without treatment?</li> <li>▪ Do the septic tanks in campsites keep sanitary?</li> <li>▪ Are oil and grease from vehicles/machines maintenance collected?</li> <li>▪ Are ditches/pits/embankments built at supplementary areas to collect sand/soil/cement before discharging into environment?</li> <li>▪ Is water quality measured periodically as presented in EMP/EIA?</li> </ul>	<ul style="list-style-type: none"> <li>▪ Campsites;</li> <li>▪ Crushing and mixing concrete area</li> <li>▪ Vehicle maintenance area;</li> <li>▪ Working with investor on document of water quality measurement</li> </ul>
Safety	<p>Visual observation (combine with information collection on health protection plan and safety issues):</p> <ul style="list-style-type: none"> <li>▪ Is health and safety plan prepared?</li> <li>▪ Are safe tools &amp; equipments provided to and being used by workers?</li> <li>▪ Are labors trained and disseminated information on safety?</li> <li>▪ Are there any warning notice and boards guiding safety handling to hazardous chemicals?</li> </ul>	<ul style="list-style-type: none"> <li>▪ Construction sites</li> <li>▪ Storage area</li> <li>▪ Working with investor</li> </ul>

<i>Parameters</i>	<i>Monitoring Measure</i>	<i>Monitoring location</i>
Worker health care	<ul style="list-style-type: none"> <li>▪ Are first-aid kits for workers equipped?</li> <li>▪ Do they clean up well the drainage? Is there mosquito net for sleeping?</li> <li>▪ Are workers trained about food safety and prevent sexually infected diseases?</li> <li>▪ Is there any disease for workers and did they treat by local health care centre?</li> </ul>	<ul style="list-style-type: none"> <li>▪ Camps</li> <li>▪ Working with investor</li> <li>▪ Interview workers</li> </ul>
Worker regulation	To assess implementation of regulations for workers as specified in item 19 of Table 4.1.	
Finding of cultural artifacts, and areas/structures of local cultural value	Observation, information collection, assessment of the below-mentioned issues:	<ul style="list-style-type: none"> <li>▪ Excavation area of soil/rock</li> <li>▪ Interview workers</li> <li>▪ Along transmission line</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Let check whether contractors/ investor/ related persons be informed the relevant organizations if accidental find of articles of cultural value?</li> <li>▪ Do contractors and related persons have followed procedures?</li> </ul>	
	<ul style="list-style-type: none"> <li>▪ Are there findings on cultural property and historical heritage in the soil/rock excavation?</li> </ul>	
	<ul style="list-style-type: none"> <li>▪ How are chance find procedures in place when accidental find of articles of cultural value?</li> </ul>	
	<ul style="list-style-type: none"> <li>▪ Location of tombs or valuable structures to local people</li> </ul>	

<i>Parameters</i>	<i>Monitoring Measure</i>	<i>Monitoring location</i>
<b>OPERATION PHASE</b>		
Noise	Observation at site, interview people to assess the following issues: Do noise from the powerhouse affect the local people?	<ul style="list-style-type: none"> <li>▪ The area out of the fence of powerhouse</li> </ul>
	If there is any claim about the noise, request the investor to measure noise at site.	<ul style="list-style-type: none"> <li>▪ The nearest residential area</li> </ul>
Safety and regulations to workers	The following issues should be checked and assessed: <ul style="list-style-type: none"> <li>▪ Are fire extinguishers equipped at site?</li> <li>▪ Check complying regulations for people as item 19 in Table 4.1</li> </ul>	<ul style="list-style-type: none"> <li>▪ Powerhouse area</li> <li>▪ Operation house and workers' camps (if any)</li> </ul>
Management of water quality in reservoir	The following issues should be checked and assessed: <ul style="list-style-type: none"> <li>▪ Is there any erosion at reservoir side? Are reinforcing measures applied?</li> <li>▪ Is domestic waste water collected and treated prior discharging into the environment?</li> <li>▪ Is there phenomenon of eutrophication in reservoir? Does investor remove floating vegetation from the reservoir?</li> </ul>	<ul style="list-style-type: none"> <li>▪ In the reservoir bed</li> <li>▪ Operation house and powerhouse</li> </ul>
Management of hazardous materials (fuels, lubricants, explosives etc.)	The following issues should be checked and assessed: <ul style="list-style-type: none"> <li>▪ Are hazardous materials stored in safe conditions?</li> <li>▪ Does the investor equip facilities, provide information and guide safe process to hazardous materials?</li> </ul>	<ul style="list-style-type: none"> <li>▪ In the plant and fuel, material and chemical storage areas.</li> </ul>

**Table 5-3 Form of in-site environmental monitoring report**  
**(Apply for contractor/investor)**

**Project name:** \_\_\_\_\_ **Project location:** \_\_\_\_\_  
**Name of Contractor:** \_\_\_\_\_  
**Commencement of Project report or monthly report:** \_\_\_\_\_  
**Date of report:** \_\_\_\_\_

<i>No.</i>	<i>Issues</i>	<i>Mitigation measures implemented</i>	<i>Remark</i>
<i>Construction Phase</i>			
1	Selecting of construction camps and supported facilities		
2	Vegetation clearance and topsoil stripping		
3	Detect bomb and mines		
4	Domestic and constructed solid waste management		
5	Removal of discarded vegetation out of reservoir area		
6	Soil erosion and sedimentation		
7	Transportation and traffic management		
8	Management of hazardous substances		
9	Noise		

<i>No.</i>	<i>Issues</i>	<i>Mitigation measures implemented</i>	<i>Remark</i>
10	Dust		
11	Water quality management		
12	Safety		
13	Worker Health Care		
14	Worker Regulation		
15	Chance find of cultural artifacts, and areas/structures of local cultural value		
16	Vegetation cover including reforestation		
<b><i>Operation Phase</i></b>			
1	Noise		
2	Surface water quality		
3	Waste water		
4	Solid waste		
5	Vegetation cover maintenance		

<i>No.</i>	<i>Issues</i>	<i>Mitigation measures implemented</i>	<i>Remark</i>
6	Environmental flow		
7	Management of hazardous materials		
8	Safety		
9	Labour Health Care		
10	Working regulation		

**Name of person prepared this Report:**

**Investor's technical supervisor statement**

**Title:**

**Address:**

**Telephone:**

**Table 5-4 Form of EMP implementation monitoring report**

(Applying for environmental monitoring report of independent environmental consultant)

**Project name:**

**Project location:**

**Date of report:**

<i>No</i>	<i>Impacts</i>	<i>Assessment of Consultant/ community complaints</i>	<i>Comments/Recommendations</i>
<b><i>Construction phase</i></b>			
1	Selecting of construction camps and supported facilities		
2	Vegetation clearance and topsoil stripping		
3	Detect bomb and mines		
4	Domestic and constructed solid waste management		
5	Removal of discarded vegetation out of reservoir area		
6	Soil erosion and sedimentation		
7	Transportation and traffic management		
8	Management of hazardous substances		

<i>No</i>	<i>Impacts</i>	<i>Assessment of Consultant/ community complaints</i>	<i>Comments/Recommendations</i>
9	Noise		
10	Dust		
11	Water quality management		
12	Safety		
13	Worker health care		
14	Worker regulation		
15	Chance find of cultural artifacts, and areas/structures of local cultural value		
16	Vegetation cover including reforestation		
<b><i>Operation phase</i></b>			
1	Noise		
2	Surface water quality		
3	Waste water		
4	Solid waste		

<i>No</i>	<i>Impacts</i>	<i>Assessment of Consultant/ community complaints</i>	<i>Comments/Recommendations</i>
5	Vegetation cover remaining		
6	Environmental flow		
7	Management of hazardous materials		
8	Safety		
9	Labour health care		
10	Worker regulation		

**Report prepared by:**

**Address and contact information:**

**Table 5-5 Requirements on environmental management reporting system**

<i>No.</i>	<i>Contents</i>	<b>1<sup>st</sup> reporting level</b>	<b>2<sup>nd</sup> reporting level</b>	<b>3<sup>rd</sup> reporting level</b> <i>(A copy sent to the district's Environment Management Department )</i>
<b>CONSTRUCTION PHASE</b>				
1	Implementation of mitigation measures and on-site environmental management	<b>By:</b> Contractor <b>Frequency:</b> Monthly <b>To:</b> Investor	<b>By: Investor</b> <b>Frequency:</b> Quaterly <b>To:</b> VCB (Quang Ngai Branch)/GDoE	<b>By:</b> VCB (Quang Ngai Branch) <b>Frequency:</b> Semi-annual <b>To:</b> GDoE
<i>No.</i>	<i>Contents</i>	<b>1<sup>st</sup> reporting level</b>		<b>2<sup>nd</sup> reporting level</b> <i>(A copy sent to the district's Environment Management Department )</i>
<b>CONSTRUCTION PHASE</b>				

1	Environmental monitoring	<b>By:</b> Independent Consultant <b>Frequency:</b> Semi-annual <b>To:</b> Investor/ VCB (Quang Ngai Branch)	<b>By:</b> Independent Consultant <b>Frequency:</b> Semi-annual <b>To:</b> GDoE/WB
<b>OPERATION PHASE</b>			
1	Labor safety and environmental monitoring	<b>By:</b> Investor <b>Frequency:</b> Yearly for first two years <b>To:</b> VCB (Quang Ngai Branch)	<b>By:</b> VCB (Quang Ngai Branch) <b>Frequency:</b> Yearly for first two years <b>To:</b> WB/GDoE

## **6. COMPLAINT ON ENVIRONMENT AND PENALTY**

While monitoring the scene if supervising/monitoring environmental officers discover that there is non-compliance with regulations on the implementation of measures to minimize environmental impacts mentioned in EMP then monitoring construction staff/ environmental supervisor shall make the records and report the investor .The investor will stop paying that month expense for the contractor until the contractor performed adequate measures to minimize environmental effects. The contractor will be extended one time (due to the construction supervision consultant / supervisor of environmental regulate) to correct this violation. If the contractor performs the repairs within the time extension he will not be penalized. However, if the contractor does not conduct the repairs needed in the extension period, the contractor will have to pay for a third party to repair the damage (this cost will be taken from retained). Investors must make provisions for compliance and sanctions for environmental violations in the contract with the contractor.

In case supervision staff / monitoring environmental officers find non-compliance with the environmental regulations of the contractor, the contractor shall have to pay the cost to repair the violation.

The investor is responsible for monitoring and implementing the EMP effectively. If he does not fulfill the implementation of the EMP, the slow disbursement from the project to the investors will happen

Environmental offices of the contractor will be the place to receive complaints from citizens against environmental influences such as dust, noise, traffic safety,... The Contractor's Chief Engineer and Personnel Assistant with the safety and environment officers will be responsible for carrying out or giving solutions to handle the above issues. Officer safety and environmental construction supervision consultant (or team management environment of the investor) will be provided with copies of the complaints of the people and must confirm that the problems are properly resolved by the contractor in a similar incidents were discovered when examining at site.

## 7. ENVIRONMENTAL MANAGEMENT CAPACITY BUILDING PLAN

### 7.1. In the preparation phase

Investor will send staffs who are assigned to manage environmental protection of project to participate the WB/GDoE training courses on preparation of EMP and public consultation.

### 7.2. In the construction and operation phase

The assigned staffs shall participate the training courses on WB's safeguard policies under REDP. The investor will appoint 1-2 environmental staffs to attend the short-term training courses on environment which are held by the local authorities. Additionally, book, papers and documents will be bought by Investor so that they could update the environmental protection information.

**Table 7-1 Cost estimation for environmental management capacity building**

<i>No</i>	<i>Activites</i>	<i>Costs (VND)</i>
<b>CONSTRUCTION PHASE</b>		
1	To appoint staffs to participate training courses held by WB: 2 persons x 5,000,000 VND/person/training course x 2 times	20,000,000
2	To appoint staffs to attend training courses held by the local environmental authorities. 2 persons x 1,000,000 VND/person/time x 2 time	4,000,000
3	Purchase of books, documents, papers to update information	10,000,000
	<b>TOTAL</b>	<b>34,000,000</b>
<b>OPERATION PHASE</b>		
4	Cost for annual training in the project running phase (10,000,000 VND/year x 20 year)	200,000,000
	<b>TOTAL</b>	<b>234,000,000</b>

## 8. ENVIRONMENTAL MANAGEMENT COST ESTIMATION

Table 8-1 Estimated cost for EMP implementation

<i>No.</i>	<i>Items</i>	<i>Construction phase</i>	<i>During operation phase (20 years of life cycle)</i>
1	Mitigation measures	The cost is covered in investment cost	The cost is covered in operation cost
2	Recover vegetation at project sites after construction phase	40,000,000 VND (The cost is covered in investment cost)	
3	Detect mine	30,000,000 VND (The cost is covered in investment cost)	
4	Monitoring costs for the Project. (By staff of environmental management team's company)	The cost is covered in investment cost	The cost is covered in operation cost
5	Environmental quality monitoring as required in Environment Accessment Report	Construction Phase 25,000,000 VND (Cost estimated)	Operation Phase 400,000,000 VND (Cost estimated)
6	Monitoring costs for independent environmental monitoring consultant*	Lump-sum (2 times/year x 2 years x 20,000.000/time) = 80,000,000 VND	
	Sub-total	<b>175,000,000 VND</b>	<b>400,000,000 VND</b> This cost is covered in production cost
	Total	<b>575,000,000 VND</b>	

\* This cost is paid by Project Management Board under GdoE

## **9. PUBLIC CONSULTATION AND DISCLOSURE**

### **9.1. Public consultation**

Public consultation have been conducted during the project preparing phase by the Quang Ngai SOVICO Energy One Member CO., Ltd, the main activities could be summarised as the following:

1 The feasibility study report and investment report of Son Tay project were submitted to the People Committees of Son Tan, Son Mua and Son Dung Commune. Based on the comments from above local authorities on locations of the main components, the investor can revise promptly project documents to get effective investment and mitigate compensation of relocation and impacts on environment and communities.

2 Social survey by interview directly representatives of local authorities and affected households was done by developer. Results from these investigations show that almost households and local authorities support to construction of project since it provides benefits for local residents.

3 Site survey and check list impacts on environmental and affected people.

4 Preparing the Environmental Management Plan for project.

5 Organising the public consultation meetings on information included in the EMP report and other related issues were held at the offices of Communal People Committees in Son Tan, Son Mua and Son Dung communes from 26<sup>th</sup> – 28<sup>th</sup> August 2014. The participants were representatives of Quang Ngai SOVICO, local authorities of communes of Son Tan, Son Mua, Son Dung commune, environmental and social consultants and affected households (Minute of meetings and list of participants are presented in the Annex 3). The main results from consultation meetings could be summarised as the bellow:

Investor presented the main information of project:

- Son Tay small hydropower project has with the capacity of 18 MW is categorized as the III class, with annual electricity production is 72,85 million KWh, and it is impoundment, regulated by reservoir. The headwork consists of gravity concrete dam with 28,5m in length, and spillway with 124m in length, intake with 230m in length. The bank energy route includes intake, penstock, transport route, powerhouse, switchyard and management area. Son Tay hydropower project was approved in Quang Ngai small power development plan under Decision No. 2848/QĐ-UBND dated 7/12/2007 and Letter No. 1283/UBND - CNXD date 9/5/2008 of Quang Ngai PC.
- Construction of Son Tay small hydropower project as the same other ones will cause some negative/positive impacts to environment and social and these negative impacts are unavoidable. EMP is prepared following to the World Bank safeguard policies and commits to complying to mitigation measures so that the negative impacts could limit. Developer also develops CDM for Son Tay hydropower project and hope to have support from local authorities as well as residents for project.

The environmental consultant presented generally the environmental negative/positive impacts and mitigation measures which will be applied by developer/contractors during project implementation as below:

***Positive impacts:***

- Around 4 km length of internal road to connect with the Provincial Road No. 623 in Son Tan commune will be built newly serving for project construction facilitate for improving traffic system of local residents. The project also will utilize road TC5 of Dakdrinh Hydropower plant and newly construct ĐM1 and ĐM2 to access to left and right bank energy route of project. All these roads will help to enhance the accessibility and mobility for local communities in term of goods transportation, information access and others.
- When finishing, project will supply stable power with high quality for the local people. It will support to development of industrial, handicraft and traditional sectors in the locality
- During construction and operation phases, project creates jobs for local people
- After formation of reservoir, climate in the project area becomes cooler with higher humidity that facilitates for development of vegetation cover, trees and reservoir aquatic species such as fish, snail, shrimp etc. The reservoir could allow developing aquaculture in the future which provides new jobs and income for local residents.
- Income from tax of water resource usage which is provided from project will be added to provincial budget.

***Negative impacts:***

Construction and operation of project must block river, storage water, build the main components such as dam, powerhouse, switchyard, transmission line etc that cause some unavoidable impacts as below:

- 34.8 ha of land will be acquired permanently for building components of headwork and a certain land area will also be acquired temporary for auxiliary facilities
- Construction activities of components of headwork such as dam, spillway, intake, penstock, powerhouse and switchyard have to excavation of soil/rock that cause landslide/erosion at these sites.
- Process of blocking river, constructing dam bringing about increasing turbidity and reduction of water quality on Đakdrinh river.
- Activities such as blasting, excavation of foundation, quarry, levelling soil and rock, material transportation, rock grind, concrete mixing, operation of constructed machines, construction etc will impact to environment causing air pollution in case the mitigation measures are not applies.
- In the construction phase, the operation of constructed/transported facilities, concrete mixing, rock grind, blasting, using driller etc will create noise that disturb to local residents.
- Constructed and domestic solid waste that discharged from workers will cause pollution of air and river water quality if it is not well controlled.

- In the construction phase, the aquatic species may lose temporary living condition due to reduction of surface water quality that cause by random spilling or rain sweeping away concrete, petrol, oil, gear, soil, rock etc..

However, this is only temporary and negligible impacts. They may be mitigated because project has small scale and the construction time takes only 2 years.

***Some key main mitigation measures:***

Environmental consultant presented briefly draft EMP which will be complied by investor to mitigate negative impacts with some key measures as below:

- The permanent and temporary acquired land due to project construction will be compensated following compensation plan which is approved by local authorities. During construction phase, cultivate and public transportation acquired land for campsites, transmission line and auxiliary facilities will be limited by contractors.
- The contractors are responsible for inform to local authorities and residents on blasting time so that they do not travel or release cattle in the blasting areas.
- Disposals have to meet criteria: far from surface water at lease 100m, do not affect to surface water, cultivate land, do not locate on the risk of erosion, should locate on the hollow sites to mitigate sweep away by runoff water.
- To establish the worker code at construction site containing regulations such as prohibiting workers to discard domestic/construction waste into surrounding areas, river, stream or places which may sweep away to surface water.
- Do not allow to burn solid waste to mitigate risks of forest fire.
- After construction phase, the mine, borrow pits or disposals etc must be restored by levelling ground then planting trees to prevent erosion.
- Planting trees and controlling vegetation cover at reservoir surrounding area especially in the places of semi-flooding, main components for more stability of ground.
- To arrange storehouses of petrol, fuels etc at minimum safe distances of 300 m from surface water, local communities.
- Reduce dust generated by watering at least 1-2time/day during hot and strong wind season on the construction sites which will be located close to residential areas or along the inter construction road next to residential areas.

Developer commits to comply with EMP with the main issues presented above.

***Questions and answers are summarized as below:***

***Son Dung commune, Son Tay district:***

Questions from representatives of local authorities and affected households

- Mr. Dinh Nguyen Tran – Secretary of Commune party: The commune total agree with construction fo Son Tay Hydropower plan. However, the

experiences from Đakrinh 1 hydropower need to be considered during preparing resettlement plan and compensation prices for affected households.

- Mr. Le Khac Gam Anh: The developer need to carefully remove trees and biomass in reservoir before restore water to reduce odour. Traffic safety and noise, dust need to be minimized during construction times.
- Mr. Truong Quang Tho – Vice Chairman: The developer need to clearance reservoir bed. Disclosure the mine explode plan for local authorities and peoples and temporary register for workers.

***Son Tan commune, Son Tay district:***

Comments and suggestions from local authorities and people:

- Mr. Pham Hoai Dao: Local people will support for Son Tay hydropower plant to promote social and economic development in the areas and in Son Tay district. However, the compensation price, compensated procedures, livelihood assistance and environmental protection need to be concerned.
- Mr. Vuong Hoang Hieu: The Project have been delay, by there are not announcement for local people. The Project need to carry out DMS, compensation. And informing for local people on the mining explode plan need to be followed to ensure safety for local people.
- Mr. Dinh Van Phuong: The Project need to carry out mitigation measure to ensure water quality in the down stream areas.
- Mr. Ngo Van Truong – Officer from Commune People Committee: The developer need to considered all recommendations and suggestion from local people, follow technical specification to avoid risk of dam broken. Ensure safety and sanitation condition during construction time.

***Son Mua commune, Son Tay district:***

Recommendation and suggestion from local authorities and people:

- Mr. Le Van Cuong – Vice Chairman: We agree with construction of Son Tay hydropower plant. However, the developer need to update compensation price, ensure safety and sanitation condition and ambient environmental quality during construction time.
- Mr. Dinh Van Lang: The developer need to update DMS and compensation price, ensure safety for local people during explode and create good condition for local people.
- Mr. Nguyen Thanh Son – Representative from developer concluded that: thanks for all comments, suggestion from local people. The developer commit that thr Project will ensure environmental protection, upded DMC and compensation price.

6 The EMP report will be updated according to suggestion, comments from local authorities and affected people in the consultation meetings as well as result from site surveys.

7 To provide EMP to communal people committee of Son Tan, Son Mua, Son Dung for their further comments.

8 To revise EMP again based on comments.

## **9.2. Disclosure**

As policy of WB's disclosure, investor will implement steps as below:

- To provide EMP (approval by WB) in Vietnamese version to Son Tay DONREs, Son Tay District People Committees and Son Dung, Son Mua, Son Tan Communal People Committees.
- The approved EMP in Vietnamese version will be disclosure at project site during project implementation, and in commune office of Son Dung, Son Mua, Son Tan Communal People Committees during working time.
- To provide EMP in both English and Vietnamese versions to Information Development Centre, 63 Ly Thai To street, Hanoi so that they are accessed by NGOs and communities. EMP in English version is sent to WB Infoshop for disclosure.

**List of reference documents**

- 1 The compensation and relocation Plan of the project - SOVICO Quang Ngai
- 2 Investment Report of Son Tay hydropower project - SOVICO Quang Ngai
- 3 The World Bank's Safeguard policies;
- 4 Environmental Impact Assessment of Son Tay hydropower project
- 5 Environmental safeguard framework for Vietnam Renewable Energy Development Project - MOIT 2008, revised 2014.
- 6 Statistical yearbook- statistic publishing house

**Annex 1. List of EMP preparers**

<i>No.</i>	<i>Name</i>	<i>Agency</i>
1	Mr. Do Van Chinh	Director of SOVICO Quang Ngai
2	Mr. Pham Van Quang	Head of Technical Department - SOVICO Quang Ngai
3	Mrs. Le Thi Thanh Nhan	Environmental expert

## **Annex 2. Responsibility of safe and environmental supervising officer**

### **The Target**

*The safe and environmental supervising officer* supports the EMP efficiently during the Son Tay hydropower construction

To achieve the target of diminishing the environmental negative impacts of the project, the contractor needs to comply with this management plan. Therefore, implementing him environmental management plan will relate to the following units:

*The safe and environmental officers of the contractor* are responsible for supervising the EMP and problems about safety and environment of the construction

*The safe and environmental supervising officers of the developer* are responsible for the construction inspection and guarantee that the contractor will comply with the requests in the contract and EMP

### **Tasks:**

Overall responsibilities of the safe and environmental supervising officers including supervision and inspection of construction activities to ensure that the mitigation measures are implemented as appropriate in the plan so that environmental management and the negative impact of the project on the environment is diminished.

The contractor is responsible for ensuring compliance with the environmental management plan of the project and the contract conditions during construction under the supervision of safety and the environment officer. Therefore, safety and the environment officer is an independent supervisory personnel to ensure compliance with the environmental management plan and ensure the full implementation of the contractor for environmental issues

Personnel monitoring and environmental safety will examine monitor and implement the environmental review for tenders and contracts for road construction. Supervisors on safety and the environment have much knowledge and experience in monitoring and verification of environmental issues and advise investors on implementation issues of the project environment project. Personnel monitoring and environmental safety should be familiar with the project work through the review of relevant reports, including the report on environmental impact assessment (DTM) Son Tay hydropower project, environmental Management plan as well as the relevant technical standards and contract documents.

Being a part of the construction examiner group, safety and environmental staff is obliged to the following tasks

#### **Phase 1: Preparation**

The objective of Phase I is taking foundation for successful implementation of the project. During this period, supervisors, safety and environment must: (i) consider the DTM, environmental management plan, project design and technical standards to assert not to miss these mitigation measures ; (ii) prepare guidelines for contractors in the implementation of Environmental Management Plan; and (iv) develop and implement training programs for activities related to construction.

Main tasks for this phase are:

Desk study: supervisors on safety and the environment will review the DTM, environmental management plan, project design and technical standards and certify in writing expressly not to omit any mitigation measures. If problems arise, safety and environment officers propose to the investor for additional updates in the environmental management plan, project design and technical standards of this issue. When the Investors, Board of Management and the World Bank project GDoE ratify, personnel monitoring and environmental safety will conduct additional updates environmental management plan

**Environmental supervision directory:** The safety and environment officers need to create an examination directory during the construction for supervising the implementation of the contractor. This includes the core issue of the project, the requested mitigation measures and implementation plan

**Diary:** safety and environment supervising staff of the Contractor shall keep diaries to record events or changes possibly implicate the assessment of environmental impact and non-compliance attached to the proposals. Diaries must be always ready to serve when the supervisory staff support as mentioned in the environmental management plan and contract suggest. Safety and environment staff of the investor will verify this diary.

**Environmental training :** Environmental safety staff of the investors are obliged to design and implement a comprehensive training program for the Supervision Engineer, Owner, environmental safety officers of the contractor (and workers as part of training for supervisors, safety and environment), the environmental requirements of the project and methods for monitoring and evaluation, especially should pay attention to:

Environmental management plan: the requirements of the Environmental Management Plan, approved check list in supervising environmental, environmental sample monitoring and processing methods for non-compliance with the management plan environment and all the issues will be mentioned. Special attention should be paid to the specific terms of the contract emphasized on compliance with the environmental management plan

Health and safety: Health and safety requirements of the project must be apparently verified and coordinated to the contractors and the investor (included in the technical standard environment for the contractors

At the end of training, the contractor will sign a confirmation through training grasp of environmental regulations, the environmental management plan and compliance framework, on the health and safety obligations. Construction supervisors must sign the certification through training understand the oversight responsibilities.

### ***Phase 2 Construction activities supervision***

Safety and environment officer of the investors will represent the Owner and monitoring Chief Engineer:

- Examining and monitoring independently the implementation of the Environmental management plan

- Performing random checks and review the profiles of environmental safety staff of the Contractor
- Proceeding the inspection frequently in the building section
- Reviewing the implementation of the mitigation measures is not right with the environmental management plan and contract documents
- Reviewing the effectiveness of the mitigation measures and the implementation of environmental problems;
- Reviewing the terms acceptable environmental construction methodology (including temporary works and permanent works), designs and related submissions. If necessary, staff safety and the environment have to research and propose solutions to the environmental impacts discussed with the designers, contractors and Investors
- Verifying survey cases of non-compliance of environmental quality and effectiveness of the remedial measures;
- Providing feedback to the Owner and Chief Engineer under the supervision of the process of non-compliance with the Environmental Management Plan;
- Organizing training programs, including team environmental safety staff of the contractors, evaluating issues identified an improve environmental compliance method;
- To conduct the contractors to repairs within the prescribed time, conducting additional monitoring, if required, in accordance with the provisions of the contract and procedures in case of non-compliance and complaints
- To conduct the contractor to take measures to minimize the impact and comply with the environmental management process required in the case of non-compliance and inconsistency
- To conduct the contractor to stop the construction activities which can cause negative effects, and / or if the contractor fails to perform the requirements of the Environmental Management Plan / not conduct operations as directed the supervisor of environmental safety.

**Review of the plan at site:** To ensure the consistency throughout the project, safety and the environment staff must consider the entire plan could affect the environment. These plans include, but are not limited to: plan pits and dumps. Supervisors on safety and the environment will be considered and approved the environmental management of the project and plans to restore the landscape of the contractor. What parts of the plan does not comply with the environmental management plan, environmental impact assessment, personnel and environmental safety of the investors will work with the Chief Engineer and the Contractor to take appropriate measures.

**Health and Safety:** To ensure consistency throughout the project, *the environmental safety officer* must consider all of the safety plan of the contractor, and on the basis of this plan, with the data of the investor's input, to create a comprehensive plan for safety projects. Comprehensive Plan about project safety must include processes such

as blast management and safety in the construction process, preventing landslides / soil erosion during the rainy season, ... These plans must be reviewed on an annual basis and must be updated as necessary.

The supervisors on safety and the environment must ensure compliance with the provisions of health and safety in the contract documents. This Compliance includes, but is not limited to: (i) the construction activities; (ii) dissemination of education on HIV / AIDS; (iii) comply with the labor law of Vietnam; and (iv) traffic safety. For the prevention of HIV / AIDS, not only focusing on the construction site, but also pay attention to the nearby communities.

In case of violation in the requirements of technical standards, or contractual conditions or non-compliance with the environmental management plan, safety and the environment monitor immediately notify to the Chief Engineer of the Contractor , Chief Engineer supervision and investor. Safety and the environment supervisors must also report violations to the Investor as part of the monthly report.

Diary of safety and the environment staff must always be ready to provide, upon request by the support team of project management

Safety and the environment supervisors have to regularly review records of the Contractor to ensure that all records are updated in accordance with reality and meet the requirements of the Environmental Management Plan (eg the records of complaints about environmental issues).

**The unintended effect:** In case of the incident which was not anticipated in the environmental management plan and DTM, safety and the environment monitors must be closely coordinated with the investor, the contractor and the project manager to confirm that the problem has been resolved. Safety and the environment supervisors must update Environmental Management Plan and implement guidelines, based on that training for contractor personnel

**Monthly Payment:** safety and the environment monitoring officer must certify the monthly payment for activities related to the environment as proposed by the Monitoring Officer safety and the environment to the investor.

**Roadwork's and landscaping restore:** safety and the environment monitoring officer must closely monitor the operation to restore the site and landscaping in areas such as land mines, quarries, wash stations vehicles, to ensure that activities are carried out according to acceptable standards. Safety and the environment supervisors must be consistent with the contractor about the recovery plan which should be implemented before the end of construction activities.

**Human Resource for the Project:** safety and environmental supervisors and building monitors group is expected to be mobilized 1 month prior to construction commencement. In January, the safety and environmental monitor will be familiar with the project, project design, specifications, contract documents, environment protection commitment, environment management plan and other reports and documents related to the project. Based on the review, monitoring officer safety and the environment will report a summary of the issues that may arise in the process of implementing the environmental management plan and the conditions of the contract

the recommend the Manager the best option to improve the process of implementing the environmental management plan.

Supervisors and safety are expected to be mobilized in the early stages of the contract to prepare the guidelines, documentation, training,

**Report:** environmental safety officers must make a minimum of the following documents: ...

- Weekly reports on issues of non-compliance;
- Monthly report summarizes the main issues and findings during surveillance activities;
- Quarterly report from the contractor's monthly report

Reports and data must be provided as required by the project manager.

At the end of the project, safety and environment monitoring staff set up a final report summarizing the main findings, the non-compliance, the solutions ... as well as guidance on implementing orientation this mission later.

Annex 3. The approval documents on EIA of Son Tay HP

<p><b>ỦY BAN NHÂN DÂN TỈNH QUẢNG NGÃI</b></p> <p>Số: 1226 /QĐ-UBND</p>	<p><b>CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM</b> <b><u>Độc lập - Tự do - Hạnh phúc</u></b></p> <p>Quảng Ngãi, ngày 29 tháng 7 năm 2015</p>																		
<p><b>QUYẾT ĐỊNH</b> <b>Phê duyệt Báo cáo đánh giá tác động môi trường</b> <b><u>Dự án Thủy điện Sơn Tây</u></b></p>																			
<p><b>CHỦ TỊCH ỦY BAN NHÂN DÂN TỈNH QUẢNG NGÃI</b></p>																			
<p>Căn cứ Luật Tổ chức HĐND và UBND ngày 26/11/2003;</p> <p>Căn cứ Luật Bảo vệ môi trường ngày 23/6/2014;</p> <p>Căn cứ Nghị định số 18/2015/NĐ-CP ngày 14/02/2015 của Chính phủ Quy định về quy hoạch bảo vệ môi trường, đánh giá môi trường chiến lược, đánh giá tác động môi trường và kế hoạch bảo vệ môi trường;</p> <p>Xét nội dung Báo cáo đánh giá tác động môi trường Dự án Thủy điện Sơn Tây đã được chỉnh sửa, bổ sung kèm theo kèm theo văn bản số 64/CV-SVCQN ngày 10/7/2015 của Công ty TNHH MTV năng lượng SOVICO – Quảng Ngãi; Theo đề nghị của Giám đốc Sở Tài nguyên và Môi trường tại Kết quả thẩm định số 1305/STNMT-ĐTM ngày 11/6/2015 và Tờ trình số 1641/TT-STNMT ngày 20/7/2015,</p>																			
<p><b>QUYẾT ĐỊNH:</b></p>																			
<p><b>Điều 1.</b> Phê duyệt Báo cáo đánh giá tác động môi trường Dự án Thủy điện Sơn Tây (sau đây gọi là Dự án), với các nội dung chủ yếu sau đây:</p>																			
<p><b>1. Chủ dự án:</b> Công ty TNHH MTV năng lượng SOVICO – Quảng Ngãi.</p>																			
<p><b>2. Phạm vi, quy mô, công suất của Dự án:</b></p>																			
<p><b>2.1. Phạm vi:</b></p>																			
<p>- Địa điểm thực hiện Dự án: thuộc 03 xã: Sơn Mùa, Sơn Tân và Sơn Dung, huyện Sơn Tây, tỉnh Quảng Ngãi.</p>																			
<p>- Vị trí đập chính: cách Cầu Tà Đồ và Nhà máy thủy điện Đăkdrinh khoảng 3km về phía Tây (phía thượng nguồn).</p>																			
<p>- Kênh chuyển nước và tuyến đập phụ nằm bên vai phải đập chính, nằm trên suối Tà Mực, gần vị trí tiếp giáp giữa nhánh suối Tà Mực và sông Đăkdrinh.</p>																			
<p>- Vị trí Nhà máy cách Nhà máy thủy điện Đăkdrinh khoảng 500m về phía Tây Bắc (phía thượng nguồn).</p>																			
<p>- Nhu cầu sử dụng đất tại khu vực Dự án:</p>																			
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;">STT</th> <th style="width: 45%;">Loại đất</th> <th style="width: 20%;">Diện tích (m<sup>2</sup>)</th> <th style="width: 30%;">Ghi chú</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>Tổng diện tích đất chiếm dụng</td> <td style="text-align: center;">516.400</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">1.1</td> <td>Chiếm dụng vĩnh viễn</td> <td style="text-align: center;">375.200</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">1.2</td> <td>Chiếm dụng tạm thời</td> <td style="text-align: center;">141.200</td> <td style="text-align: center;">-</td> </tr> </tbody> </table>	STT	Loại đất	Diện tích (m <sup>2</sup> )	Ghi chú	1	Tổng diện tích đất chiếm dụng	516.400	-	1.1	Chiếm dụng vĩnh viễn	375.200	-	1.2	Chiếm dụng tạm thời	141.200	-			
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1.2	Chiếm dụng tạm thời	141.200	-																

2	Số liệu các loại đất		
2.1	Đất rừng sản xuất	423.437,2	-
2.2	Đất trồng lúa	12.930,7	Ruộng bậc thang
2.3	Đất trồng cây lâu năm	3.577,2	-
2.4	Đất trồng cây hàng năm khác	1.125,1	-
2.5	Đất ở nông thôn	796,9	-
2.6	Đất sông suối	72.819,4	-
2.7	Đất giao thông	1.520,4	-
2.8	Đất đồi, núi chưa sử dụng	193,1	-
3	Tổng số hộ dân bị mất đất		
3.1	Xã Sơn Tân	83 hộ	-
3.2	Xã Sơn Dung	07 hộ	-
3.3	Xã Sơn Mùa	07 hộ	-

2.2. Quy mô, công suất:

- Công suất lắp máy 18 MW, sản lượng điện hằng năm 72,85 triệu kWh.
- Diện tích lưu vực: 186 km<sup>2</sup>.
- Các thông số chính của Dự án:

TT	THÔNG SỐ	ĐƠN VỊ	TKKT	GHI CHÚ
I	Cấp công trình			
		cấp	III	
II	Lưu vực			
1	Diện tích lưu vực $F_{lv}$	km <sup>2</sup>	186	
2	Lượng mưa trung bình nhiều năm $X_p$	mm	3.510	
3	Tổn thất bốc hơi $\Delta Z$	mm	459	
4	Mô đun dòng chảy $M_0$	l/s/km <sup>2</sup>	83,3	
5	Lưu lượng bình quân năm $Q_b$	m <sup>3</sup> /s	15,53	
6	Tổng lượng dòng chảy năm $W_0$	10 <sup>6</sup> m <sup>3</sup>	489	
III	Hồ chứa			
1	Mực nước lũ kiểm tra ứng với P = 0,2%	m	202,75	
2	Mực nước lũ thiết kế ứng với P = 1%	m	201,03	
3	Mực nước dâng bình thường (MNDBT)	m	192,50	
4	Mực nước chết (MNC)	m	183	
5	Dung tích toàn bộ ( $W_0$ )	10 <sup>6</sup> m <sup>3</sup>	535	
6	Dung tích hữu ích ( $W_{hi}$ )	10 <sup>6</sup> m <sup>3</sup>	397	
7	Dung tích chết ( $W_c$ )	10 <sup>6</sup> m <sup>3</sup>	138	
8	Diện tích ứng với MNDBT ( $F_{MNDBT}$ )	km <sup>2</sup>	0,06	
IV	Quy mô các hạng mục công trình chính			
1	<b>Đập dâng bờ phát</b>			
	- Kết cấu đập			BTTL
	- Cao trình đỉnh đập	m	203,50	
	- Chiều dài đập theo đỉnh (L)	m	45,50	
	- Chiều rộng đỉnh đập (B)	m	3	
2	<b>Đập dâng bờ trái</b>			
	- Kết cấu đập			BTTL
	- Cao trình đỉnh đập	m	203,50	

TT	THÔNG SỐ	ĐƠN VỊ	TKKT	GHI CHÚ
	- Chiều dài đập theo đỉnh (L)	m	41	
	- Chiều rộng đỉnh đập (B)	m	6	
3	<b>Đập tràn xả lũ</b>			
	- Kết cấu đập		BTTL	
	- Số khoang tràn (n)	khoang	1	
	- Chiều rộng khoang tràn	m	120	
	- Cao trình ngưỡng tràn	m	192,50	
	- Chiều cao đập lớn nhất (H <sub>d</sub> )	m	20,50	
	- Lưu lượng xả ứng với lũ thiết kế P <sub>1%</sub>	m <sup>3</sup> /s	7.180	
	- Cột nước lớn nhất trước tràn với P <sub>1%</sub>	m	8,53	
	- Lưu lượng xả ứng với lũ kiểm tra P <sub>0,2%</sub>	m <sup>3</sup> /s	9.390	
	- Cột nước lớn nhất trước tràn với P <sub>0,2%</sub>	m	10,25	
4	<b>Cửa lấy nước</b>			
	- Cao trình ngưỡng	m	178	
	- Cao trình đỉnh	m	203,50	
	- Cao trình đáy	m	177	
	- Kích thước B x H	m	3,0 x 3,0	
	- Lưu lượng thiết kế (Q <sub>sk</sub> )	m <sup>3</sup> /s	22,20	
5	<b>Hầm dẫn nước</b>			
	- Chiều dài hầm	m	2.990	
	- Đường kính trong hầm	m	3	
	- Độ dốc hầm	%	0,44	

Điều 2. Chủ dự án có trách nhiệm thực hiện những nội dung đã được nêu trong Báo cáo đánh giá tác động môi trường và những yêu cầu bắt buộc sau đây:

2.1. Phối hợp với các cơ quan chức năng liên quan, các chủ rừng bị chiếm dụng đất bồi Dự án thực hiện công tác kiểm kê, bồi thường và thỏa thuận phương án trồng rừng bồi hoàn đối với diện tích rừng bị thiệt hại.

2.2. Thực hiện hoàn thổ và khôi phục cảnh quan các khu đất được giao làm mặt bằng phục vụ thi công; phối hợp với chính quyền địa phương xác định vị trí bãi trữ vật liệu và bãi thải phát sinh trong quá trình thi công và chỉ được phép đổ thải vào vị trí khi được sự đồng ý của chính quyền địa phương.

2.3. Thông tin rộng rãi cho chính quyền địa phương và cộng đồng dân cư nơi thực hiện Dự án biết về các hoạt động thi công của Dự án.

2.4. Xây dựng quy trình vận hành hồ chứa của Dự án, bảo đảm duy trì dòng chảy tối thiểu đáp ứng các nhu cầu sử dụng nước cho các đối tượng đồng nước phía hạ du.

2.5. Thực hiện các biện pháp giảm thiểu tác động đến môi trường đất, không khí, nước và tài nguyên sinh vật, các biện pháp phòng chống cháy nổ và các giải pháp quản lý, kỹ thuật khác trong quá trình thi công, vận hành đảm bảo các yêu cầu của quy trình vận hành hồ chứa, đảm bảo các quy định về vệ sinh môi trường, an toàn và phòng ngừa các sự cố môi trường cho người lao động và cộng đồng dân cư khu vực hạ lưu Dự án. Trường hợp xảy ra sự cố làm ảnh hưởng đến các công trình và môi trường xung quanh, Chủ dự án phải có trách

nhệm bồi thường thiệt hại và khắc phục các sự cố theo đúng quy định pháp luật.

2.6. Trong quá trình thi công xây dựng Dự án phải thực hiện các biện pháp giảm thiểu ô nhiễm môi trường, đảm bảo không gây ảnh hưởng đến khu vực xung quanh và tuân thủ các Quy chuẩn kỹ thuật quốc gia về tiếng ồn, độ rung, môi trường không khí: Quy chuẩn kỹ thuật quốc gia về tiếng ồn – QCVN 26:2010/BTNMT, Quy chuẩn kỹ thuật quốc gia về độ rung QCVN 27:2010/BTNMT, Quy chuẩn kỹ thuật quốc gia về chất lượng không khí xung quanh – QCVN 05:2013/BTNMT và các Quy chuẩn môi trường hiện hành khác có liên quan.

2.7. Thu gom, xử lý các loại nước thải phát sinh trong quá trình xây dựng và hoạt động của Dự án theo các quy định của pháp luật hiện hành; nước thải đảm bảo sau khi được xử lý đạt Quy chuẩn kỹ thuật quốc gia về môi trường: Quy chuẩn kỹ thuật quốc gia về nước thải sinh hoạt – QCVN 14:2008/BTNMT (cột B với hệ số K= 1).

2.8. Thu gom, xử lý các loại chất thải rắn phát sinh trong quá trình thi công và vận hành Dự án đảm bảo các yêu cầu về vệ sinh môi trường và theo đúng quy định tại Nghị định 59/2007/NĐ-CP ngày 09/04/2007 của Chính phủ về quản lý chất thải rắn. Quy chuẩn kỹ thuật quốc gia về chất thải nguy hại QCVN 07:2009/BTNMT; Thông tư số 12/2011/TT-BTNMT ngày 14/4/2011 của Bộ tài nguyên và Môi trường quy định về quản lý chất thải nguy hại và các quy định hiện hành khác.

2.9. Thường xuyên kiểm tra các hạng mục công trình, khi phát hiện có sự cố xảy ra phải nhanh chóng khắc phục và thông báo cho các cơ quan chức năng biết để phối hợp xử lý kịp thời.

2.10. Lập, phê duyệt và niêm yết công khai kế hoạch quản lý môi trường của Dự án tại trụ sở UBND các xã: Sơn Mùa, Sơn Tân và Sơn Dung, huyện Sơn Tây, đồng thời gửi Sở Tài nguyên và môi trường để kiểm tra theo dõi ngay sau khi Quyết định này có hiệu lực.

2.11. Thực hiện nghiêm túc các yêu cầu về bảo vệ môi trường quy định tại Điều 2 Quyết định này và các trách nhiệm khác theo quy định của pháp luật về bảo vệ môi trường.

2.12. Lập hồ sơ đề nghị kiểm tra, xác nhận việc thu dọn lòng hồ trước khi tích nước phục vụ giai đoạn vận hành của Dự án gửi cơ quan có thẩm quyền để kiểm tra, xác nhận.

**Điều 3.** Chủ dự án phải tuân thủ nghiêm túc chế độ thông tin, báo cáo về việc thực hiện nội dung của báo cáo đánh giá tác động môi trường đã được phê duyệt và các điều kiện kèm theo:

3.1. Tuân thủ nghiêm ngặt các quy định của pháp luật hiện hành về sử dụng vật liệu nổ công nghiệp phục vụ cho hoạt động thi công xây dựng Dự án; bảo đảm an toàn đối với cộng đồng dân cư, các máy móc, thiết bị và các công trình cần bảo vệ xung quanh trong quá trình xây dựng Dự án.

3.2. Thực hiện nghiêm các yêu cầu của UBND về việc phê duyệt phương án trồng rừng thay thế diện tích rừng chuyển đổi mục đích sử dụng để xây dựng Dự án Thủy điện Sơn Tây và các văn bản của Ủy ban nhân dân các xã: Sơn Mùa, Sơn

Tân và Sơn Dung, huyện Sơn Tây; Ủy ban mặt trận tổ quốc các xã: Sơn Mù, Sơn Tân và Sơn Dung, huyện Sơn Tây kèm báo cáo ĐTM được phê duyệt này.

3.3. Tuân thủ các quy định về an toàn hóa chất, phòng cháy chữa cháy, ứng cứu sự cố, an toàn lao động, tài nguyên nước và các quy định khác của pháp luật trong các hoạt động của Dự án; phối hợp chặt chẽ với chính quyền địa phương trong quá trình thực hiện Dự án để làm tốt công tác tuyên truyền nâng cao nhận thức về bảo vệ môi trường đối với nhân dân địa phương, công nhân tham gia thi công và vận hành Dự án.

3.4. Đảm bảo kinh phí để thực hiện các hoạt động bảo vệ môi trường và chương trình quan trắc, giám sát môi trường hàng năm theo như Báo cáo đánh giá tác động môi trường đã được phê duyệt. Số liệu quan trắc, giám sát phải được cập nhật, lưu giữ và phải có báo cáo gửi cơ quan quản lý Nhà nước về bảo vệ môi trường để theo dõi, giám sát.

Điều 4. Báo cáo đánh giá tác động môi trường của Dự án và những yêu cầu bắt buộc tại Điều 2, Điều 3 của Quyết định này là cơ sở để các cơ quan quản lý nhà nước có thẩm quyền thanh tra, kiểm soát việc thực hiện công tác bảo vệ môi trường của Dự án.

Điều 5. Trong quá trình triển khai thực hiện nếu có những thay đổi về nội dung Báo cáo đánh giá tác động môi trường, Chủ dự án phải có văn bản báo cáo cơ quan có thẩm quyền và chỉ được thực hiện những thay đổi sau khi có văn bản chấp thuận của UBND tỉnh Quảng Ngãi.

Điều 6. Giao các sở, ngành, địa phương: Tài nguyên và Môi trường, Nông nghiệp và Phát triển nông thôn, Công Thương, Công an tỉnh, UBND huyện Sơn Tây thực hiện việc kiểm tra, giám sát việc thực hiện các nội dung bảo vệ môi trường trong Báo cáo đánh giá tác động môi trường đã được phê duyệt tại Quyết định này.

Điều 7. Quyết định này có hiệu lực thi hành kể từ ngày ký.

Điều 8. Chánh Văn phòng UBND tỉnh, Giám đốc các Sở: Tài nguyên và Môi trường, Nông nghiệp và Phát triển nông thôn, Công Thương, Xây dựng, Giao thông vận tải, Công an tỉnh; Thủ trưởng các sở, ngành có liên quan; Chủ tịch UBND huyện Sơn Tây; Công ty TNHH MTV Năng Lượng SOVICO chịu trách nhiệm thi hành Quyết định này./

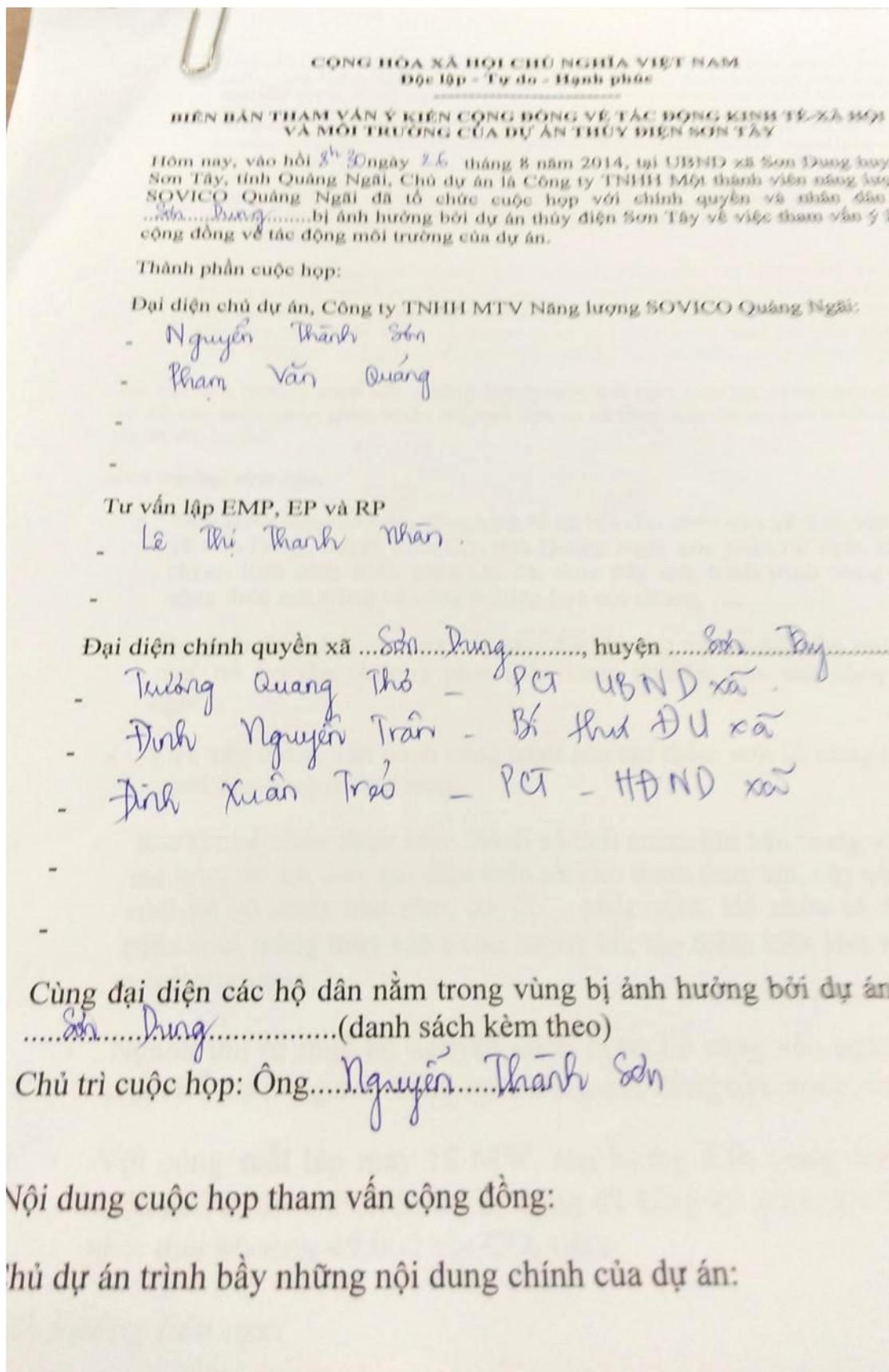
Nơi nhận:

- Như Điều 8;
- TTU, T/UBND tỉnh (báo cáo);
- CT, PCT (CN,NL) UBND tỉnh;
- VPUB: PCVP(CN,NL), NNTN, CBTH;
- Lưu: VT, CNXD.04/2022.



Phạm Như Số

Annex 4. Minute of Public Consultation Meetings



Thủy điện Sơn Tây với công suất lắp máy 18 MW thuộc công trình cấp III, sản lượng điện trung bình năm khoảng 72,85 triệu KWh, thuộc loại nhà máy thủy điện dẫn dòng, có hồ chứa để điều tiết. Cụm đầu mỗi công trình gồm đập dâng bê tông trọng lực 28,5 m, đập tràn dài 124 m, kênh chuyển nước dài 230m. Công trình trên tuyến năng lượng gồm kênh dẫn vào, cửa lấy nước, đường ống bê tông, hầm dẫn nước, tháp điều áp, đường ống áp lực, nhà máy, trạm biến áp, khu quản lý vận hành. Dự án đầu tư xây dựng thủy điện Sơn Tây đã được UBND tỉnh Quảng Ngãi ra quyết định quy hoạch thủy điện nhỏ của tỉnh theo QĐ số 2848/QĐ-UBND ngày 7/12/2007 và văn bản số 1283/UBND - CNXD ngày 9/5/2008 của UBND tỉnh Quảng Ngãi về việc chủ trương đầu tư thủy điện Sơn Tây, huyện Sơn Tây.

- Việc xây dựng công trình thủy điện Sơn Tây cũng như các công trình thủy điện và công trình xây dựng khác, sẽ gây ra một số ảnh hưởng tích cực và tiêu cực và việc này là không tránh khỏi. Để giảm thiểu các ảnh hưởng tiêu cực nêu trên, chủ đầu tư đã xây dựng kế hoạch quản lý môi trường theo yêu cầu của Ngân hàng Thế giới và cam kết sẽ tuân thủ nghiêm túc các biện pháp giảm thiểu này.

Tư vấn môi trường trình bày những ảnh hưởng tích cực, tiêu cực cũng như giới thiệu sơ bộ các biện pháp giảm thiểu mà chủ đầu tư sẽ thực hiện trong quá trình phát triển dự án án, cụ thể:

**Ảnh hưởng tích cực:**

- Góp phần nâng cao đời sống kinh tế xã hội cho nhân dân xã Sơn Mùa, Sơn Tân và Sơn Dung, huyện Sơn Tây, tỉnh Quảng Ngãi, góp phần rút ngắn khoảng cách chênh lệch phát triển giữa các xã, thúc đẩy quá trình trình công nghiệp hoá nông thôn nói riêng và công nghiệp hoá nói chung.....
- Dự án hoàn thành sẽ cung cấp cho địa phương nguồn điện ổn định, chất lượng cao, hỗ trợ địa phương phát triển công nghiệp, tiểu thủ công nghiệp, làng nghề...
- Việc xây dựng, vận hành công trình còn tạo thêm một số công ăn việc làm cho người lao động địa phương.
- Sau khi hồ chứa được hình thành và tích nước, khí hậu trong vùng dự án sẽ mát mẻ hơn, độ ẩm cao, tạo điều kiện tốt cho thảm thực vật, cây cối và các loại thú sinh hệ hồ chứa như tôm, cá, ốc.... phát triển. Hồ chứa có thể cho phép phát triển nuôi trồng thủy sản trong tương lai, tạo thêm việc làm và thu nhập cho bà con trong vùng.
- Nguồn thu từ thuế tài nguyên nước cũng bổ sung vào ngân sách của tỉnh, góp phần hỗ trợ nâng cao thêm mức sống của đồng bào trong vùng.
- Với công suất lắp máy 18 MW, sản lượng điện trung bình năm khoảng 72,85 triệu KWh, thủy điện Sơn Tây cũng đã đăng ký tham gia CDM và dự kiến giảm phát thải khoảng 49.000 tấn CO<sub>2</sub>/năm.

**Ảnh hưởng tiêu cực:**

Việc xây dựng và vận hành dự án sẽ phải ngăn sông, tích nước, xây dựng các hạng mục công trình như đập, đường ống áp lực, nhà máy, trạm biến áp, đường dây... dẫn tới một số ảnh hưởng không tránh khỏi như sau:

- Dự án sẽ chiếm dụng lâu dài 26,7 ha chủ yếu là đất rừng tạp ven sông, đất nương rẫy (2,27ha), đất mặt nước, đất ruộng, đất ven suối và đất hoang.
- Việc xây dựng đường và các hạng mục công trình đầu mối như đập dâng, đập tràn, cửa nhận nước, đường ống áp lực, nhà máy và trạm phân phối cần phải tiến hành đào, đắp đất đá nên dễ dẫn tới sạt lở tại các vị trí này.
- Trong quá trình xây dựng, ngăn sông, đắp đập sẽ gây ảnh hưởng đến chất lượng nước sông Dakdrinh.
- Các hoạt động như nổ mìn làm đường, đào hố móng, khai thác mỏ, đào, đắp, san ủi đất đá, vận chuyển, bốc xếp nguyên vật liệu, hoạt động của các trạm nghiền sàng, trộn bê tông, vận hành máy móc thiết bị xây dựng, vận tải, xây dựng các hạng mục công trình... cũng sẽ gây ảnh hưởng đến chất lượng môi trường, làm ô nhiễm không khí nếu không áp dụng các biện pháp giảm thiểu.
- Trong quá trình xây dựng, sự vận hành các phương tiện thi công, các phương tiện giao thông vận chuyển nguyên vật liệu, máy móc thiết bị, hoạt động của các trạm trộn bê tông, nghiền, sàng, nổ mìn, phá đá, sử dụng máy khoan hầm... sẽ phát sinh tiếng ồn làm ảnh hưởng đến bà con.
- Các chất thải xây dựng, chất thải sinh hoạt của công nhân nếu không được thu gom, xử lý tốt sẽ làm ô nhiễm không khí, ô nhiễm nguồn nước sông.
- Trong quá trình ngăn sông, đắp đập, các loài động vật dưới nước sẽ mất đi tạm thời điều kiện sống vì chất lượng nước suy giảm do độ đục tăng, tràn đổ ngẫu nhiên hoặc nước mưa chảy tràn cuốn theo các chất gây ô nhiễm như nước xi măng, xăng, dầu, mỡ, đất, đá...

Tuy nhiên, đây chỉ là những tác động tạm thời và không đáng kể, có thể giảm thiểu được do thời gian xây dựng chỉ kéo dài khoảng 2 năm, quy mô dự án nhỏ.

- Việc tích nước hồ chứa và chế độ vận hành của nhà máy thủy điện Sơn Tây sẽ làm thay đổi chế độ dòng chảy của sông Dakdrinh từ sau tuyến đập về phía hạ lưu. Có thể gây ra tác động tiêu cực đến một số loài thủy sinh và cá có tập tính di cư. Tác động này không thể tránh khỏi khi xây dựng và vận hành các dự án thủy điện.

**Một số biện pháp giảm thiểu chính:**

Tư vấn lập EMP đã trình bày sơ lược dự thảo kế hoạch quản lý môi trường để giảm thiểu các tác động môi trường này, gồm một số nội dung chính:

- Phần đất bị chiếm dụng tạm thời và vĩnh viễn do xây dựng dự án sẽ được đền bù cho bà con theo phương án và kế hoạch đã được chính quyền địa phương phê duyệt. Trong quá trình xây dựng, các nhà thầu sẽ giảm thiểu chiếm dụng

đất canh tác, đường giao thông công cộng trong việc bố trí các lán trại, bãi tập kết nguyên vật liệu, xây dựng tuyến đường dây..

- Các nhà thầu có trách nhiệm thông báo đến chính quyền địa phương và cộng đồng dân cư thời gian nổ mìn để người dân không qua lại, chặn thả gia súc ở khu vực nổ mìn
- Bãi thải phải đảm bảo các tiêu chí: cách xa nguồn nước mặt ít nhất 100 m, không làm ảnh hưởng đến các dòng chảy, đất canh tác, không nằm trong vị trí có nguy cơ sạt lở, nằm trên các vùng đất trũng để giảm thiểu rửa trôi.
- Ban hành quy định làm việc tại công trường gồm những nội dung như nghiêm cấm cán bộ, công nhân đổ đất đá thừa rơi vãi và chất thải rắn sinh hoạt không đúng nơi quy định đặc biệt là vào lòng sông, suối hoặc các vị trí có thể rửa trôi vào nguồn nước mặt;
- Nghiêm cấm việc đốt rác nhằm giảm thiểu nguy cơ cháy rừng, hoả hoạn
- Sau khi hoàn thành công trình, các mỏ vật liệu, bãi thải, ... được san lấp hoàn trả lại mặt bằng, đầm nén lớp đất bề mặt, sau đó được trồng phủ cây xanh lên trên bề mặt để tránh xói mòn, rửa trôi.
- Trồng cây, quản lý tốt thảm thực vật tại khu vực ven hồ và lân cận, đặc biệt tại khu vực bán ngập để tăng sự ổn định của đất khu vực bờ hồ, dọc theo các tuyến công trình và ở những vùng đất mới bồi đắp.
- Bố trí các kho chứa xăng, dầu, mỡ bôi trơn... đảm bảo cách xa nguồn nước mặt, khu dân cư với khoảng cách tối thiểu 300m.

Chủ đầu tư cam kết sẽ tuân thủ nghiêm túc kế hoạch quản lý môi trường bao gồm các vấn đề chính như nêu trên.

**Một số ý kiến của các thành viên tham gia:**

- \* Ông Đinh Nguyễn Trần - bí thư ĐU xã:
  - Xã đồng thuận với việc đầu tư xây dựng CT TP Sơn Tây
  - Kết kinh nghiệm thủy điện Đakrinh 1, ĐST cần lưu ý
  - Cập nhật lại đơn giá đến bù.
- \* Ông Lê Khắc Giám Anh:
  - Cần dự cây cối /sinh khối long hồ để khoả bớt mùi
  - Thi công xây dựng cần đảm bảo an toàn GT& quản
  - Khieu bù, ổn.
- \* Trưởng Quang Thọ (PCT xã) kết luận:
  - Ghi nhận các ý kiến của CT
  - Về sinh khối hồ sạch sẽ
  - Công bố lịch nổ mìn cho địa phương
  - Dự tam trú cho công nhân.

Nội dung thống nhất sau cuộc họp:

Người dân tham gia cuộc họp đều ủng hộ việc xây dựng dự án thủy điện Sơn Tây và cơ bản đồng ý với các nội dung nêu trong kế hoạch quản lý môi trường do tư vấn trình bày.

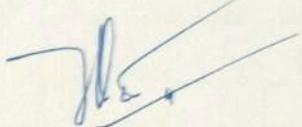
Trong quá trình phát triển dự án, chủ đầu tư sẽ phân công cán bộ chuyên trách môi trường, xã hội của dự án. Cán bộ này là đầu mối, có trách nhiệm liên hệ với chính quyền địa phương và người dân để tiếp thu những ý kiến góp ý, phản nàn và những phản ảnh của người dân về những vấn đề môi trường của dự án, có trách nhiệm đề xuất phương án và báo cáo lãnh đạo công ty giải quyết. Chủ đầu tư sẽ nghiêm túc thực hiện các quy định về quản lý môi trường của Việt Nam và Ngân hàng thế giới.

Chính quyền địa phương về cơ bản ủng hộ chủ trương xây dựng nhà máy, bày tỏ mong muốn chủ đầu tư sớm triển khai xây dựng để dự án sớm đi vào hoạt động. Đề nghị tư vấn bổ sung, chỉnh sửa kế hoạch quản lý môi trường theo những ý kiến góp ý tại cuộc họp tham vấn.

Cuộc họp kết thúc vào hồi 10h00 cùng ngày, biên bản này được đọc và thông qua trước toàn thể cuộc họp, không ai có ý kiến gì thêm.

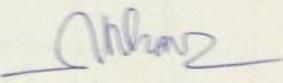
Ký tên :

Đại diện chủ đầu tư:

  
Phạm Văn Quang

Đại diện chính quyền:  
  
KT. CHỦ TỊCH  
PHÓ CHỦ TỊCH  
  
Trương Quang Học

Tư vấn môi trường

  
Lê Thị Thanh Nhân

Phụ lục  
**DANH SÁCH ĐẠI DIỆN**  
**THAM VẤN CUỘC HỌP THAM VẤN Ý KIẾN CỘNG ĐỒNG**  
**ĐỒ ÁN THỦY ĐIỆN SƠN TÂY**  
 Xã Sơn Dung - Huyện Sơn Tây - Tỉnh Quảng Ngãi

TT	Người tham gia	Công tác/nơi ở	Chữ ký
1	Trương Quang Thọ	PCT UBND xã	
2	Đình Văn Giang	Phó trưởng CA xã	
3	Nguyễn Văn Tài	Văn phòng Thống kê xã	
4	Đình Như Trí	CF. UBND TỈNH xã	
5	Đình Xuân Trào	PCT-HAND xã	
6	Đinh Nguyễn Tiến	Li'Đu'Đang ủy xã	
7	Lê Khắc Tâm Anh	CC-ĐP-NĐ-XD SMT	
8	Trần Văn Thủy	Nhân dân xã Sơn Dung	
9	Đình Văn Bật Đạt	Nhân dân xã Sơn Dung	
10	Đình Văn Đi	Nhân dân xã Sơn Dung	
11	Phạm Ngọc Minh	"	
12	Nguyễn Thị Sơn	"	
13	Vũ Tiến Trung	"	
14	Lê Thị Thanh Nhân	Tư vấn EMP	

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

BIÊN BẢN THAM VẤN Ý KIẾN CỘNG ĐỒNG VỀ TÁC ĐỘNG KINH TẾ-XÃ HỘI  
VÀ MÔI TRƯỜNG CỦA DỰ ÁN THỦY ĐIỆN SƠN TÂY

Hôm nay, vào hồi <sup>giao</sup> ngày 27 tháng 8 năm 2014, tại UBND xã Sơn Tân huyện Sơn Tây, tỉnh Quảng Ngãi, Chủ dự án là Công ty TNHH Một thành viên năng lượng SOVICO Quảng Ngãi đã tổ chức cuộc họp với chính quyền và nhân dân xã .....~~Sơn~~.....~~Tân~~..... bị ảnh hưởng bởi dự án thủy điện Sơn Tây về việc tham vấn ý kiến cộng đồng về tác động môi trường của dự án.

Thành phần cuộc họp:

Đại diện chủ dự án, Công ty TNHH MTV Năng lượng SOVICO Quảng Ngãi:

- Nguyễn Thanh Sơn
- Phạm Văn Quang
- 
- 

Tư vấn lập EMP, EP và RP

- Lê Thị Thanh Nhân
- Ngô Huy Kiên

Đại diện chính quyền xã .....~~Sơn~~.....~~Tân~~....., huyện .....~~Sơn~~.....~~Tây~~.....:

- Trần Văn Nguyên - Đại diện xã Sơn Tân
- Ngô Văn Trường - Chánh VP UBND xã Sơn Tân
- 
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Cùng đại diện các hộ dân nằm trong vùng bị ảnh hưởng bởi dự án thuộc địa phận xã .....~~Sơn~~.....~~Tân~~.....(danh sách kèm theo)

Chủ trì cuộc họp: Ông.....~~Trần~~.....~~Văn~~.....~~Nguyễn~~

Nội dung cuộc họp tham vấn cộng đồng:

Chủ dự án trình bày những nội dung chính của dự án:

Thủy điện Sơn Tây với công suất lắp máy 18 MW thuộc công trình cấp III, sản lượng điện trung bình năm khoảng 72,85 triệu KWh, thuộc loại nhà máy thủy điện dẫn dòng, có hồ chứa để điều tiết. Cụm đầu mỗi công trình gồm đập dâng bê tông trọng lực 28,5 m, đập tràn dài 124 m, kênh chuyển nước dài 230m. Công trình trên tuyến năng lượng gồm kênh dẫn vào, cửa lấy nước, đường ống bê tông, hầm dẫn nước, tháp điều áp, đường ống áp lực, nhà máy, trạm biến áp, khu quản lý vận hành. Dự án đầu tư xây dựng thủy điện Sơn Tây đã được UBND tỉnh Quảng Ngãi ra quyết định quy hoạch thủy điện nhỏ của tỉnh theo QĐ số 2848/QĐ-UBND ngày 7/12/2007 và văn bản số 1283/UBND - CNXD ngày 9/5/2008 của UBND tỉnh Quảng Ngãi về việc chủ trương đầu tư thủy điện Sơn Tây, huyện Sơn Tây.

- Việc xây dựng công trình thủy điện Sơn Tây cũng như các công trình thủy điện và công trình xây dựng khác, sẽ gây ra một số ảnh hưởng tích cực và tiêu cực và việc này là không tránh khỏi. Để giảm thiểu các ảnh hưởng tiêu cực nêu trên, chủ đầu tư đã xây dựng kế hoạch quản lý môi trường theo yêu cầu của Ngân hàng Thế giới và cam kết sẽ tuân thủ nghiêm túc các biện pháp giảm thiểu này.

Tư vấn môi trường trình bày những ảnh hưởng tích cực, tiêu cực cũng như giới thiệu sơ bộ các biện pháp giảm thiểu mà chủ đầu tư sẽ thực hiện trong quá trình phát triển dự án, cụ thể:

***Ảnh hưởng tích cực:***

- Góp phần nâng cao đời sống kinh tế xã hội cho nhân dân xã Sơn Mùa, Sơn Tân và Sơn Dung, huyện Sơn Tây, tỉnh Quảng Ngãi, góp phần rút ngắn khoảng cách chênh lệch phát triển giữa các xã, thúc đẩy quá trình công nghiệp hoá nông thôn nói riêng và công nghiệp hoá nói chung.....
- Dự án hoàn thành sẽ cung cấp cho địa phương nguồn điện ổn định, chất lượng cao, hỗ trợ địa phương phát triển công nghiệp, tiểu thủ công nghiệp, làng nghề...
- Việc xây dựng, vận hành công trình còn tạo thêm một số công ăn việc làm cho người lao động địa phương.
- Sau khi hồ chứa được hình thành và tích nước, khí hậu trong vùng dự án sẽ mát mẻ hơn, độ ẩm cao, tạo điều kiện tốt cho thảm thực vật, cây cối và các loại thủy sinh hệ hồ chứa như tôm, cá, ốc.... phát triển. Hồ chứa có thể cho phép phát triển nuôi trồng thủy sản trong tương lai, tạo thêm việc làm và thu nhập cho bà con trong vùng.
- Nguồn thu từ thuế tài nguyên nước cũng bổ sung vào ngân sách của tỉnh, góp phần hỗ trợ nâng cao thêm mức sống của đồng bào trong vùng.
- Với công suất lắp máy 18 MW, sản lượng điện trung bình năm khoảng 72,85 triệu KWh, thủy điện Sơn Tây cũng đã đăng ký tham gia CDM và dự kiến giảm phát thải khoảng 49.000 tấn CO<sub>2</sub>/năm.

***Ảnh hưởng tiêu cực:***

Việc xây dựng và vận hành dự án sẽ phải ngăn sông, tích nước, xây dựng các hạng mục công trình như đập, đường ống áp lực, nhà máy, trạm biến áp, đường dây... dẫn tới một số ảnh hưởng không tránh khỏi như sau:

- Dự án sẽ chiếm dụng lâu dài 26,7 ha chủ yếu là đất rừng tạp ven sông, đất nương rẫy (2,27ha), đất mặt nước, đất ruộng, đất ven suối và đất hoang.
- Việc xây dựng đường và các hạng mục công trình đầu mối như đập dâng, đập tràn, cửa nhận nước, đường ống áp lực, nhà máy và trạm phân phối cần phải tiến hành đào, đắp đất đá nên dễ dẫn tới sạt lở tại các vị trí này.
- Trong quá trình xây dựng, ngăn sông, đắp đập sẽ gây ảnh hưởng đến chất lượng nước sông Dakdrinh.
- Các hoạt động như nổ mìn làm đường, đào hố móng, khai thác mỏ, đào, đắp, san ủi đất đá, vận chuyển, bốc xếp nguyên vật liệu, hoạt động của các trạm nghiền sàng, trộn bê tông, vận hành máy móc thiết bị xây dựng, vận tải, xây dựng các hạng mục công trình... cũng sẽ gây ảnh hưởng đến chất lượng môi trường, làm ô nhiễm không khí nếu không áp dụng các biện pháp giảm thiểu.
- Trong quá trình xây dựng, sự vận hành các phương tiện thi công, các phương tiện giao thông vận chuyển nguyên vật liệu, máy móc thiết bị, hoạt động của các trạm trộn bê tông, nghiền, sàng, nổ mìn, phá đá, sử dụng máy khoan hầm... sẽ phát sinh tiếng ồn làm ảnh hưởng đến bà con.
- Các chất thải xây dựng, chất thải sinh hoạt của công nhân nếu không được thu gom, xử lý tốt sẽ làm ô nhiễm không khí, ô nhiễm nguồn nước sông.
- Trong quá trình ngăn sông, đắp đập, các loài động vật dưới nước sẽ mất đi tạm thời điều kiện sống vì chất lượng nước suy giảm do độ đục tăng, tràn đổ ngẫu nhiên hoặc nước mưa chảy tràn cuốn theo các chất gây ô nhiễm như nước xi măng, xăng, dầu, mỡ, đất, đá...

Tuy nhiên, đây chỉ là những tác động tạm thời và không đáng kể, có thể giảm thiểu được do thời gian xây dựng chỉ kéo dài khoảng 2 năm, quy mô dự án nhỏ.

- Việc tích nước hồ chứa và chế độ vận hành của nhà máy thủy điện Sơn Tây sẽ làm thay đổi chế độ dòng chảy của sông Dakdrinh từ sau tuyến đập về phía hạ lưu. Có thể gây ra tác động tiêu cực đến một số loài thủy sinh và cá có tập tính di cư. Tác động này không thể tránh khỏi khi xây dựng và vận hành các dự án thủy điện.

#### **Một số biện pháp giảm thiểu chính:**

Tư vấn lập EMP đã trình bày sơ lược dự thảo kế hoạch quản lý môi trường để giảm thiểu các tác động môi trường này, gồm một số nội dung chính:

- Phần đất bị chiếm dụng tạm thời và vĩnh viễn do xây dựng dự án sẽ được đền bù cho bà con theo phương án và kế hoạch đã được chính quyền địa phương phê duyệt. Trong quá trình xây dựng, các nhà thầu sẽ giảm thiểu chiếm dụng

đất canh tác, đường giao thông công cộng trong việc bố trí các lán trại, bãi tập kết nguyên vật liệu, xây dựng tuyến đường dây..

- Các nhà thầu có trách nhiệm thông báo đến chính quyền địa phương và cộng đồng dân cư thời gian nổ mìn để người dân không qua lại, chặn thả gia súc ở khu vực nổ mìn
- Bãi thải phải đảm bảo các tiêu chí: cách xa nguồn nước mặt ít nhất 100 m, không làm ảnh hưởng đến các dòng chảy, đất canh tác, không nằm trong vị trí có nguy cơ sạt lở, nằm trên các vùng đất trũng để giảm thiểu rửa trôi.
- Ban hành quy định làm việc tại công trường gồm những nội dung như nghiêm cấm cán bộ, công nhân đổ đất đá thừa rơi vãi và chất thải rắn sinh hoạt không đúng nơi quy định đặc biệt là vào lòng sông, suối hoặc các vị trí có thể rửa trôi vào nguồn nước mặt;
- Nghiêm cấm việc đốt rác nhằm giảm thiểu nguy cơ cháy rừng, hoả hoạn
- Sau khi hoàn thành công trình, các mô vật liệu, bãi thải, ... được san lấp hoàn trả lại mặt bằng, đầm nén lớp đất bề mặt, sau đó được trồng phủ cây xanh lên trên bề mặt để tránh xói mòn, rửa trôi.
- Trồng cây, quản lý tốt thảm thực vật tại khu vực ven hồ và lân cận, đặc biệt tại khu vực bán ngập để tăng sự ổn định của đất khu vực bờ hồ, dọc theo các tuyến công trình và ở những vùng đất mới bồi đắp.
- Bố trí các kho chứa xăng, dầu, mỡ bôi trơn... đảm bảo cách xa nguồn nước mặt, khu dân cư với khoảng cách tối thiểu 300m.

Chủ đầu tư cam kết sẽ tuân thủ nghiêm túc kế hoạch quản lý môi trường bao gồm các vấn đề chính như nêu trên.

**Một số ý kiến của các thành viên tham gia:**

- \* Ông Phạm Hoài Đào:
  - o, Bà con xã đồng ý theo chủ trương chung;
  - o, Kinh phí đền bù phải lập trước, hộ trợ ổn định t/sống;
  - o, Áp giá theo QĐ mới; đảm bảo MT khi thi công
- \* Ông Vương Hoàng Hiếu:
  - o, D/A để thi công 1 tuần → đình lại → không thấy có thông báo
  - o, Kã lại kiểm tra chi tiết, mức giá áp dụng
  - o, Thi công nổ mìn phải khớp và lịch đã thông báo
- \* Ông Đinh Văn Phương:
  - o, Đảm bảo chất lượng và CT để đảm bảo lưu lượng nước hạ lưu
  - o, Văn Trưởng (Chánh VP) kết luận;
- \* Ông Ngô Văn Trường:
  - o, Ghi nhận ý kiến của bà con, để nghị cốt thép nhận và có hiện phí
  - o, Yêu cầu CT đảm bảo chất lượng để không xảy ra sự cố vỡ đập
  - o, Đảm bảo an toàn và vệ sinh MT khi thi công

chung thống nhất sau cuộc họp:

Người dân tham gia cuộc họp đều ủng hộ việc xây dựng dự án thủy điện Sơn Tây và cơ bản đồng ý với các nội dung nêu trong kế hoạch quản lý môi trường do tư vấn trình bày.

Trong quá trình phát triển dự án, chủ đầu tư sẽ phân công cán bộ chuyên trách môi trường, xã hội của dự án. Cán bộ này là đầu mối, có trách nhiệm liên hệ với chính quyền địa phương và người dân để tiếp thu những ý kiến góp ý, phản nản và những phản ánh của người dân về những vấn đề môi trường của dự án, có trách nhiệm đề xuất phương án và báo cáo lãnh đạo công ty giải quyết. Chủ đầu tư sẽ nghiêm túc thực hiện các quy định về quản lý môi trường của Việt Nam và Ngân hàng thế giới.

Chính quyền địa phương về cơ bản ủng hộ chủ trương xây dựng nhà máy, bày tỏ mong muốn chủ đầu tư sớm triển khai xây dựng để dự án sớm đi vào hoạt động. Đề nghị tư vấn bổ sung, chỉnh sửa kế hoạch quản lý môi trường theo những ý kiến góp ý tại cuộc họp tham vấn.

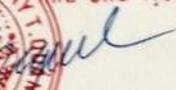
Cuộc họp kết thúc vào hồi 11h00 cùng ngày, biên bản này được đọc và thông qua trước toàn thể cuộc họp, không ai có ý kiến gì thêm.

Ký tên :

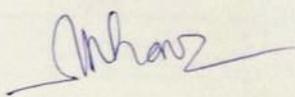
Đại diện chủ đầu tư:

  
Phạm Văn Quang

Đại diện chính quyền:

  
KT/ CHỦ TỊCH  
PHÓ CHỦ TỊCH  
  
Trần Thế Nguyên

Tư vấn môi trường

  
Lê Thị Thanh Nhân

Phụ lục  
**DANH SÁCH ĐẠI DIỆN**  
**THAM GIA CUỘC HỌP THAM VẤN Ý KIẾN CỘNG ĐỒNG**  
**DỰ ÁN THỦY ĐIỆN SƠN TÂY**  
 Xã: Sơn Tân - Huyện Sơn Tây - Tỉnh Quảng Ngãi

TT	Người tham gia	Công tác/nơi ở	Chữ ký
	Trần Thế Nguyễn	PCT UBND xã Sơn Tân	
	Ngô Văn Trường	Chủ tịch VP UBND xã Sơn Tân	
	Đinh Văn Kiên	Trưởng C.A xã Sơn Tân	
	Đinh Văn Trung	Thôn Camang 1	
	Đinh Văn Tròn	Làng camang 1	
	Phạm Hoàn Đào	Làng camang 1	
	Vương Hoàng Hiền		
	Đinh Ra Kế		
	Đinh Văn Ven	Làng camang 1	
	Đinh Văn Đôn		
	Đinh Văn Đào	Làng Camang 1	
	Đinh Văn Hiệp	Làng camang 1	
	Đinh Văn Trép	Làng camang 1	hiệp
	Đinh Văn Phương	Chi huy trưởng	
	Đinh Văn Trung	Làng camang 1	Trung
	Đinh Văn Thuận		Thuận
	Đinh Văn Tôn	Làng camang 1	Phông

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

BIÊN BẢN THAM VẤN Ý KIẾN CỘNG ĐỒNG VỀ TÁC ĐỘNG KINH TẾ-XÃ HỘI  
VÀ MÔI TRƯỜNG CỦA DỰ ÁN THỦY ĐIỆN SƠN TÂY

Hôm nay, vào hồi 14<sup>h</sup> ngày 27 tháng 8 năm 2014, tại UBND xã Sơn Mùa huyện Sơn Tây, tỉnh Quảng Ngãi, Chủ dự án là Công ty TNHH Một thành viên năng lượng SOVICO Quảng Ngãi đã tổ chức cuộc họp với chính quyền và nhân dân xã Sơn Mùa bị ảnh hưởng bởi dự án thủy điện Sơn Tây về việc tham vấn ý kiến cộng đồng về tác động môi trường của dự án.

Thành phần cuộc họp:

Đại diện chủ dự án, Công ty TNHH MTV Năng lượng SOVICO Quảng Ngãi:

- Nguyễn Thành Sơn
- Phạm Văn Quang
- 
- 

Tư vấn lập EMP, EP và RP

- Lê Thị Thanh Nhân
- Ngô Huy Kiên

Đại diện chính quyền xã Sơn Mùa, huyện Sơn Tây:

- Lê Văn Cường - PCT UBND xã Sơn Mùa
- Nguyễn Thị Chung - Tư pháp hộ tịch
- 
- 

Cùng đại diện các hộ dân nằm trong vùng bị ảnh hưởng bởi dự án thuộc địa phận xã Sơn Mùa (danh sách kèm theo)

Chủ trì cuộc họp: Ông Nguyễn Thành Sơn

Nội dung cuộc họp tham vấn cộng đồng:

Chủ dự án trình bày những nội dung chính của dự án:

- Thủy điện Sơn Tây với công suất lắp máy 18 MW thuộc công trình cấp III, sản lượng điện trung bình năm khoảng 72,85 triệu KWh, thuộc loại nhà máy thủy điện dẫn dòng, có hồ chứa để điều tiết. Cụm đầu mối công trình gồm đập dâng bê tông trọng lực 28,5 m, đập tràn dài 124 m, kênh chuyển nước dài 230m. Công trình trên tuyến năng lượng gồm kênh dẫn vào, cửa lấy nước, đường ống bê tông, hầm dẫn nước, tháp điều áp, đường ống áp lực, nhà máy, trạm biến áp, khu quản lý vận hành. Dự án đầu tư xây dựng thủy điện Sơn Tây đã được UBND tỉnh Quảng Ngãi ra quyết định quy hoạch thủy điện nhỏ của tỉnh theo QĐ số 2848/QĐ-UBND ngày 7/12/2007 và văn bản số 1283/UBND - CNXĐ ngày 9/5/2008 của UBND tỉnh Quảng Ngãi về việc chủ trương đầu tư thủy điện Sơn Tây, huyện Sơn Tây.
- Việc xây dựng công trình thủy điện Sơn Tây cũng như các công trình thủy điện và công trình xây dựng khác, sẽ gây ra một số ảnh hưởng tích cực và tiêu cực và việc này là không tránh khỏi. Để giảm thiểu các ảnh hưởng tiêu cực nêu trên, chủ đầu tư đã xây dựng kế hoạch quản lý môi trường theo yêu cầu của Nghị hàng Thế giới và cam kết sẽ tuân thủ nghiêm túc các biện pháp giảm thiểu này.

Tư vấn môi trường trình bày những ảnh hưởng tích cực, tiêu cực cũng như giới thiệu sơ bộ các biện pháp giảm thiểu mà chủ đầu tư sẽ thực hiện trong quá trình phát triển dự án án, cụ thể:

***Ảnh hưởng tích cực:***

- Góp phần nâng cao đời sống kinh tế xã hội cho nhân dân xã Sơn Mùa, Sơn Tân và Sơn Dung, huyện Sơn Tây, tỉnh Quảng Ngãi, góp phần rút ngắn khoảng cách chênh lệch phát triển giữa các xã, thúc đẩy quá trình trình công nghiệp hoá nông thôn nói riêng và công nghiệp hoá nói chung.....
- Dự án hoàn thành sẽ cung cấp cho địa phương nguồn điện ổn định, chất lượng cao, hỗ trợ địa phương phát triển công nghiệp, tiểu thủ công nghiệp, làng nghề...
- Việc xây dựng, vận hành công trình còn tạo thêm một số công ăn việc làm cho người lao động địa phương.
- Sau khi hồ chứa được hình thành và tích nước, khí hậu trong vùng dự án sẽ mát mẻ hơn, độ ẩm cao, tạo điều kiện tốt cho thảm thực vật, cây cối và các loại thủy sinh hệ hồ chứa như tôm, cá, ốc.... phát triển. Hồ chứa có thể cho phép phát triển nuôi trồng thủy sản trong tương lai, tạo thêm việc làm và thu nhập cho bà con trong vùng.
- Nguồn thu từ thuế tài nguyên nước cũng bổ sung vào ngân sách của tỉnh, góp phần hỗ trợ nâng cao thêm mức sống của đồng bào trong vùng.
- Với công suất lắp máy 18 MW, sản lượng điện trung bình năm khoảng 72,85 triệu KWh, thủy điện Sơn Tây cũng đã đăng ký tham gia CDM và dự kiến giảm phát thải khoảng 49.000 tấn CO<sub>2</sub>/năm.

***Ảnh hưởng tiêu cực:***

Việc xây dựng và vận hành dự án sẽ phải ngăn sông, tích nước, xây dựng các hạng mục công trình như đập, đường ống áp lực, nhà máy, trạm biến áp, đường dây... dẫn tới một số ảnh hưởng không tránh khỏi như sau:

- Dự án sẽ chiếm dụng lâu dài 26,7 ha chủ yếu là đất rừng tạp ven sông, đất nương rẫy (2,27ha), đất mặt nước, đất ruộng, đất ven suối và đất hoang.
- Việc xây dựng đường và các hạng mục công trình đầu mối như đập dâng, đập tràn, cửa nhận nước, đường ống áp lực, nhà máy và trạm phân phối cần phải tiến hành đào, đắp đất đá nên dễ dẫn tới sạt lở tại các vị trí này.
- Trong quá trình xây dựng, ngăn sông, đắp đập sẽ gây ảnh hưởng đến chất lượng nước sông Dakdrinh.
- Các hoạt động như nổ mìn làm đường, đào hố móng, khai thác mỏ, đào, đắp, san ủi đất đá, vận chuyển, bốc xếp nguyên vật liệu, hoạt động của các trạm nghiền sàng, trộn bê tông, vận hành máy móc thiết bị xây dựng, vận tải, xây dựng các hạng mục công trình... cũng sẽ gây ảnh hưởng đến chất lượng môi trường, làm ô nhiễm không khí nếu không áp dụng các biện pháp giảm thiểu.
- Trong quá trình xây dựng, sự vận hành các phương tiện thi công, các phương tiện giao thông vận chuyển nguyên vật liệu, máy móc thiết bị, hoạt động của các trạm trộn bê tông, nghiền, sàng, nổ mìn, phá đá, sử dụng máy khoan hầm... sẽ phát sinh tiếng ồn làm ảnh hưởng đến bà con.
- Các chất thải xây dựng, chất thải sinh hoạt của công nhân nếu không được thu gom, xử lý tốt sẽ làm ô nhiễm không khí, ô nhiễm nguồn nước sông.
- Trong quá trình ngăn sông, đắp đập, các loài động vật dưới nước sẽ mất đi tạm thời điều kiện sống vì chất lượng nước suy giảm do độ đục tăng, tràn đổ ngẫu nhiên hoặc nước mưa chảy tràn cuốn theo các chất gây ô nhiễm như nước xi măng, xăng, dầu, mỡ, đất, đá...

Tuy nhiên, đây chỉ là những tác động tạm thời và không đáng kể, có thể giảm thiểu được do thời gian xây dựng chỉ kéo dài khoảng 2 năm, quy mô dự án nhỏ.

- Việc tích nước hồ chứa và chế độ vận hành của nhà máy thủy điện Sơn Tây sẽ làm thay đổi chế độ dòng chảy của sông Dakdrinh từ sau tuyến đập về phía hạ lưu. Có thể gây ra tác động tiêu cực đến một số loài thủy sinh và cả có tập tính di cư. Tác động này không thể tránh khỏi khi xây dựng và vận hành các dự án thủy điện.

**Một số biện pháp giảm thiểu chính:**

Tư vấn lập EMP đã trình bày sơ lược dự thảo kế hoạch quản lý môi trường để giảm thiểu các tác động môi trường này, gồm một số nội dung chính:

- Phần đất bị chiếm dụng tạm thời và vĩnh viễn do xây dựng dự án sẽ được đền bù cho bà con theo phương án và kế hoạch đã được chính quyền địa phương phê duyệt. Trong quá trình xây dựng, các nhà thầu sẽ giảm thiểu chiếm dụng

đất canh tác, đường giao thông công cộng trong việc bố trí các lán trại, bãi tập kết nguyên vật liệu, xây dựng tuyến đường dây..

- Các nhà thầu có trách nhiệm thông báo đến chính quyền địa phương và cộng đồng dân cư thời gian nổ mìn để người dân không qua lại, chặn thả gia súc ở khu vực nổ mìn
- Bãi thải phải đảm bảo các tiêu chí: cách xa nguồn nước mặt ít nhất 100 m, không làm ảnh hưởng đến các dòng chảy, đất canh tác, không nằm trong vị trí có nguy cơ sạt lở, nằm trên các vùng đất trũng để giảm thiểu rửa trôi.
- Ban hành quy định làm việc tại công trường gồm những nội dung như nghiêm cấm cán bộ, công nhân đổ đất đá thừa rơi vãi và chất thải rắn sinh hoạt không đúng nơi quy định đặc biệt là vào lòng sông, suối hoặc các vị trí có thể rửa trôi vào nguồn nước mặt;
- Nghiêm cấm việc đốt rác nhằm giảm thiểu nguy cơ cháy rừng, hoả hoạn
- Sau khi hoàn thành công trình, các mỏ vật liệu, bãi thải, ... được san lấp hoàn trả lại mặt bằng, đầm nén lớp đất bề mặt, sau đó được trồng phủ cây xanh lên trên bề mặt để tránh xói mòn, rửa trôi.
- Trồng cây, quản lý tốt thảm thực vật tại khu vực ven hồ và lân cận, đặc biệt tại khu vực bán ngập để tăng sự ổn định của đất khu vực bờ hồ, dọc theo các tuyến công trình và ở những vùng đất mới bồi đắp.
- Bố trí các kho chứa xăng, dầu, mỡ bôi trơn... đảm bảo cách xa nguồn nước mặt, khu dân cư với khoảng cách tối thiểu 300m.

Chủ đầu tư cam kết sẽ tuân thủ nghiêm túc kế hoạch quản lý môi trường bao gồm các vấn đề chính như nêu trên.

**Một số ý kiến của các thành viên tham gia:**

- \* Ông Lê Văn Cường - PCT xã:
  - Ông Huân với việc đầu tư xây dựng
  - Cập nhật lại đơn giá đến bà
  - Đảm bảo an toàn và chất lượng MT quanh.
- \* Ông Đinh Văn Lang:
  - Cần kiểm đếm lại cho chính xác và áp giá mới
  - Lưu ý đảm bảo an toàn khi nổ mìn
  - Tạo điều kiện tốt nhất cho bà con.
- \* Ông Nguyễn Thanh Sơn (CĐT) kết luận:
  - Ghi nhận các ý kiến của xã và bà con
  - CĐT cam kết đảm bảo chất lượng công trình và giữ gìn MT
  - Kiểm đếm chi tiết sẽ được cập nhật và áp đơn giá mới



Annex 5. Some pictures of consultation meetings



*EMP - Son Tay Hydropower Plant - Quang Ngai Province*



*EMP - Son Tay Hydropower Plant - Quang Ngai Province*

