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Ministry of Agriculture and Rural Development
Project Preparation Unit
Vietnam red river delta Rural Water supply and Sanitation Project

(P077287)

environment assessment
subproject: in viet hung-thai binh

(December - 2004)
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1. **Foreword**

1.1 **Introduction**

The Rural water and environment project in Viet Hung Commune, Vu Thu District of Thai binh Province is a sub-project of the Red River Delta Rural Water Supply and Sanitation Project (previous name: The Rural Water Supply and Sanitation Infrastructure and health Improvement Project-RWSIHIP) for 4 provinces of Hai Duong, Thai Binh, Ninh Binh and Nam Dinh borrowing loans from the World Bank. Danida co-financed for Project Preparation including Pre Feasibility Study and Feasibility Studies in order to identify prioritized investment projects in an aim to improve rural water supply and sanitation services.

The Project is carried out at commune level including the following components (i) Construction, rehabilitation of the Rural Water Supply and Sanitation Infrastructure (ii) Health and Hygiene behavior change education, health improvement (iii) Capacity building and institutional strengthening for community and local institution for project implementation; (iv) Project monitoring and management.

The overall environmental impacts of the Project (including sub-projects) are positive, aiming to improve community health by improving rural water supply and sanitation infrastructure, at the same time, the project will also help rural residents moving from the use of individual polluted water supply solutions to clean piped water systems.

According to Circular 490/1998/TT-BKHCNMT guiding on preparation and appraisal of Environmental assessment reports for investment projects, Rural Water Supply and Sanitation sub-project in Viet Hung belongs to group II: small scale project with short time for construction, environmental impacts are insignificant. According to World Bank’s guideline, this subproject belongs to group B. In order to ensure comprehensive development and sustainability, environmental assessment including “Environmental inspection and Environmental management plans” are developed during Project Preparation period to meet the requirements of both Government of Viet nam and the World Bank.

1.2 **Objectives of Environmental Assessment Report**

The Environmental Impact Assessment Report of the RWSSIHIP is developed to:

- Assess the natural conditions as well as social economic conditions in the sub-project area: Viet Hung Commune, Vu Thu District, Thai Binh province.
- Assess and scientifically anticipate positive and negative impacts, direct and indirect impacts, long term and short-term impacts of the subproject to the surrounding environment.
- Elaborate and propose technical, technology and managerial measures to prevent, minimize and alleviate negative impacts during contraction and operation period of the sub-project.
- Propose environmental management and supervision program.
- This Environmental Impact Assessment serves as a scientific ground for the national and provincial functional bodies on environmental protection to control and manage the Project implementation, at the same time, it also is an important document for the project implementers to strictly follow environmental protection measures.
- Environmental Impact Assessment Reports serve as legal basis and scientific ground for Investors (World Bank) to consider and approve financial support.
1.3 **Content of the Environmental Assessment**

Environmental Impact Assessment for Feasibility Study period of the “Rural Water Supply and Environment Infrastructure and Health Improvement project” in Viet Hung commune comprises of the following key sections:

- Foreword.
- Project introduction and description: describing project rules and key principles.
- Existing situation of the project area: geographical condition, social economic conditions, and environmental conditions of the project site.
- Environmental Impact Assessment: Identify and assess the project’s impacts to environment, analyze negative impact and recommend measures for mitigation.
- Proposed Environmental Management and Monitoring plans for environmental management and supervision at different phase during project implementation period.
- Conclusions and recommendation.

2 **Project description**

2.1 **Basis of Environmental Assessment Report**

In Vietnam, the National Environmental Policies are based on the Law on Environmental Protection, adopted by the National Assembly on 27/12/1993. The Law on Environmental Protection clearly stated specific articles on environmental pollution prevention in general and water and sanitation management in particularly. Decree No. 175 CP dated 18-10-1994 guiding the implementation of the Law on Environmental Protection.

Environmental Impact assessments of sub-projects are carried out to ensure that all environmental impact assessment requirements of the Government of Vietnam and safeguard requirements of the World Bank are met. :

Table 1. Environment-related regulations, guidance from the Government of Vietnam and the World Bank

<table>
<thead>
<tr>
<th>Regulations, guidance from the Government of Vietnam and the World Bank</th>
<th>Applicable standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viet Nam</td>
<td></td>
</tr>
<tr>
<td>Law on Environmental Protection dated December 27 2003</td>
<td></td>
</tr>
<tr>
<td>Decree No.175 CP dated October 18, 1994 guiding the implementation of the Law on Environmental protection.</td>
<td></td>
</tr>
<tr>
<td>Decision 1806/QD-MTg dated December 31,1994 by Ministry of Science, Technology and Environment (now Ministry of Natural Resource and Environment) on organization of the Environmental Impact Assessment Committee and granting the Environmental Standard Certificate.</td>
<td></td>
</tr>
</tbody>
</table>
Regulations, guidance from the Government of Vietnam and the World Bank

<table>
<thead>
<tr>
<th>World Bank</th>
<th>Applicable standard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Decree No. 121/2004/N§-CP of the Government on May 12, 2004 on Administrative penalties for violation on environmental protection.</td>
</tr>
<tr>
<td></td>
<td>Guidelines on Environmental Assessment OP 4.01 and BP 17.5</td>
</tr>
<tr>
<td></td>
<td>Natural Ecosystem (OP/BP 4.04)</td>
</tr>
<tr>
<td></td>
<td>Pesticide Management (OP 4.09)</td>
</tr>
<tr>
<td></td>
<td>Culture heritage (draft OP 4.11 - OPN 11.03-)</td>
</tr>
<tr>
<td></td>
<td>Involuntary resettlement (OP/BP 4.12)</td>
</tr>
<tr>
<td></td>
<td>Ethnic minority (OD 4.20)</td>
</tr>
<tr>
<td></td>
<td>Forestry (OP/BP 4.36)</td>
</tr>
</tbody>
</table>

Technical foundations for preparing the Environmental Impact Assessment for the “Red River Delta Rural Water Supply and Sanitation Project” in Viet Hung commune include:

- Feasibility Study Report for the sub-project.

2.2. **Methodology and organization for the implementation**

The Vietnam Water and Sanitation Company (VIWASE)- Lead Consultant Team and the International Support Consulting Team (COWI) are responsible for the preparation of the Environmental Impacts Assessment Report for the sub-project in Viet Hung of “Rural Water Supply and Environment Infrastructure and Health Improvement project”. The preparation of the Environmental Impact Assessment Report is based on the collected data, information from field surveys, community consultation in the project areas in combination with International and Local reference documents.

*The following methods are used:*

- Gathering and analyzing information and data
- Field surveys collect quantitative information (FGD) and interview 10% of households in the commune.
- Community consultation
- Analyzing and assessing
- Listing and comparing
- Forecasting

2.3 **Scope of the Project**

2.3.1 **Project Objectives**

- Respond to local people’s pressing needs on water for domestic use in ensuring both quality and quantity.
• Improve people’s health in the project areas by providing improved Rural Water Supply and Sanitation services.
• Increase people’s awareness on clean water and environmental sanitation. Strengthen capacity on management, operation and maintenance of piped schemes through specialized training, strengthen organizations in locality.
• Create a clean green and beautiful environment for rural areas, contributing to improve rural infrastructure and livelihood for rural population in the province.

2.3.2 Scope of the Project
On the basis of urgent need of inhabitants living in Viet Hung, Vu Thu, Thai Binh. A piped water scheme and a number of sanitation facilities (public and household level facilities) are designed and constructed with financial support from the Government of Vietnam and Government of Denmark, loans from the World Bank.

a. Household sanitation
Types of latrines proposed in this project are:
*Ecological latrine
This is an improved type of the traditional double vault latrine and has been well widespread in Vietnam and has proven high effectiveness. Ecological latrines have been supported by Department of Preventive Medicine and SANRES Program (Sweden) and many specialized departments have adopted this type of latrine and slightly adapt it to different localities with different conditions. Ecological latrine is appreciated by Ministry of health and promoted to widespread nationwide. The advantages of ecological latrines are: minimize environmental and water pollution, make use of excreta for agriculture production, low cost, affordable to rural households.

*Pour flush/ Seepage latrines,
Seepage latrines have been developed in rural areas of Vietnam since the 1980's in provinces with WATSAN Program. The advantages of this kind of latrines are: clean, no smell, simple treatment, low cost, suitable for areas without drainage system. However, on the other hand, seepage latrines are only appropriate for areas with plentiful source of water, soil with high absorption capacity, no danger of polluting ground water source. This type of latrine is not suitable in clay areas, low land, shortage of water, and high demand to excreta as fertilizer.

*Septic latrine
Septic latrines originated from Europe and were introduced into Vietnam by the end of the 19th century. This is the best and most advanced type of latrines with outstanding advantages such as: hygiene, no smell, no flies, easy to clean, convenience, privacy. However, this type of latrine is water consuming, and it requires to have drainage system in the residential area, high cost, therefore they can only be affordable to better off households.

These sanitation facilities should meet the following requirements:
• Not disease transmitted
• Not pollute the water sources for drinking and domestic purposes
• No flies, mosquitoes or other diseases transmitted insects.
• Clean, no smell.
• No access for animals
- Technical requirement.
• Simple techniques for construction, operation and maintenance.
• Feces are well treated, no danger of accidents.

b. Water supply facilities
The proposed area for Rural Water Supply and Sanitation improvement in Viet Hung Commune, Vu Thu District, Thai Binh province have surface area of approx. 300 ha. A piped water scheme with capacity of 1.100 m3/day is expected to be built to serve about 12,670 residents by the end of 2015.

Figure 1. Diagram of the proposed treatment plan in Viet Hung

Water supply source for this scheme is from Red River, water is pumped to the treatment plant through primary pumping station and water intake. Raw water is pumped into the mixing tank with alum and to sediment and filtration tanks. Water is disinfected using chlorine and The High lift pumps at the treatment plant pumps water from the ‘treated water tank ’ to the clean water reservoir, and to water tower and distributed to individual households using gravity through a Distribution Pipe Network.

When the project is in operation, wash water and turbidity from sediment tanks, filtration tank, and waste will be collected and treated in conformity with existing regulations.

*Location of the pumping station and treatment plant

The primary pumping station (raw water) is expected to be located at the alluvial ground of Red river at the area of 60m2. This is a part of the agriculture land, which is allocated to a family of 4 people in My Loc 1 village, being maize cultivated.

The treatment plant is expected to be built in an area of 1000m2 including: Mixing tank, sediment tank, fast filtration tank, clean reservoir, secondary pumping station and water tower. This area belongs to the commune and contracted annually, presently, this area is contracted to 4 households with 11 people from My Loc II village and being rice cultivated.

Affected households in these two areas for pumping station and treatment plant are also the beneficiaries of the project. From the preliminary survey, most of PAH want to get compensation/assistance according to Vietnam regulation. These household are willing to hand over land as they get compensation and assistance.

*Selection of water source (for further information, please see the chapter on water resource, feasibility study report of sub-projects).

From the outcomes of the field surveys and analysis of the existing documents, it is found out that:

For ground water source:
From the outcomes of field survey and water source analysis, Viet Hung Commune, Vu Thu is located in area with saline ground water source (both Qh and Qp layer); therefore this source of water cannot be used as the supply source for the project.

Surface water source:
The only surface water source that can be used as the supply source for drinking and domestic purposes is from Red river. Water quality from Red River is relatively good since it is with high flow, near the residential area, convenient for construction arrangement, raw water quality meets water standard for domestic purpose after treatment.

Under the context that ground water source in the project area is not good enough for the project, it is proposed that **surface water from Red river will be selected as the supply source for the Project**. The intake is proposed to be outside the dyke of My Loc village.

Results from water quality testing are presented below.

**Table 2 Result from water quality analyzing of water sample from Red river in Viet Hung commune**

<table>
<thead>
<tr>
<th>No</th>
<th>Parameters</th>
<th>Unit of measure</th>
<th>Result</th>
<th>Standard 1329/2002/BYT/QD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>pH</td>
<td></td>
<td>7,05</td>
<td>6.5-8.5</td>
</tr>
<tr>
<td>2</td>
<td>Alkali mg/l CaCO3</td>
<td></td>
<td>100,0</td>
<td>Not applicable</td>
</tr>
<tr>
<td>3</td>
<td>Turbidity NTU</td>
<td></td>
<td>142</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Color mg/l Pt/Co</td>
<td></td>
<td>16,85</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>Hardness mg/l CaCO3</td>
<td></td>
<td>87,3</td>
<td>300</td>
</tr>
<tr>
<td>6</td>
<td>Oxidization KMnO4 mg/l O2</td>
<td></td>
<td>3,84</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>SO4²⁻ mg/l</td>
<td></td>
<td>5,12</td>
<td>250</td>
</tr>
<tr>
<td>8</td>
<td>NO2⁻ mg/l</td>
<td></td>
<td>0,18</td>
<td>3.0</td>
</tr>
<tr>
<td>9</td>
<td>NO3⁻ mg/l</td>
<td></td>
<td>1,80</td>
<td>50</td>
</tr>
<tr>
<td>10</td>
<td>PO4³⁻ mg/l</td>
<td></td>
<td>1,02</td>
<td>NA</td>
</tr>
<tr>
<td>11</td>
<td>NH4⁺ mg/l</td>
<td></td>
<td>0,15</td>
<td>1.5</td>
</tr>
<tr>
<td>12</td>
<td>Cl⁻ mg/l</td>
<td></td>
<td>17,75</td>
<td>250</td>
</tr>
<tr>
<td>13</td>
<td>Fe total mg/l</td>
<td></td>
<td>0,62</td>
<td>0.5</td>
</tr>
<tr>
<td>14</td>
<td>Mn total mg/l</td>
<td></td>
<td>0,28</td>
<td>0.5</td>
</tr>
<tr>
<td>15</td>
<td>E. coliforms MPN/100ml</td>
<td></td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>Pb µg/l</td>
<td></td>
<td>4,55</td>
<td>10</td>
</tr>
<tr>
<td>17</td>
<td>As µg/l</td>
<td></td>
<td>4,02</td>
<td>10</td>
</tr>
<tr>
<td>18</td>
<td>Hg µg/l</td>
<td></td>
<td>0,40</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>Cd µg/l</td>
<td></td>
<td>0,11</td>
<td>3</td>
</tr>
<tr>
<td>20</td>
<td>Cr µg/l</td>
<td></td>
<td>2,30</td>
<td>50</td>
</tr>
<tr>
<td>21</td>
<td>Cu µg/l</td>
<td></td>
<td>4,63</td>
<td>2000</td>
</tr>
<tr>
<td>22</td>
<td>CN mg/l</td>
<td></td>
<td>0,0076</td>
<td>70</td>
</tr>
<tr>
<td>23</td>
<td>Total Phenolic compounds µg/l</td>
<td></td>
<td>0,74</td>
<td>Pentachlorophenol 9 2,4,6 triclophenol 200</td>
</tr>
<tr>
<td>24</td>
<td>Alpha-HCB ng/l</td>
<td></td>
<td>3,8</td>
<td>NA</td>
</tr>
</tbody>
</table>
Red River Delta Rural Water supply and Sanitation Project Feasibility Study

<table>
<thead>
<tr>
<th>No</th>
<th>Parameters</th>
<th>Unit of measure</th>
<th>Result</th>
<th>Standard 1329/2002/BYT/QD</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.</td>
<td>Gama-BHC</td>
<td>ng/l</td>
<td>&lt;0.1</td>
<td>NA</td>
</tr>
<tr>
<td>26.</td>
<td>Beta-BHC</td>
<td>ng/l</td>
<td>&lt;0.1</td>
<td>NA</td>
</tr>
<tr>
<td>27.</td>
<td>Denta-BHC</td>
<td>ng/l</td>
<td>&lt;0.1</td>
<td>NA</td>
</tr>
<tr>
<td>28.</td>
<td>Hetachlor</td>
<td>ng/l</td>
<td>&lt;0.1</td>
<td>30*</td>
</tr>
<tr>
<td>29.</td>
<td>Aldrin</td>
<td>ng/l</td>
<td>&lt;0.1</td>
<td>0.2*</td>
</tr>
<tr>
<td>30.</td>
<td>Hetachlorepoxide</td>
<td>ng/l</td>
<td>&lt;0.1</td>
<td>30</td>
</tr>
<tr>
<td>31.</td>
<td>Chloran</td>
<td>ng/l</td>
<td>&lt;0.2</td>
<td>2000*</td>
</tr>
<tr>
<td>32.</td>
<td>4,4'-DDE</td>
<td>ng/l</td>
<td>3.0</td>
<td>NA</td>
</tr>
<tr>
<td>33.</td>
<td>Dieldrin</td>
<td>ng/l</td>
<td>&lt;0.1</td>
<td>30</td>
</tr>
<tr>
<td>34.</td>
<td>Endrin</td>
<td>ng/l</td>
<td>1.8</td>
<td>2*</td>
</tr>
<tr>
<td>35.</td>
<td>4,4'-DDD</td>
<td>ng/l</td>
<td>&lt;0.1</td>
<td>NA</td>
</tr>
<tr>
<td>36.</td>
<td>Endosulfan 2</td>
<td>ng/l</td>
<td>&lt;0.1</td>
<td>NA</td>
</tr>
<tr>
<td>37.</td>
<td>4,4'-DDT</td>
<td>ng/l</td>
<td>&lt;0.1</td>
<td>200</td>
</tr>
<tr>
<td>38.</td>
<td>Endrin aldehyde</td>
<td>ng/l</td>
<td>&lt;0.1</td>
<td>NA</td>
</tr>
<tr>
<td>39.</td>
<td>Methoxychlor</td>
<td>ng/l</td>
<td>&lt;0.1</td>
<td>20000</td>
</tr>
<tr>
<td>40.</td>
<td>Endosulfan sulphat</td>
<td>ng/l</td>
<td>&lt;0.1</td>
<td>NA</td>
</tr>
<tr>
<td>41.</td>
<td>Endrin Ketone</td>
<td>ng/l</td>
<td>&lt;0.1</td>
<td>NA</td>
</tr>
</tbody>
</table>

Source: Viet Nam Water, Sanitation and Environment Coporation (VIWASE) and Science and Technology Association (STA)

*United State Standard

Turbidity, Color, Oxidization KMnO4 and E. Colifroms of Sample not to be meet the applicable standard.

Raw Water have to treat to be meet the applicable standard by water treatment process as mention above

3. **Existing situation in the project areas and the needs for improvement**

Viet Hung commune of Vu Thu district, Thai Binh province has natural area of 960 ha, with 616 ha of cultivating areas. The main source of income of the inhabitants is mainly from agriculture production and some small-scale business and services. Income from off-farm jobs is insignificant.

There are 13,416 inhabitants in the commune in 3,086 households from 7 villages. Poor households take an account of 11% (under criteria set out by MoLISA at less than VND 100,000/person/month).

Results from the field surveys in 300 households on priority areas have revealed that contaminated water for domestic use and untreated solid waste are the two most concerning issues of rural households in the commune.

Table 3 Prioritized areas ranked by local residents

<table>
<thead>
<tr>
<th>Problems</th>
<th>Number of votes</th>
<th>Percentage (%)</th>
</tr>
</thead>
</table>

Environment Assessment
<table>
<thead>
<tr>
<th>Problem Description</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pollution (smoke, dust)</td>
<td>8.3</td>
</tr>
<tr>
<td>Polluted water for domestic uses</td>
<td>79.3</td>
</tr>
<tr>
<td>Uncollected solid waste</td>
<td>51.3</td>
</tr>
<tr>
<td>Flooded in rainy season</td>
<td>27.7</td>
</tr>
<tr>
<td>Pollution from surrounding areas</td>
<td>1</td>
</tr>
<tr>
<td>Others pollution-related problems</td>
<td>8.7</td>
</tr>
</tbody>
</table>

*Percentage (%) here represents the proportion out of 100% of the interviewee.

The most common diseases in this commune are: Fever, headache, digestive disorders, gynecology, and skin diseases. The main causes of these diseases as feedback from community are: polluted water (91%), polluted human and animal waste (56%).

Solutions as identified by communities by ranking the most 3 prioritized investment including (i) construct water supply system (95.7%), (ii) rehabilitate drainage system (58%) and (iii) public environmental sanitation (50%) and household sanitation (45%).

This result is in accordance with the rapid quantitative assessment through Focus Group Discussion with key leaders of the communes.

### 3.1 Existing situation of the water source

#### *Surface water:

Viet Hung commune of Vu Thu District, Thai Binh province is ran across by 2 main rivers: Red River and Bung River

Red river: Red river runs along the commune at 7 km long, 200 m away from the commune on the South-West, width of the river running across the commune is 400 m, depth -13m compared with the dyke frame, average water transitivity is 2.300 m³/s. Red river is a big river, the water deposit therefore is sufficient for domestic use. However, the content of turbidity and mud are relatively high, especially during rainy season.

Water quality analysis for Viet Hung is presented at table 2.

Bung River: Bung River originates from Tra Ly River crossing Cu Lam 2 culvert – part of the irrigation system of the commune. The average width is 15 – 16. The highest water level is 1,0m, lowest is 0,2m. The maximum water flow is 6 m³/s; and the minimum is 0.8 m³/s. Annually, from October to December, Cu Lam 2 culvert is closed for river dredging. This river is used both for irrigation systems for residents living on the North-east of the commune.

Results from field survey show that water from Bung river is highly likely polluted because of agriculture production activities and human wastes from households living along the two sides of river bank

#### *Ground water*

In the period of 1988-1995, the Geology team 58 and Map league visited Thai Binh Province, including Vu Thu District to conduct survey and explore ground water source for developing the hydrogeology map. Based on the composition of the petrography and capacity of the aquifer, ground water source in Thai Binh can be classified as follow:

**The Intergranula aquifer of Holocen sediment, Qₜ**

Water layer comprises all sediments of different origins: river, river-sea, sea, etc from Thai Binh and Hai Hung. Composition of water store gravelly soil is also very complicated and varies according to area and depth, including sand, sandy-clay, with thickness from 15 to 30m as in Minh Tan, Vu Thu, Tien Hai. Storage capacity of these layers is limited, the average flow normally is 0.2 - 0.3 l/s. The average water transitivity ranges from 25 - 100 m²/day. Total mineralization varies from 0,3 to 6,3 g/l. UNICEF boreholes are using water from this water layer.

**The Intergranula aquifer of Pleistocen middle**
Water layer comprises river-sea sediments Pleistocene QIII2 vp, QII-III1 largely covered in the North Delta areas. Underground water exists in holes with pressure and is divided into 2 layers: the upper layer is sediment with smooth sand while the lower one is sand-grit mixture, average thickness of over 80 m. There exists an uncontinuous and unequally distributed clay layer. Discharge of drilling hole varies from some to several tens l/s. This is an important water supply source for piped water system however the layers are not evenly distributed.

In Vu Thu District, there are a number of exploratory boreholes at Qp layer, results from the survey has showed that water is seriously saline intruded (the content of chlorine is over 600 mg/l).

According to the team’s survey results, aquifer in this area can be divided into two types with different total mineralization level as follow:
- The north side of province includes Hung ha, Quynh Phu, Dong Hung and some parts of Thai Thuy, Vu Thu: Fresh water, mineralization level from 0.3 - 0.6 g/l.
- The south and southeast of the province include Tien Hai, Vu Thu, Vu Thu and coastal area of Thai Thuy district, water is brackish to salty, mineralization level is 1.59 - 21.2 g/l.

According to survey results, Viet Hung commune, Vu Thu district is located in saline intruded ground water at both Qh and Qp layers. Results from field test of UNICEF boreholes also showed that most of these boreholes are of high salinity exceeding the allowed limit. On the other hand, water flow is low, this water source is not suitable for piped water system.

The existing water supply sources for drinking and domestic purposes in Viet Hung are: water from dug well, boreholes, rainwater, water from ponds, lake, river. Water quality from these sources is proven to be poor. Rainwater is polluted as the result of air pollution; water from dug well and boreholes are stinking, salty and aluminous; water from ponds, rivers is not clear and badly polluted by pesticide.

Water is rare or limited in the period from October to January.

<table>
<thead>
<tr>
<th>Water source</th>
<th>% of households using these facilities</th>
<th>Number of household</th>
<th>Water quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dug well</td>
<td>63</td>
<td>1.776</td>
<td>Salty, high content of iron</td>
</tr>
<tr>
<td>Drill well</td>
<td>24</td>
<td>678</td>
<td>Water quality seems ok, do not know if it is polluted or not.</td>
</tr>
<tr>
<td>Rain water tank</td>
<td>59.3</td>
<td>1.672</td>
<td>full of pesticide, chemical fertilizer</td>
</tr>
<tr>
<td>Pond, lake, river</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piped water</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Sources: From secondary information in the commune in combination with outcomes from Focus group discussions and households interview.

Normally, a rural household uses 2 or 3 sources of water, the most popular are water from wells and rain water. Households that are living near to the river or other households may use water from rivers and ponds during dry season, but this source of water is only used for washing after working from the farm.

### 3.2 Assessment on Water drainage, sanitation and solid waste management
Except for one village of My Loc 1 where domestic wastes are collected and gathered at a fixed place with a fee of VND 2,000 per household per month, domestic wastes in Viet Hung in general have not been collected and treated at large scale at the moment, they are simply treated at households level (reuse for animal husbandry, burn, bury or disposed at remote areas or rivers). It is planned that a team of waste collectors to be formed soon to collect all domestic wastes and emptied bottles and packages of pesticide and chemical fertilizers) at village and hamlet levels.

Household wastewater is discharged to their own garden or through earthed drainage to ponds, lakes. Rainwater and wastewater in public places have not been collected and treated, so it has become one of the causes for environmental pollution. During rainy season, many areas in commune are flooded in a relatively long period.

According to households survey in 300 households in Viet Hung commune, there are 98% (296/300) of households having their own latrines, however, 80% of the latrines are unhygienic with uncomfortable smell and flies, etc.

Table 5 Existing situations on the use of latrines in Viet Hung Commune

<table>
<thead>
<tr>
<th>Types of latrines</th>
<th>Number of households using latrines</th>
<th>% of households using latrines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pit latrine</td>
<td>32</td>
<td>11</td>
</tr>
<tr>
<td>Single vault latrines</td>
<td>124</td>
<td>42</td>
</tr>
<tr>
<td>Double Vault latrines</td>
<td>24</td>
<td>8</td>
</tr>
<tr>
<td>Septic latrines</td>
<td>48</td>
<td>16</td>
</tr>
<tr>
<td>Seepage latrines</td>
<td>68</td>
<td>23</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>296</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Currently, human and animal excreta are composted and used for agriculture production. Local people desire to construct new or upgrade their existing latrines to more hygienic latrines types such as : ecological latrines (85%), septic latrines (15%).

There are few household scale industries in Viet Hung and they are allocated in residential areas, there are certain impacts to people’s living environment. In general, domestic waste and solid waste from handcraft industry need to be properly collected and treated for better living environment for local residents. However, under the current context of Vietnam, especially in rural areas, wastewater and solid waste collection and treatment are not feasible. It is proposed that households with handcraft industry should minimize the disposed waste at households level by classifying waste, recycling, building household dust-hole, etc.
Figure 2  Project site, proposed water supply source

Figure 3  Proposed areas for project site and treatment plant
4. Environmental Impact Assessment and Measures for Mitigation

4.1 Positive Impacts
In general, the overall impacts of the Rural water supply and sanitation infrastructure and health improvement project in Viet Hung commune will be positive and play an important role in improving the rural water supply and sanitation situation in the project area. The key positive impacts are:

- Provide a piped water system for local resident. Once the project is in operation, it will address the urgent need of local community, that’s having access to clean water supply source.
- Improve environmental sanitation by constructing sanitary latrines and
- Health improvement for local community.
- Significantly contribute to improve rural water supply and environmental conditions in Viet Hung, avoid water related diseases.
- Social and economic aspects: Living conditions of people in project area is significantly improved, creating momentum for other development activities in the locality.

4.2 Potential negative impact and measures for mitigation.
Beside the aforementioned positive impacts, there are potential negative impacts during construction and operation of piped water system though they are insignificant:

Table 6 Summary of the Project’s impact to environment.

<table>
<thead>
<tr>
<th>IT</th>
<th>Activities</th>
<th>Environmental Impacts</th>
</tr>
</thead>
</table>
| I  | Environmental impacts during site clearance period | - Change purposes of land use
- Destroy the flora (paddy field, cash crop)
- Direct impacts to users living in project areas
- Impact to people’s life, social and economic production activities |
|    | Land compensation and revoking.         |                                                                                      |
| II | Environmental impacts during construction period | - Dust pollution: due to soil, sand, gravel while digging and leveling the ground.  
- Air pollution, shaking, noise from vehicles running around at construction sites and along the road.
- Change mechanical and physical characteristics of the ground, and topography conditions in the project site.
- Impacts to the aqua-system in the commune
- Impacts to the transportation system in the project site.
- Reduce the absorbing areas of water to the ground.
- Surface water pollution: due to wastewater from construction and human waste during construction period.
- Human waste from workers
- Labor safety problems. |
<p>|    | Construction of treatment plant         |                                                                                      |
|    |                                          | - Air, smoke, dust pollution and shaking from various vehicles in the site.          |
|    | Construction of                         |                                                                                      |
|    |                                          | -                                                                                     |</p>
<table>
<thead>
<tr>
<th>IT</th>
<th>Activities</th>
<th>Environmental Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>transmission and distribution pipe line.</td>
<td>types of vehicles in the site;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Scattering of the construction material and excavated soil around the construction and along the transportation routes cause inconvenience, unpleasant odor and air pollution.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Surface water pollution: due to wastewater from construction and human waste during construction period.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Human waste from workers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Labor safety problems.</td>
</tr>
</tbody>
</table>

### III Environmental impacts during operation period

|  | Operation and management of the schemes | - Noise while operating systems may affect rural households in surrounding areas. |
|  |  | - Dust from drying and transporting mud coming from the sedimentation of silt in the treatment plant. |
|  |  | - Risks from mechanical leakage and accidents. |
|  |  | - Migration brings in social evils |
|  |  | - Water related diseases (if water source is polluted) |
|  |  | - Increase Wastewater form household |

#### a. Environmental impact during site clearance period.

**Environmental Impact Assessment**

During this phase of the project, major works are: land acquisition and destroy the flora for construction of treatment plant in the project site.

The raw water pumping station is located in an area 60m² of the paddy maize outside the dyke. The treatment plant is 1000 m² located in the areas that used to be rice field. Total of land acquisition for raw water pumping station and treatment plan is 1060m². Most of the area belongs to the agriculture land (already planned land) that is managed directly by the commune therefore environmental impacts are insignificant. Moreover, an area of 120m² is also temporarily used during construction period to install the transmission pipeline from primary pumping station to treatment plant. There are 5 PAH with 11 PAP.

There are 11 farmer in My Loc 1 & 2 affected when the agricultural land is acquisitioned. Provincial People’s Committee (PPC), District People’s Committee (DPC), Provincial Project Management Unit together with the investor will compensate these households accordingly so it is expected that the impacts are minor and can be resolved.

The flora areas within project site is 1060 m² and mainly rice field, therefore, if purposes of land use are changed, there do not have serious impacts to the ecological environment and flora.

**Measures for mitigation**

It is showed from fied survey results that about 94.7% (284/300) of interviewed households assumed that construction of piped water system would not affect their land. If this is the case, 54.8% of households accept to be compensated by cash, 38.1% is expected to be compensated by land for land.

Technical designs will try to minimize impacts to migration and resettlement. In case, there are affected households, they will be compensated and supported at reasonable level to ensure the same or even better living standard (Please refer to the Resettlement Plan).
Affected households resulting from land requisition have been informed and participated in site clearance period.

**b. Environmental Impact Assessment during construction phase.**

**Impact Assessment**

Environmental pollution is caused mainly due to operation of machines and equipment and vehicle during construction period (excavating, leveling, etc.). Dust and smoke will pollute the construction site and have direct impact to workers. Residents living 300-400 m from the project sites and those who live along the road to the project site will also be impacted by the construction, though these impacts are insignificant.

During construction period, different types of machines, equipments and vehicles are operating at the same time, this will also cause noise and shaking. However, the project site is far away from residential areas, these impacts are minor.

Also during this period, a volume of solid waste, construction materials, oil and lubricants from vehicles and equipment will also be spread out in the project site. This is not much and will be collected and treated.

Domestic waste disposed by workers including solid waste and containers, plastic bags, emptied bottle, etc. These should be collected daily.

Labour safety code need to be warned.

Pumping station and treatment plant are located near the river, it is likely that this may have certain impact to the Red River’s dyke system crossing the commune

**Measures for mitigations**

- Impacts such as dust, noise and disposal can be reduced by careful planning and preparation before carrying out the project such as: installing fence around the project site, water in the project field so as to reduce dust, use modern equipment to minimize noise, operating machines during working hours, avoid bed time, etc.
- When transporting stone, they need to be cover so as to minimize dust.
- Collect solid and domestic waste daily. Solid waste like cement package, emptied bottle, crushed wood and iron, construction materials should be collected, classified for recycle or reuse in other industry.
- Wastewater from the construction including domestic waste water and disposed water from washing construction materials should be collected and treated for recycle.
- Pay attention to labor safety during construction period.
- Before the project is carried out, organize training courses on reducing risks and accidents during construction period.
- Strictly follow labor safety measures, ensure clean sanitation and environment protection for the project areas. Workers need to be well trained on labor safety and equipped with labor devices such as: safety helmets, gloves, safety belt and appropriate measures should be applied to minimize noise and shaking for the surrounding areas.
- Develop instruction and signal boards at the site to warn people and minimize accidents. Machines, equipments and vehicles need to be checked up regularly.
- In case the construction site is near to the dyke, it is important to strictly obey the dyke protection regulations. The advised safety distance from the dyke to construction site is about 25m, if direct impacts to the dyke systems, local authorities should be informed and agreements should be reached.

**c. Environmental Impact Assessment during operation period**

**Impact assessment**

Increase the possibility of infiltration of polluted causing elements from the surrounding areas to the water intake (surface water source) into the ground water source.
Change the form of provision of water (e.g.: quantity of water supply for irrigation)
Lower the level of ground water causing land sinking, and exhaustion of water in boreholes of households living in the affected areas.
These impacts should be limited right at the beginning when selecting the water supply source, project sites, locating the borehole.
Disposal of household waste water and increased turbidity from treatment plants.
Dust from drying and transporting mud coming from the sedimentation of silt in the treatment plant.
Risks from mechanical leakage (aluminum, chlorine, etc.) and accidents.
Increase Wastewater form household

**Mitigation measures:**
- Workers should go through medical checked regularly to discover occupational diseases (once every 6 months)
- Organize awareness-raising movement on strictly wearing labor safety devices (labor safety clothes, helmet, gloves, belt, etc.) for workers.
- Install safety meters and fence, and plant trees around the pumping station.
- Install signboard and guiding board at critical points with high danger such as: chemical storage, water tank, water tower, etc.
- Mud will be dried at specialized areas for each scheme.

Apart from the mitigation measures mentioned, additional mitigation measures can be applied are in operation period:
- Carry out awareness raising activities for local community in the Project area, especially for those who live near the water source. Encourage community to minimize direct disposal of wastewater and domestic waste to rivers. Ban on the use of pesticide and chemical fertilizer as well as development of polluted small scale manufacturing units that pollute the water supply source for the scheme.
- Provide instruments and water quality testing equipment to do the on-site test with quick results to timely identify problems and solution for better operation and maintenance of the system.
- Training and awareness rising for managers and operators.
- Local government organizes clean and green environment movements regularly including protection of water supply source, proper use, collection and treatment of excreta, waste and wastewater.
- During operation period, people’s comments and opinion about the schemes need to be taken into consideration and resolved timely.
- It is proposed that households using pipe water should minimize the disposed waste at households level by recycling, building household dust-hole, etc

5. **Environmental Management Plan**

According to the Vietnamese Law on Environmental Protection and the World Bank’s Environmental policies, before the construction period, the winning Contractors (for construction and operation) together with the Project Management Unit and other related agencies have to prepare the Environmental Management Plan.

The objective of Environmental management plan is to provide guidelines on the Project’s environmental issues so as to ensure that environment related issues would be well dealt with. Environmental Management Plan includes monitoring and reporting program for environmental impacts mitigation and countermeasures in case of emergencies.

5.1 **Organize for the implementation**

Environmental Management Plan will be implemented by the following agencies.
The Project Management Unit will be in collaboration with relevant agencies and other functional bodies at Central, Provincial and District level. The Project Management Unit will work closely with Department of Natural Resources and Environment and also
nominate a full time environmental expert to monitor, manage and carry out the assigned tasks.

Winning contractors for construction and operation will be in cooperation with the Project Management Unit to implement the Environmental Management Plan. Winning contractors are responsible to strictly follow the mitigation measures, agreements and commitment as stated in the assigned contract.

There will also have the involvement of the Environmental specialists who are responsible for capacity building and training for organizations and individuals who will involve in the implementation of the Environmental Management Plan.

5.2 Environmental Monitoring and Reporting Program

The purpose of the Environmental Monitoring and Reporting Program of the sub-project on Rural Water and Sanitation Infrastructure and Health Improvement is to regularly collect information on environmental impacts while implementing the project, at the same time to timely discover negative impacts so as to have prevention and mitigation measures to minimizes pollution. Moreover, Environmental Monitoring also aims to closely control the environmental quality to ensure safe operation of the Project.

a. Project Preparation Period

Land compensation and Site clearance activities are monitored and assessed periodically (once a month or every 3 months) at revoked areas for treatment plant and pumping station. The Project Management Unit will be in cooperation with functional body at local level for environmental monitoring.

b. Implementation period

It is expected that it takes about 6 to 8 months for construction of piped water system in Viet Hung. Monitoring criteria include:

- Dust and noise arising during construction period at the Project site will be periodically checked at the treatment plants, the transmission pipelines and distribution pipelines every two months.
- Solid waste from construction site and human waste from workers need to be collected and safely treated.
- Regularly check the application of labor safety measures during construction period to identify and prevent risks (monthly).

c. Operation and maintenance period

Noise caused by operating schemes is controlled and checked once every 6 months.

Raw water and treated water will be tested monthly (for basic parameters of Group A) and annually (for basic parameters of Group B) based on the standard No. 1329/2002/BYT/QD of MOH. Sample raw water for testing is taken before water is taken into treatment tank. Sample treated water for testing is taken from households’ tap.

Waste management and treatment during operation period including washing water and mud from treatment plants: This needs to be checked quarterly or every 6 months.

Periodically check and identify urgent solutions for treatment plants, chemical house, transmission pipe lines, distribution pipe lines in case there are problems on chemical leakage, water source, etc.

Environmental monitoring reports during operation period is prepared by the Scheme Operators and submitted to local environment management agencies annually or upon request at specific period.
<table>
<thead>
<tr>
<th>Phase</th>
<th>Environment impact</th>
<th>Mitigation measure</th>
<th>Institutional responsibility</th>
<th>Estimated cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation for</td>
<td>Change purposes of land use</td>
<td>DPs will be compensated and supported at reasonable level to ensure the same or even better living standard</td>
<td>Provinceal project management unit (PPMU) in cooperation with local authorities.</td>
<td>VND 52,000,000</td>
</tr>
<tr>
<td>construction</td>
<td>• Destroy the flora (paddy field, cash crop)</td>
<td>• Affected households resulting from land requisition has been informed and participated in site clearance period.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Direct impacts to users living in project areas</td>
<td>• Monitoring compensation and land acquisition Periodical monitoring and evaluation (every 1 - 3 month for compensation and resettlement )</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Impact to people's life, social and economic production activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction period</td>
<td>Air pollution, shaking, noise from vehicles running around at construction sites and along the road</td>
<td>Impacts such as dust, noise and disposal can be reduced by careful planning and preparation before carrying out the project such as: installing fence around the project site, water in the project field so as to reduce dust, use modern equipment to minimize noise, operating machines during working hours, avoid bed time, etc. However, the project site is far away from residential areas, these impacts are minor</td>
<td>Contractor</td>
<td>VND 8,000,000</td>
</tr>
<tr>
<td></td>
<td>• Dust and smoke will pollute the construction site and have direct impact to workers. Residents living 300-400 m from the project sites and those who live along the road to the project site will also be impacted by the construction, though these impacts are insignificant.</td>
<td>• When transporting material, vehicles need to be cover so as to minimize dust.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Also during this period, a volume of solid waste, construction materials, oil and lubricants from vehicles and equipment will also be spread out in the project site. this is not much and will be collected and treated</td>
<td>• Test dust and noise once every 2 months (during the construction period)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Domestic waste disposed by workers including solid waste and containers, plastic bags, emptied bottle, etc. these should be collected daily.</td>
<td>• Collect solid and domestic waste daily. Solid waste like cement package. emptied bottle, crushed wood and iron, construction materials should be collected, classified for recycle or reuse in other industry.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wastewater from the construction including domestic waste water and disposed water from washing construction materials should be collected and treated for recycle.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ensure that domestic wastes are collected and treated properly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase</td>
<td>Environment impact</td>
<td>Mitigation measure</td>
<td>Institutional responsibility</td>
<td>Estimated cost</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------</td>
<td>---------------------</td>
</tr>
</tbody>
</table>
| Construction period | • Labour safety code need to be warned.                                               | • Pay attention to labor safety during construction period.  
• Before the project is carried out, organize training courses on reducing risks and accidents during construction period.  
• Strictly follow labor safety measures, ensure clean sanitation and environment protection for the project areas. Workers need to be well trained on labor safety and equipped with labor devices such as: safety helmets, gloves, safety belt and appropriate measures should be applied to minimize noise and shaking for the surrounding areas.  
• Develop instruction and signal boards at the site to warn people and minimize accidents. Machines, equipments and vehicles need to be checked up regularly.  
• In case the construction site is near to the dyke, it is important to strictly obey the dyke protection regulations. The advised safety distance from the dyke to construction site is about 25m, if direct impacts to the dyke systems, local authorities should be informed and agreements should be reached. | Contractor                     | VND 5,000,000               |
|               | • Pumping station and treatment plant are located near the river, it is likely that this may have certain impact to the Red River’s dyke system crossing the commune |                                                                                                                                                                                                                                                                                                                                                     |                               |                     |
| Project operation | • Change the form of provision of water (e.g. : quantity of water supply for irrigation)  
• Noisie of water treatment plan | • These impacts should be limited right at the beginning when selecting the water supply source, project sites, locating the borehole.  
• Noise caused by operating schemes is controlled and checked once every 6 months | Operating and managing agencies | VND 1,500,000 per year |
<table>
<thead>
<tr>
<th>Phase</th>
<th>Environment impact</th>
<th>Mitigation measure</th>
<th>Institutional responsibility</th>
<th>Estimated cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project operation</td>
<td>• Disposal of waste water and Mud from treatment plants.</td>
<td>• Mud will be dried at specialized areas for each scheme</td>
<td>Operating and managing agencies</td>
<td>VND 1,500,000 per year</td>
</tr>
<tr>
<td></td>
<td>• Dust from drying and transporting mud coming from the sedimentation of silt in the treatment plant.</td>
<td>• Washing water and mud from treatment plant will be tested once every 3 or 6 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Risks from mechanical leakage and accidents.</td>
<td>• Organize awareness-raising movement on strictly wearing labor safety devices (labor safety clothes, helmet, gloves, belt, etc.) for workers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Water related diseases</td>
<td>• Establish the equipped controlling units</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Install safety meters and fence, and plant trees around the pumping station.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Install signboard and guiding board at critical points with high danger such as: chemical storage, water tank, water tower, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Monitoring urgent measures in case there are problems on chemical leakage or water source: Every month</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increase Wastewater form household</td>
<td>• Workers should go through medical checked regularly to discover occupational diseases (once every 6 months)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Monitoring water quality: Raw water and treated water will be tested monthly (for basic parameters of Group A) and annually (for basic parameters of Group B) based on the standard No. 1329/2002/BYT/QD of MOH</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• It is proposed that households using pipe water should minimize the disposed waste at households level by recycling, building household dust-hole, etc</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity building for operation and management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase</td>
<td>Environment impact</td>
<td>Mitigation measure</td>
<td>Institutional responsibility</td>
<td>Estimated cost</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------</td>
<td>----------------------------------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Set up provincial Laboratory with equipments for monitoring water</td>
<td>Once</td>
<td>Provincial project</td>
<td>VND 400,000,000 It is expected that this activity will be financed</td>
<td>VND 400,000,000</td>
</tr>
<tr>
<td>quality of all schemes</td>
<td></td>
<td>management unit (PPMU)</td>
<td>by Danida from TA funding</td>
<td></td>
</tr>
<tr>
<td>The scheme needs to be equipped for water quality testing (PH,</td>
<td>Once</td>
<td>Operating and managing</td>
<td>VND 15,000,000</td>
<td></td>
</tr>
<tr>
<td>chlorine residual, ..)</td>
<td></td>
<td>agencies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training for environmental management and supervision (in province)</td>
<td>Once</td>
<td>Provincial project</td>
<td>VND 2,000,000</td>
<td></td>
</tr>
<tr>
<td>Training for operation worker (two persons)</td>
<td>every 6 months</td>
<td>Operating and managing</td>
<td></td>
<td>VND 1,000,000 per year</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agencies</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A: inludes criteria that will be regularly tested with frequency of once a week (for water supply factory) or once a month (by Provincial Health institutions). These criteria are affected by weather changes, water quality testing can be carried out water suppliers or Provincial Preventive medicine. Monitoring water quality by these indicators is helpful in identifying problems with treatment plants to timely work out solutions accordingly.

B: includes criteria that require expensive equipment and under stable weather. These criteria need to be tested before the schemes are operationalised and once a year (or when required); and at the same time with testing criteria mentioned in A above by local or regional health centre.
6. Environment consultation
Local authorities, relevant agencies and community participated in different stage of the Project from preparing environmental impact assessment to environmental management and monitoring.

Right at the beginning during project preparation phase, local authorities and leaders at different levels in the project province have been informed about the project, its objectives and activities. Department of Natural Resource and Environment are consulted and they have actively participated in discussions on various activities related to environment in their localities.

Local residents in Viet Hung communes also involved in environmental impact assessment through community meetings when they are informed about the project, project objectives, project activities, positive and potential negative environmental impacts to their commune. People’s comments and opinions from these meetings have been taken into consideration and incorporated into environment reports. Community meetings in Viet Hung were carried out from October 21 to October 24, 2004.

Minutes of community meetings with feedback from Community consultation and list of participants are attached as appendix of this report. Community opinions focused on:
- Effected transport in construction period
- Way will be distroyed
- The school are near the pumping station which are effected by the noise and dust
- Risk in operation (chemical leakage, pipeline dirt ..)

All environment impact given by community that are mentioned in EA and to be limited by mitigation measure in preparation, construction and operation project. Environment report is one of the pre-conditions for appraisal.

7. Conclusions
Outcomes from the Environmental Impact Assessment of the Rural water supply and sanitation infrastructure and health improvement sub-project in Viet Hung Commune, Vu Thu District, Thai Binh Province have confirmed that:

In general, the overall impacts of the sub-project will be positive and play an important role in improving the rural water supply and sanitation situation in the project area.

- provide a piped water system for local resident. Once the project is in operation, it will address the urgent need of local community, that’s having access to clean water supply source.
- Improve environmental sanitation by constructing sanitary latrines and
- Health improvement for local community, prevent water and sanitation related diseases.
- Significantly contribute to improve rural water supply and environmental conditions in Viet Hung.

Social and economic aspects: Living conditions of people in project area is significantly improved, creating momentum for other development activities in the locality.

Environmental impacts of the project are almost on-site or at local level. Affected households are also the beneficiaries of the project. Impacts can be mitigated by improvement of technologies, management and supervision.

Appendix 2 Environmental screening

<table>
<thead>
<tr>
<th>Environment Assessment</th>
<th>Criteria</th>
<th>Env.Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Evaluation criteria for the project area and the water treatment plan location
Appendix 3  Minute of Environmental consultant meeting and list of participants

Commune: Viet Hung  
Date: October 21, 2004  
Venue: Meeting room in CPC

Number of commune participants: 40 persons  
(representative of DPC, CPC and community)  
Conducted by: representative of PPU, CPC and P.CERWASS

### Content of Discussion

#### 1. Project Description

- **Name of the Project:** Red river delta rural water supply and sanitation-subproject: Viet Hung
- **Environmental Classification:** B
- **Location:** Province: Thai Binh
- **District:** Vu Thu
- **Commune:** Viet Hung

- **Project Objective:** Improve rural water supply and sanitation services.

- **Main component of the sub-projects:** The Project is carried out at commune level including the following components:
  1. Construction, rehabilitation of the Rural Water Supply and Sanitation Infrastructure
  2. Health and Hygiene behavior change education, health improvement
  3. Capacity building and institutional strengthening for community and local institution for project implementation
  4. Project monitoring and management

- **Total investment:** VND 5,091,600,000
- **Capacity of the treatment plant:** 1,100m³/day
- **Serviced population:** 12,670 (2015)
- **Water source:** Red river
- **Treatment technology:** mixing, sediment, fast filtration tank and disinfection

#### 2. Environment impacts and issue (including opinions of participants)

<table>
<thead>
<tr>
<th>Environment impacts</th>
<th>Possible mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Preparation phase</td>
<td></td>
</tr>
<tr>
<td>- Conflicting rights of water users</td>
<td>□ Monitor and assess water reserve</td>
</tr>
<tr>
<td>- Land revoke and resettlement</td>
<td>□ Ensure the users’ rights</td>
</tr>
<tr>
<td>- Change purposes of land use and economic activities crisis</td>
<td>□ Ensure reasonable compensation</td>
</tr>
<tr>
<td>..........................</td>
<td></td>
</tr>
</tbody>
</table>

*Implementation phase*

- Minimize impacts, use public land areas
- Reasonable compensation
- Selection of substitute areas.
- Affected people are informed and involved during period of site clearance
- Use of public land areas
- Reasonable compensation
- Change on the use of land (temporary lose the use of land)
- Destruction of natural trees
- Land and water pollution
- Impact from noise and air pollution, ...
- Impact to people’s life and production activities
- Safety at project site ........

*Operation phase
- Washing water and mud from treatment plants
- Risk in operation (chemical leakage, pipeline dirt ..)
- Noise during operation of the treatment plants
- Water transmitted diseases ......

3. Follow-up actions

- Disclose the EA report after appraisal
- Use public land and public physical structures
- Re-plant
- Solid waste management
- Minimize impacts to local people
- Hire local labourers
- Use public land and public physical structures
- Apply safety measures and use safety working instruments (proper instruction, safety clothes and warning board)
- Disseminate information to community
- Treat waste water and mud before discharge
- Apply safety measures and use safety working instruments (proper instruction, safety clothes and warning board)
- Disseminate information to community
- Regularly check and maintain equipment
- Secure proper drainage of waste water
Appendix 4   Result of raw water quality
References

2. The Law on environmental Protection ratified by the National Assembly of the Socialist Republic of Vietnam on 27-1-1993 and signed by the President on 10-1-1994.
5. Decision No.1807/Q§-MTg promulgated in attached with Decision 1806/Q§- MTg, by MOESTE, promulgating the operational and organisational regulations of the Appraisal Committee on Environmental Impact Assessment Report and environment licensing.
6. Decree No. 121/CP signed by Prime Minister (?) on 12-5-2004 on administrative penalties for violation of environmental protection.