MINISTRY OF AGRICULTURAL AND RURAL DEVELOPMENT (MARD)
CENTRAL PROJECT OFFICE (CPO)

Irrigated Agriculture Improvement Project (VIAIP)

Environment and Social Management Framework (ESMF)

(FINAL VERSION)

September, 2013
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<tr>
<td>BOD</td>
<td>Biochemical Oxygen Demand</td>
</tr>
<tr>
<td>CPMU</td>
<td>Central Project Management Unit</td>
</tr>
<tr>
<td>CPO</td>
<td>Central Project Office of MARD</td>
</tr>
<tr>
<td>CPC</td>
<td>Commune People Committee</td>
</tr>
<tr>
<td>CSEP</td>
<td>Contract Specific Environmental Plan</td>
</tr>
<tr>
<td>CSB</td>
<td>Community Supervision Board</td>
</tr>
<tr>
<td>DARD</td>
<td>Department of Agriculture and Rural Development</td>
</tr>
<tr>
<td>DO</td>
<td>Dissolved Oxygen</td>
</tr>
<tr>
<td>DONRE</td>
<td>Department of Natural Resources and Environment</td>
</tr>
<tr>
<td>DPC</td>
<td>District People Committee</td>
</tr>
<tr>
<td>DTM</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>ECOP</td>
<td>Environmental Code of Practices</td>
</tr>
<tr>
<td>EMDP</td>
<td>Ethnic Minority Development Plan</td>
</tr>
<tr>
<td>EMP</td>
<td>Environment Management Plan</td>
</tr>
<tr>
<td>ESMF</td>
<td>Environment and Social Management Framework</td>
</tr>
<tr>
<td>GOV</td>
<td>Government of Vietnam</td>
</tr>
<tr>
<td>HH</td>
<td>Household</td>
</tr>
<tr>
<td>IPM</td>
<td>Integrated Pest Management</td>
</tr>
<tr>
<td>IPMP</td>
<td>Integrated Pest Management Plan</td>
</tr>
<tr>
<td>LEP</td>
<td>Law on Environmental Protection</td>
</tr>
<tr>
<td>MARD</td>
<td>Ministry of Agriculture and Rural Development</td>
</tr>
<tr>
<td>OP/BP</td>
<td>Operational Policy/Bank Procedures</td>
</tr>
<tr>
<td>PPC</td>
<td>Provincial People’s Committee</td>
</tr>
<tr>
<td>PPMU</td>
<td>Provincial Project Management Unit</td>
</tr>
<tr>
<td>QCVN</td>
<td>National Technical Regulations</td>
</tr>
<tr>
<td>RAP</td>
<td>Resettlement Action Plan</td>
</tr>
<tr>
<td>REA</td>
<td>Regional Environment Assessment</td>
</tr>
<tr>
<td>RPF</td>
<td>Resettlement Policy Framework</td>
</tr>
<tr>
<td>SCADA</td>
<td>Surveillance, Control, and Data Analysis</td>
</tr>
<tr>
<td>SP</td>
<td>Sub-Project</td>
</tr>
<tr>
<td>TCVN</td>
<td>National Environmental Standards</td>
</tr>
<tr>
<td>VDIC</td>
<td>Vietnam Development Information Center</td>
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<td>WB</td>
<td>World Bank</td>
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This document is called the Environment and Social Management Framework (ESMF) for the Vietnam Irrigated Agriculture Improvement Project (VIAIP, the Project). It is developed as a stand-alone document to satisfy WB’s safeguard requirement on (i) Environmental Assessment (OP/BP 4.01), (ii) Pest Management (OP 4.09), (iii) Physical Cultural Resources (OP/BP 4.11), (iv) Indigenous Peoples (OP/BP 4.12), (v) Involuntary Resettlement (OP/BP 4.10), (vi) Safety of Dams (OP/BP 4.37), and (vii) Projects on International Waterways (OP/BP 7.50). It is also connected to other safeguard policy documents namely the Ethnic Minorities Policy Framework (EMPF), the Resettlement Policy Framework (RPF), and the Integrated Pest Management Plan (IPMP), as well as the safeguard action plans for the sub-projects namely the Resettlement Action Plans (RAPs), the Ethnic Minority Development Plans (EMDPs), the Environmental Management Plans (EMPs), including the Environmental Code of Practices (ECOPs). This is a Category B project. The ESMF will be applied to all the sub-projects to be financed under the Project. The ESMF together with EMPs/ECOPs/IPMP will be submitted to WB for clearance.

The ESMF includes eight (8) sections, as mentioned below:

Section 1- Introduction
Section 2- Project Description
Section 3- Summary of Background and issues
Section 4- Legal and Policy Frameworks
Section 5- Potential Negative Impacts and Mitigation Measures
Section 6- Procedures for Review, Clearance and Disclosure
Section 7- Implementation Arrangement
Section 8- Public Consultation

Annexes
- Annex 1- Summary Description of ten (10) Sub-Projects
- Annex 1.1- Estimation of magnitude of social impacts in Project (Component B)
- Annex 2- Outline of an Environmental Management Plan (EMP)
- Annex 3- Environmental Codes of Practice (ECOP);
- Annex 4- Integrated Pest Management Plan (IPMP).
SECTION I – INTRODUCTION

1.1. Background

Vietnam Irrigated Agricultural Improvement Project (VIAIP) is implemented based on the recommendations of the Ministry of Agriculture and Rural Development request for World Bank (WB) assistance for several northern mountainous and central provinces in Vietnam to improve the sustainability of irrigated agricultural production systems to adapt to climate change, improve environmental conditions, livelihoods and living standards. The project is proposed with a total investment of US$210 million (of which US$ 180 million from ODA loan of World Bank, and $30 million from counterpart funds of the Government of Vietnam). The project duration is 6 years (2014-2020). The Project area consists of seven (07) provinces, including 03 northern mountainous provinces, Ha Giang, Hoa Binh, Phu Tho, and 04 central coastal provinces, Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam.

1.2. Objectives

**Long-term objectives:** (i) to ensure an effective and sustainable approach to upgrade irrigation/drainage services for rural areas in the northern mountainous and central provinces in Vietnam, and (ii) to increase competitiveness and maximize the benefits of irrigated agriculture (agriculture production to adapt climate change and reduce emissions causing the greenhouse effect).

**Short-term objective:** to assist upgrading irrigation systems in some northern mountainous and central provinces to provide better irrigation services, and improve the efficiency and sustainability of agricultural production in terms of climate change adaptation. These objectives will be achieved through the following activities:

- Increase water management through institutional and policy support;
- Improve the irrigation/drainage infrastructure; and
- Service aid for smart agriculture to adapt to climate change.

1.3. Objectives of Environmental and Social Management Framework (ESMF)

Environmental Social Management Framework (ESMF) was developed to provide the principles, rules and procedures to guide the assessment of environmental impacts and requirements of basic techniques in preparing reports on environmental protection to ensure the implementation of safeguard policies of the Project, and to meet the regulations on environmental protection of Vietnam and the World Bank. It includes mitigation measures and plans to reduce, limit, and/or compensate for adverse impacts and increase the positive impacts, estimates and funding sources to implement these measures, and provide information about the agencies responsible.

1.4. Project Components
To achieve the above objectives, the approach "smart agriculture for climate change adaptation" in various ecosystems, land use flexibly and more diversely to increase the efficiency of water use and reduce the negative environmental impacts is proposed. The project is designed with components to link and assist concurrent construction and non-construction solutions to ensure projects achieve objectives effectively. The project includes four (4) components\(^1\), with contents, activities and resources allocations as below:

- Component A: Improved Water Management: US$ 10 Million
- Component B: Irrigation and Drainage scheme level improvements: US$ 170 Million
- Component C: Support Service for Smart Agriculture Practices: US$ 25 Million
- Component D: Project Management, Monitoring and Evaluation (M&E): US$ 5 Million

1.5. The linkage of project components

To achieve the objectives and the expected results, the four components above have been designed to link closely together, to support each other in a systematic way. The approach is based on the results; the activities of the four components will effectively use the project funds to obtain the goals of the project. The modernization of irrigation systems is approached by using the Rapid Appraisal Procedure (RAP) for irrigation system according to the criteria of 'service' to assess the system comprehensively to create an orientation and modernization plan to improve the service quality, irrigation efficiency, organizational reform, institutional strengthening and capacity management system, and simultaneously mobilize the participation of stakeholders in the management system by using existing management structures, operation, and the capacity of IMCs and WUOs. Therefore, the project will provide support to improve water management, institutional development and training and capacity building of the IMCs, and provide managing facilities in Component A; investment in construction works, irrigation/drainage system such as upgrading and improving canals from the main canal to onfarm canals in Component B; implement integrated sub-projects to improve irrigated agriculture with social and economic development plans in local rural areas as new rural programs, best way to line canal system program, create field model to support smart agricultural practices, reclamation measurement and conservation in Component C; and improve capacity in management and project implementation, social and environmental management in Component D.

Thus, the impact of the components will achieve maximum investment efficiency, especially Component B – to improve irrigation system infrastructure with the other programs to improve additional performance and sustainability of the local systems.

1.6. Project duration

Anticipated starting and closing of the project:

- Project duration will be 6 years (2014-2020)

\(^1\) Source: Aide-Memoire of WB Mission (15-26/04/2013) – Irrigated Agriculture Improvement Project (VIAIP)
- Closing year 2020 (anticipated closing time is 2/2020)

1.7. Scope of the project

VIAIP project will be implemented in the seven (07) provinces of Ha Giang, Phu Tho, Hoa Binh, Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam, in which:

1- Ha Giang province: Bac Quang, Quang Binh, Vi Xuyen, Quang Ba, Yen Minh, Dong Van, Meo Vac districts;
2- Phu Tho province: Tam Nong, Thanh Thuy districts
3- Hoa Binh province: Lac Thuy, Kim Boi, Luong Son, Lac Son, Tan Lac, Yen Thuy, Cao Phong, Mai Chau districts;
4- Thanh Hoa province: Yen Dinh, Thieu Hoa district;
5- Ha Tinh province: Thach Ha, Cam Xuyen, Ky Anh district and Ha Tinh city;
6- Quang Tri province: Vinh Linh, Gio Linh, Cam Lo district and Dong Ha city;
7- Quang Nam province: Phu Ninh, Thang Binh, Que Son, Duy Xuyen, Nui Thanh district and Tam Ky city
Figure 1: Location of project provinces
SECTION II – PROJECT DESCRIPTION

The objectives of the Project are in accordance with the planned restructuring and the modernization of the irrigation system of MARD. Focus on institutional reform, restructuring and capacity building for all levels are consistent with agricultural restructuring plan and the new Law on Water Resources of the MARD. The project will be implemented in seven (07) provinces, including Ha Giang, Phu Tho, Hoa Binh, Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam. The project includes four (4) components and ten (10) sub-projects in component B, as below:

2.1. Description of project component

(1) **Component A: Improved Water Management: US$ 10 Million**

The objectives of Component A are to: 1) prepare legal and regulatory documents and guides that will be issued or distributed by the Government of Vietnam, at national and provincial levels, to improve the regulation, direction and mix of public and private sector services for governance, management and financing of irrigation and drainage systems, 2) build the capacity of irrigation management organizations and their financing, and 3) improve the performance of the irrigation and drainage systems in provinces affected by Component B interventions.

(2) **Component B: Irrigation and Drainage scheme level improvements: US$ 170 Million**

This component would support the upgrade and modernization of selected existing irrigation and drainage schemes in Central and Northern Vietnam as well as making provision for some small multi-purpose schemes in remote area in northern Vietnam. The works would include (a) major improvement to existing under –performing infrastructure, including gated control structures and regulators, re-sectioning and remodelling of major and other canals within the systems to enable more efficient demand system operation; (b) modernization and/or minor upgrading of existing infrastructure (replacement of primary, secondary or tertiary sluice gates with more effective and efficient options, construction of small bridges, upgrading canal banks, including introduction of a pilot project on using drip irrigation; (c) improvement and protection works for existing dams (generally including protection works on the dam slopes), and appurtenant outlet works and canal systems, and considering introduction of mini-hydropower; (d) construction of new multipurpose village ponds for rural communities with adjacent minor irrigation works; (e) upgrading and modernization of water pumps and associated weirs, with appurtenant water delivery pipelines; (f) refurbish infrastructure and supply drains and (h) construction of measuring devices within the selected projects and installation of Supervisory, Control and Data Analysis (SCADA) system for improved water management systems, with associated logistical support, in conjunction with activities to establish and strengthen WUOs under Component A.

**National Dam Safety:** This Project (VIAIP) includes the improvement and upgrading of many medium to small dams to conform with more modern design concepts, and continues to focus on dam safety issues, and invests to improve dam safety will follows recommendations of the Dam Safety Unit (DSU). VWRAP Project has supported the Ministry of Agriculture and Rural Development (MARD) in facilitating the establishment of a Dam Safety Unit for the coordination of dam safety activities, laws and regulations in Vietnam with respect to MARD and EVN related to dam safety programs.

**Land Acquisition:** The cost for land acquisition, estimated US $ 5.3 million, would be exclusively financed by Government.
(3) Component C: Support Service for Smart Agriculture Practices: US$ 25 Million

The objective of this component is to increase agricultural and water productivity of selected field, vegetable and fruit crops (citrus), promote shift to low water requiring crops during the dry season and reduce water foot print of agriculture. On-farm systems of crop intensification will be the core project intervention under this component, and the main vehicle for the dissemination of improved technologies to the farmers. On-farm systems of crop intensification will include the complete package of practices for a particular crop from land preparation to harvesting of crop (including use of seed of improved high yielding varieties/hybrids), seed treatment, soil test based application of fertilizers (including use of organic manures, bio-fertilizers and micro-nutrients), weed control, integrated pest management, efficient methods of on-farm water management, carrying out all cultural practices at the optimum stage of crop. Special efforts will be made to include precision land levelling such as laser land levelling.

The project will support post-harvest management demonstrations for promoting farm level cleaning, grading, packing and value addition to the agriculture and horticulture produce. A broad menu of interventions for agriculture and horticulture will be developed during the first two years of the project. High pay-off interventions will be selected by water users associations (WUAs) from this menu depending upon agroecological conditions and emerging marketing opportunities. For disseminating the improved technologies to a large number of farmers, farmer-to-farmer and farmer-to-field school approach will be an integral part of the on-farm demonstration program.

Approach: Component C will be organized into three (03) groups of activities: (i) Promoting good practice of Climate Smart Agriculture (CSA), (ii) Improving agriculture services and capacity building, and (iii) Technical Assistance and Research.

On Promoting good practice of CSA: The Project feasibility study proposed a list of activities in seven (07) provinces to seek increasing productivity in an environmentally and socially sustainable way, strengthening farmers’ resilience to climate change, and reducing agriculture’s contribution to climate change by reducing greenhouse gas emissions.

Improve agricultural services and capacity building: The feasibility study proposes (i) various training for Government staff, training of trainers (TOT), and training for farmers, (ii) partnership between "4 houses", and information dissemination.

On Technical Assistance and Research: The FS proposes (i) Technical Assistance (TA) on GHG emissions monitoring, (ii) Technical Assistance for Monitoring and Evaluation (M & E). The project will support key study/research to increase farmer resilience to climate change including varieties more tolerant to draught, salinity, etc... as well as key policy or technical guidelines to promote CSA.

(4) Component D: Project Management, Monitoring and Evaluation (M&E): US$ 5 Million

The contents of the component are: (1) The technical support for project management, consulting and monitoring, auditing, M&E consulting; (2) support for the activities of the project management agencies at central and local tasks in project management, and (3) professional training, technology transfer, capacity building, and project manager for the Board management, particularly the management boards at the local provinces.
2.2. List of proposed Sub-Projects in Component B

The project covers seven (07) provinces in the northern mountainous and Central Coastal areas in Vietnam, including Ha Giang, Phu Tho, Hoa Binh, Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam. The potential sub-projects are listed in Table 1 below:

Table 1: List of proposed Sub-Projects in Seven (07) provinces

<table>
<thead>
<tr>
<th>No.</th>
<th>Province</th>
<th>Sub-Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ha Giang</td>
<td>SP1- Improve irrigation schemes in Bac Quang, Quang Binh and Vi Xuyen districts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SP2- Improve irrigation systems and construct multi-purpose village ponds in Quan Ba, Yen Minh, Dong Van, and Meo Vac districts</td>
</tr>
<tr>
<td>2</td>
<td>Phu Tho</td>
<td>SP3- Improve drainage and irrigation systems in Tam Nong and Thanh Thuy districts</td>
</tr>
<tr>
<td>3</td>
<td>Hoa Binh</td>
<td>SP4- Improve and upgrade small scale irrigation schemes in Mai Chau, Tan Lac, Luong Son, Cao Phong, and Lac Son districts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SP5- Improve small scale irrigation systems in Hoa Binh province</td>
</tr>
<tr>
<td>4</td>
<td>Thanh Hoa</td>
<td>SP6- Improve and upgrade the South Ma irrigation scheme</td>
</tr>
<tr>
<td>5</td>
<td>Ha Tinh</td>
<td>SP7- Improve Ke Go and Song Rac irrigation schemes</td>
</tr>
<tr>
<td>6</td>
<td>Quang Tri</td>
<td>SP8- Medium scale irrigation schemes in Quang Tri</td>
</tr>
<tr>
<td>7</td>
<td>Quang Nam</td>
<td>SP9- Improve Phu Ninh irrigation schemes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SP10- Improve Khe Tan irrigation scheme</td>
</tr>
</tbody>
</table>

Source: FS report, April 2013- Vietnam Academy for Water Resources

This component will be implemented through two (02) phases. In Phase 1 in the first year, three sub-projects will be implemented and have been prepared with detailed design and documentation of safeguards, see Table 2:

Table 2: List of Sub-Projects implemented in the First Year

<table>
<thead>
<tr>
<th>No.</th>
<th>Sub-project (SP)</th>
<th>Province</th>
<th>Description</th>
<th>Irrigated Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SP 6</td>
<td>Thanh Hóa</td>
<td>Improve and upgrade South Ma Irrigation Scheme</td>
<td>11,154</td>
</tr>
<tr>
<td>2</td>
<td>SP 9</td>
<td>Quảng Nam</td>
<td>Improve Phu Ninh irrigation schemes</td>
<td>19,427</td>
</tr>
<tr>
<td>3</td>
<td>SP 4</td>
<td>Hòa Bình</td>
<td>Improve and up-grade small scale irrigation schemes in Mai Chau, Tan Lac, Luong Son, Cao Phong, and Lac Son districts</td>
<td>1,048</td>
</tr>
</tbody>
</table>

The remaining seven (7) sub-projects will be prepared with environmental safeguards instruments during project implementation.
SECTION III – SUMMARY OF EXISTING ENVIRONMENT ISSUES IN THE PROJECT AREA

3.1 Grouping Sub-Projects according to construction works

Based on the proposed schemes from seven (07) provinces, with total of ten (10) Sub-Projects under the frame of the Project, these Sub-Projects are classified into groups according to the major work component, as followings: (1) Group 1– major improvement and modernization to existing under-performing infrastructure (03 SPs); (2) Group 2– improvement and protection works for existing dams (03 SPs), (3) Group 3– upgrading and modernization of e pumps and electric pumps and associated weirs (01 SP); (4) Group 4– Refurbish infrastructure and supply modern and efficient systems (01 SP); (5) Group 5– construction of new multi-purpose village ponds (01 SP). In Table 3, the Sub-Projects are grouped according to the content, investment and construction works.

<table>
<thead>
<tr>
<th>No</th>
<th>Group of subproject</th>
<th>Summary of major construction works</th>
<th>Sub-Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Group 1- Rehabilitation, Upgrading irrigation canals</td>
<td>The construction items mainly remodelling and reforming canal systems, the construction of regulators, water measurement works; construction of canal banks for O&amp;M and combination with transportation; Restoration of hydraulic works to ensure effective operation; Reshape and consolidate existing canals, and construction of new canal sections to provide enough water for crop requirements, on time.</td>
<td>SP6, SP7, SP9, SP10</td>
</tr>
<tr>
<td>2</td>
<td>Group 2- improvement and protection works for existing dams and upgrade associated canal systems</td>
<td>The main items of construction to ensure dam safety, expand dam crest width or reinforce and stabilise the dam face (provide access road for management and operation), build breakwater wall on the crest; Reinforce upstream dam slope, plant grass in downstream slope. Install additional or repair drainage tools. Repair and upgrade spillways. Repair, upgrade intakes. Construction of operation station in the headworks.</td>
<td>SP1; SP5; SP8.</td>
</tr>
<tr>
<td>3</td>
<td>Group 3- upgrading and modernization of water turbine pumps and electric pumps and associated weirs</td>
<td>The construction activities are mainly repairing and reinforcement of weirs; Replace water pumps; Reparing suction basin of pumping station; Repairing and upgrading on-farm irrigation canals.</td>
<td>SP4</td>
</tr>
<tr>
<td>4</td>
<td>Group 4- Refurbish infrastructure and Modernization of pumping stations</td>
<td>Construction of two drainage pumping stations; refurbish on-farm irrigation pumping plants and associated canals; construction of small bridges cross drainage canals</td>
<td>SP 3</td>
</tr>
<tr>
<td>No</td>
<td>Group of subproject</td>
<td>Summary of major construction works</td>
<td>Sub-Project</td>
</tr>
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<tr>
<td>5</td>
<td>Group 5- construction of new multi-purpose village water harvesting ponds</td>
<td>Construction of new multi-purpose village ponds to collect surface water for drinking water supply, domestic uses and livestock development. Install pipelines to take water from these ponds to community.</td>
<td>SP2</td>
</tr>
</tbody>
</table>


3.2 Summary of the environmental existing conditions in Project Areas

The project area is in seven (07) provinces, including three (03) northern mountainous provinces of Ha Giang, Hoa Binh and Phu Tho, and four (04) central provinces of Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam. The existing environment condition would be presented in two sub-regions, one is in the northern mountainous province of Ha Giang, Phu Tho and Hoa Binh and other is in central provinces of Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam.

3.3.1. Summary of the environmental existing conditions in Northern high land area (Ha Giang, Phu Tho and Hoa Binh Provinces)

(1) Northern mountain area (Ha Giang, Phu Tho and Hoa Binh): The total natural land area is 1.6 million ha, of which agricultural land is nearly 20% of the total natural land area. Midland and mountainous north is not flat; there are no large fields and cultivated areas are separated, located in the valleys and interspersed with mountains and hills. Tropical climate, monsoon rainfall, total annual rainfall is 2,300-2,400mm, with around 80% of the total annual rainfall in the rainy season from June to September and frost, fog, high humidity occur in winter. There are large river systems such as the Lo, Da and Red River which have high discharges, concentrated in the rainy season, often flooding. Erosion land due to slope. Agricultural development is rice, maize, cassava and fruit trees.

(2) The total population of Ha Giang, Phu Tho and Hoa Binh province is 2,871 million (2011). There are many ethnic groups as Vietnamese, Hmong, Tay, Dao, Muong, Lo Lo, Nung, approximately 88-90% population in Ha Giang province, and 87% of population is Thai and Muong group in Hoa Binh province. 100% Vietnamese and no ethnic group live in Phu Tho sub-project area. Over 80% of the population lives in rural areas, and main income is from agriculture and husbandry. The cultivated land per household ranges from 0.2 -0.4 ha for paddy crop and vegetables. The poverty rate and poor access to approximately 50% in Ha Giang province (statistics data in 31/12/2012), 20% in Phu Tho and 28% in Hoa Binh province (data of the year 2011). Per capita income (GDP) from 10-13 million dong/person-year (2011).

(3) The key environmental issues in the Northern Mountains and particularly in project area:

Landslide cause by Deforestation: According to statistic data from the years 2006-2010, forests are cleared: 14.76 ha in Hoa Binh Province. Forest fires: 61.9ha (statistic data from 2006 to 2010, with 637.55 hectares of forest damaged by fire), 43.3ha burnt in Vi Xuyen District, Ha Giang Province (2012).

Drought: water levels in rivers and streams were lower than the average of many years, and the water level in the reservoir is the lowest, many reservoirs were dried, making prolonged hot dry conditions and lack water occurs more seriously.
Water shortage caused by drought, especially to people live in mountainous areas such as Quan Ba, Yen Minh, Dong Van, Meo Vac, Ha Giang province, villagers have to take water from far distance from 3 to 5km, and get water from 10km low area. Lack of water for both people and livestock in these above areas, main income is from cattle, buffaloes, goats and pigs.

In Hoa Binh province, although there have been many small lakes are interspersed in residential areas, supply water, irrigation water, but due to the low height dam, the more climate change, precipitation concentrated in a short time, full water reservoir, but not enough for people in the area, causing a lack of drinking and irrigation water, in the case of water reservoirs.

Flooding: Flooding occurs frequently in the northern mountainous provinces while heavy rains. Despite the interlacing river system, but when the water level in field is higher than water level in the river, drainage sluide stop working, then flooding occurs, as the cases in Dau Duong commune and Doan Ha commune in Tam Nong and Thanh Thuy districts, Phu Tho province.

Soil quality: Soil quality is generally poor nutrition, pH ranges from 5.3 to 7.5, organic matter content is in the range of poor to moderate, total nitrogen content in the medium to poor levels of potassium loss is low level; total phosphorus concentrations is from medium to rich. Overall soil quality is not variation between the different types of farming technique. In Ha Giang, soil for cultivation is scare – crop lands are soils intersected with “cat ear” shaped rocks. Ha Giang also has the Dong Van highland Plateau Geopark. Any disturbance onto the ground should consider landscape conservation.

Water quality: Water quality in rivers and streams is relatively good, with no pollution of heavy metals and anions, cations toxic. However, there are a number of targets in a higher standard QCV 08:2008 / MONRE (B1) as BOD₅, COD, TSS, NH₃, NO₂, NO₃. The quality of ground water is as pH = 6.9-8.4, as high as the upper limit of the standard, due to high CaCO₃ caused by limestone terrain. Groundwater contamination does not include nitrogen, and other elements in the standard QCVN09: 2008/BTNMT.

Agricultural chemical using: Social survey was conducted during the project preparation in Ha Giang, Phu Tho and Hoa Binh province, to show average fertilizer application is 320kg² per 1.0 hectare (ha) and average pesticide application is 1.3 liters per 1.0 ha in the project area. The use of excessive agricultural chemicals will not only cause serious environmental impacts, but also affect the profitability of the crop from farmers. The government has issued regulations and policies to reduce fertilizers, pesticides and herbicides used for agriculture.

3.3.2. Summary of the environmental existing conditions in central region (Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam Provinces)

(1) Northern part area (Thanh Hoa, Ha Tinh, and Quang Tri province) and coastal area of middle land (Quang Nam province): total natural land is 3.26 million ha, of which nearly 20% agricultural land. The flat coastal area (mostly elevation of area is 3 m high above sea level), is often affected by tidal and salinity. Tropical monsoon climate divided into two distinct seasons, the rainy season from May to October, and dry season from November to April next year. River network densely but short due to topographic central region of steep and narrow, with the large rivers as Ma river, Rac river, Thach Han river and Thu Bon River. Every year, these provinces are often affected by floods in the rainy season and the dry hot wind blows from Laos during

² Source: Evarage data from field survey in 03 Provinces, Ha Giang, Phu Tho, and Hoa Binh in March 2013
the dry season. Paddy rice is the main crop together with aquacultural breeding (shrimp, fish, ...).

(2) The total population is 1,637,000 people, of which over 80% of the population live in rural areas. The poverty rate is 15-20%, including Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam's poverty rate is 16.4%, 20%, 16% and 15%, respectively (statistics data 2011). Per capita income was from 8.9 to 21.6 million/person-year, which income per capita (GDP) in Thanh Hoa of 8.9 million/person-years (data 2011). All local people (100%) are Vietnamese living in the Sub-Project Area.

(3) The key environmental issues are in the Central Region of Thanh Hoa, Ha Tinh and Quang Tri and Quang Nam provinces, and the particular project areas:

**Water quality:** the water quality is quite good in Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam provinces in normal conditions, good surface water quality, except suspended solids are high due to river erosion during the rainy season. Surface water quality in flood rains severely reduced, due to flood and disposal of the waste, destroyed drainage system, distribution waste from toilets, sewers, ... organic pollutants, pathogenic microorganism is high, spreading fast and widespread after flooding. Surface water quality in the dry season is relatively good in the upstream, but in the downstream, estuaries with salt water intrusion inland, affect to irrigation water for crops.

**Groundwater quality:** The ground water quality is relatively good, and can be used as a water source for drinking water, but the groundwater is polluted in the coastal areas. Heavy metal pollution: high levels of iron and manganese, nitrogen, organic matter exceeds permitted standards in Binh Nam commune of Thang Binh district, Que Son district, Nui Thanh district, Duy Xuyen district, Tam Ky City, Quang Nam province.

Saline pollution in coastal area along Quang Tri and Quang Nam provinces.

Iron and Arsenic Pollution: Thach Bang commune and Viet Xuyen commune belong to Ky Anh district and Thach Ha district has two high risk pollution, 2 communes with an average risk of pollution (Thach Kenh and Thach Dai communes), 2 social low risk of contamination (Long Thach, Thach Son).

Agricultural chemical Pollution: At present, some pesticide and herbicide stores, (which contain high level of DDT, 666) backlog from period to the American war, with total 11 locations in the Ha Tinh province are still untreated. High chemical pollution appeared in Thach Luu, Thach Vinh communes of Thach Ha District, Cam My, Cam Thanh belong to Cam Xuyen district.

**Termites in the body of dam:**

Termites occur in inside body dams of Truc Kinh reservoir consist of 01 main dam and 03 auxiliary dams. There are 06 Termites species as: Odontotermes hainanensis; Odontotermes formosanus; Macrotermes anandalei; Pericapritermes Sp; Microtermes pakistanius; Microtermes Sp; in which 03 species of 2 races of Odontotermes and Macrotermes has nest of huge cells. These termites cause damage for the dam, and need to be treated. The problems of canal bank erosion and sedimentation in the waterway occur, so that water cannot flow to downstream, as well as waterlogging in the upstream of canal.

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3 Report on Environmental condition in Quang Nam province, 2010
4 Report on the existing environment assessment in Ha Tinh, 2006-2010
5 Report on the existing environment assessment in Ha Tinh, 2006-2010
6 Source: FS Report on Irrigated Agriculture Improvement Project, April 2013
Cracking and landslides:

In Quang Tri province, earth cracking occur in many regions, with different sizes (from 7/1993 to 7/1994). At Dong Ha City, land crackings observed at the Clinic Center, Provincial Hospital, Army Office, and other locations. Beside that, these problems happened in Cam Lo Clinic Center, Long Thanh Primary and Secondary Schools of Huong Hoa district, and Vinh Lam Communes of Vinh Linh District, Gio Chau commune of Gio Linh district, Hai Thang Commune of Hai Lang District, Cam Thanh Commune of Cam Lo district. Land cracking problem covers eight (8) districts and city in Quang Tri. The length, width and depth of crackings are different from several centimeters to one meter, or to 50-60 meters, 4m depth.

Drought:

Droughts occur every year in Quang Tri Province due to extreme climatic conditions; the dry season extends from March to August, maximum temperatures up to 40°C with the dry wind with the direction from Southwest, and saltwater intrusion inland from 25 - 30 km. Sand flying is filling up the rice fields and houses, affecting the lives of people in coastal zone. The agricultural area of La Ngà - Truc Kinh irrigation systems is affected by drought because limited water volume in the reservoir, and irrigation canal affected by erosion, damaged and sedimentation, caused reducing planted area and impact to local people. Ground water level is lower in drought season, so domestic water is facing with problem.

Quang Nam province: Annual drought usually occurs during the dry season, from April to December, while rainfall during this period was only 40 - 50mm. In dry season, the water level in river decrease, and groundwater level is lower as well, sometimes can not be exploitation. Lack of drinking water, irrigation water often happened, especially in the coastal plain area, and also lack of fresh water and facing with salinity intrusion. The on-farm pumping stations located in the coastal plain region can not work because of saltwater intrusion go into 15 – 20 km inland.

In Thanh Hoa and Ha Tinh Provinces, the locations far from water sources, or end tail of canals are affected by drought, because of water loss due to canal broken. And other problem of water pollution in the end tail of canal from domestic wastes, agricultural wastes leaving into canal, causing stuck of flows.

Flooding:

Quang Tri province: Floods have severly affected local people in Quang Tri, damaged on many irrigation constructions, erosion river banks and canals. Many parts of the National Highway 1A, North-South railway, the inter-district and inter-community road have been flooded for several days causing severe traffic congestion. Moreover, post floods often leave behind environmental consequences such as water pollution, dead and diseases animals... negatively impact on people's health. According to statistics in 2006 - 2010, Quang Tri Province was damaged by floods more than 10,000 billion, the total number of 47 deaths and missing, and 170 injured.

Quang Nam province: Rainy season is from September to December. Precipitation in the basin ranges from 3,200 – 4,000 mm/year. Flow coefficient in the basin is 60%. Rainfall during the rainy season accounts for 80% of the total annual rainfall, so annual floods often happens in November and December.

Saline intrusion: Saline intrusion occurs frequently in coastal areas (SP6-Thanh Hoa, SP7-Ha Tinh Province, SP8- Quang Tri, SP9 - Quang Nam). Salt water intrusion flow 20 km into the river (Quang Nam province), and a number of pumping stations along downstream of Thu
Bon River and Truong Giang River which do not work because of salinity (1800ha salinity irrigation area in the left side of Ba Ren river).

**Flying sand and sand flow:** Flying sand & sand flows occur mainly in coastal areas. Along Quang Tri beach, sand hill strong develop in Hai Lang, Trieu Phong, Gio Linh, Vinh Linh and Dong Ha City. The phenomenon of flying sand occurs due to hot dry season 06 months (from January to July), the wind speed in the season at 3-5 m/s were made in dry sand dunes shift from sea inland, average speed 2-3 m/year. These events have a direct impact on the quality of soil, yield, and crop here. In contrast, to the dry season, in the rainy season in Quang Tri is from May to December, rainfall can reach 600 mm/month to create surface flow on sandy area. This flow was accompanied by a large volume of sand to fill the field.

**Soil quality:** Soil quality of the region is generally good, although there are some notable features as follows: soil contamination by toxic chemicals during the war in Cam Lo, Dong Ha, Khe Sanh and Quang Tri. Besides that, land degradation due to deforestation at upstream, desertification due to sand in Quang Tri, Quang Nam; salinity, land reclamation, remove the mangroves into aquaculture ponds and dykes to prevent saltwater contamination of soil due to chemical residues in agricultural use.

**The chemical using in agriculture:** average 350kg7 of fertilizer for every 1.0 hectares (ha) and average 1.5 liters of pesticides for 1.0 ha, and 0.7 liters of the herbicide for 1,0 ha crops in the project area is showed in the social survey Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam province.

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7 Evarage data from field survey in Provinces Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam, March 2013
SECTION IV - POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 Applicable Bank safeguards policies

*Vietnam Irrigated Agriculture Improvement Project (VIAIP)* proposed investments for improvement, upgrading the existing hydraulic structures and irrigation canal networks, and some new constructions with small scales and concentration, in total seven (07) provinces in the Northern and Central Vietnam. However, the Project must comply with the WB environment and social safeguard policies, as follows:

**Environment Assessment (OP/BP- 4.01):** The works of all 10 Sub-projects will include improvement of existing under-performing infrastructures, modernization of irrigation canal systems; improvement and protection works for existing dams and appurtenant outlet works and canal system, and water pumps and associated weirs; construction of new multi-purposes village ponds; and refurbishment of infrastructure and construction or upgrading drainage pumping plant. Given negative environmental impacts associated with civil works, this policy is triggered. Safeguard tools are prepared to help ensure the environmental and social soundness and sustainability of investment. Also, to support integration of environmental and social aspects of project into decision making CPO is a Project Management Office that belongs to MARD, responsible for screening each sub-project. And the results of screening process, CPO will decide environmental safeguards instruments to be prepared including Environmental Impact Assessment (EIA), Environmental Management Plan (EMP) and/or Environment Codes of Practice (ECOP).

**Pest Management (OP 4.09)** – The project will not finance the purchase of any pesticides or herbicides. Under current cultivation practices, pesticides are used, and it is estimated approximately two-thirds of the farmers in the project area have not received training in integrated pest management (IPM). Modernization of irrigation schemes would increase cropping intensity, which could lead to increased pesticide use. A national Integrated Pest Management program already exists and will be implemented in each scheme province. During implementation, each province will prepare a plan for IPM activities and submit a report to IDA describing the extent of the problem, training program, and recommendations for improvements. If justified, the project will provide supplemental funding to support the IPM program. After project completion, the irrigated area will be stable with 100,166 ha⁸, and consequence is the amount of agricultural chemicals used in the project provinces will increase about 1.3 times in comparison with before Project, because of increasing cropping areas. Thus, this policy is triggered. An Integrated Pest Management Plan has been prepared as part of this ESMF and will be implemented to minimize and manage the environmental and health risks associated with pesticide use and promote and support safe, effective, and environmentally sound pest management.

**Physical Cultural Resources (OP/BP 4.11)** – During project preparation phase, there are 12 graves determined to be affected and will be relocated in Sub-Project 6 of Thanh Hoa province (Phase 1) and 07 graves plus 01 altar determined in Sub-Project 8 of Quang Tri Province (Phase 2), and thus this policy is triggered. Application of this policy is to assist in preserving physical cultural resources and avoiding their destruction or damage. Also, a “chance find procedures” will be included in EMP or

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⁸ Source: FS Report on Irrigated Agriculture Improvement Project, April 2013
ECOP to address Physical Cultural Resources which is unexpectedly found during construction.

*Indigenous Peoples (OP/BP 4.10)* - In order to ensure that indigenous peoples (or ethnic minorities): (a) Obtain the fully respects the dignity, human rights, and cultural identity, (b) do not affected by the impact of the development process, (c) enjoy the economic benefits combined with socio-cultural, and (d) benefit through the process of consultation and participation. During preparation phase of Project, there are two provinces of Ha Giang and Hoa Binh, where ethnic minority people living as Tay, H’Mong, Han, Hoa, Dao, Nung, Co Lao, San Chay,… in Ha Giang, and Thai and Muong in Hoa Binh Provinces.

*Involuntary Resettlement (OP/BP 4.12) –* The project is estimated land area is permanently revoked 96.0 ha (of which 2.6881ha resident land), temporary recovery area is 105.33ha of mainly agricultural land; and affected households (PAPs) are 4,553households and 05 office houses of Communal People Committee (CPC); And the relocation of 13 households (SP3 in Phu Tho province) for upgrading works and new construction pumping stations and construction of irrigation works. CPO/CPMU prepares the Resettlement Policy framework (RPF) to submit WB and Government for approval. PPMU prepares Resettlement Action Plan (RAP) based on the RPF for each Sub-project.

*Safety of dams (OP/BP 4.37) –* This policy is triggered to ensure that adequate safety evaluation of these dams are completed prior to project implementation since the project involves activities of repair and rehabilitation and drawing water from some existing dams. Dams higher than 15 meters include SP6 - Thanh Hoa Province, SP7 - Ha Tinh, SP8 – Quang Tri Province, and SP9 - Quang Nam Province with the construction activities such as raising the crest of dam, widening the dam crest, strengthen dam body, and construction of new breakwater walls. The Dam safety Report (DSR) will be prepared by MARD separately, not included in this ESMF, and will be reviewed by an independent panel of experts.

*Projects on International Waterways (OP/BP- 7.50) -* The Sub-Project to improve the South Ma scheme in Thanh Hoa will draw water from Cua Dat Reservoir which stores water from Chu River. The Chu River originates from Laos and therefore this policy is triggered to ensure that the project financed by the Bank affecting international waterways would not affect relations between the Bank and its borrowers. The South Ma Sub-Project essentially involves rehabilitation of an existing scheme. It does not involve works and activities that would exceed the original scheme, change its nature, or alter and expand its scope and extent to make it appear a new or different scheme. Moreover, the Project: (a) will not adversely affect the quality or quantity of water flows to the other riparians; and (b) will not be adversely affected by other riparian’s water use. Paragraph 7 of OP 7.50, sets out three exceptions to the Bank’s requirement that the other riparian states be notified about the Project. After analyzing the exceptions, this Project falls within the exception provided for in paragraph 7(a) of OP 7.50.

4.2 National laws

4.2.1 Regulations on Environment Impacts Assessment and Environmental Protection

*Law of Environmental Protection (LEP)(2005):* sets out regulations on strategic environmental assessment, environmental impact assessment and environmental
protection commitment of development activities. Environmental Impact Assessment report is developed at the same time as investment project preparation (feasibility study).

*Decree No. 29/2011/ND-CP* dated 18/04/2011, provide regulations on the preparation, appraisal and approval of Strategic Environmental Assessment reports, DTM reports, and Environmental Protection Commitment (Clause 29-36). At the time of formulation, appraisal and approval of reports detailed in Clause 2, Article 13 of Decree No. 21/2011/ND-CP, the screening environment (type of environmental assessment for the investment project) shall comply with the list of projects in Annex 1 and Annex 2 of the Decree 29/2011/ND-CP, *Environment Impacts Assessment (EIA)*. According to this Decree, subprojects in 07 provinces Ha Giang, Phu Tho, Hoa Binh, Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam under this Project have to prepare Reports of Environmental Impacts Assessment (DTM).

- Circular No. 16/2009/TT-BTNMT issued on 07/10/2009 of Ministry of Natural Resources and Environment on regulations, national technical criteria on environment, air quality and toxic substances in the air ambient;
- Decision No.22/2006/QD-BTNMT dated 25/12/2006 issued by MONRE on forcing to apply Environmental Standards of Vietnam.

### 4.2.2 Regulations on land use and land acquisition in investment projects

- Decree No. 188/2004/ND-CP on methods to determine land price and frame of land prices.
- Decree No. 197/2004/ND-CP on compensation, assistance and resettlement when State requires land; Cicular No.116/2004/TT-BTC on instruction to implement Decree No.197/2004/ND-CP;
- Decree No.69/2009/ND-CP on additional Regulation on land use planning, land acquisition, compensation, assistance, and resettlement.

### 4.2.3 Regulations on Construction Management in investment projects

- Decree No.12/2009/ND-CP dated 10/02/2009 on construction projects management and investment,
4.2.4 Regulations on integrated Water Exploitation, Forest Protection, Cultural Heritage and Biodiversity

- Law on Water Resources issued on 21/06/2012 by the National Assembly Republic Socialist of Vietnam;
- Decree No. 112/2008/ND-CP issued on 20/10/2008 of the Government on management, protection, using natural and environmental reservoirs for hydropower and irrigation;
- Decree no. 120/2008/ND-CP issued on 01/12/2008 of the Government on river basin management;
- Decree No. 72/2007/ND-CP issued on 07/05/2007 of the Government on dam safety management;
- Decree No. 149/2004/ND-CP issued on 27/07/2004 of the Government to regulate licenses for exploration, exploitation and water resources use, wastewater discharge into water resources;
- Law on Forest Development and Protection No. 29/2004/QH11 issued on 03/12/2004 by the National Assembly Republic Socialist of Vietnam;
- Decree No. 23/2006/ND-CP issued on 03/03/2006 of the Government on guidance to implement Law on Forest Development and Protection;
- Decision No. 57/QD-TTg issued on 09/01/2012 approved a plan to protect and develop forests for 2011-2020 by the Prime Minister.
- Law on Cultural Heritage No.28/2001/QH10 issued on 07/12/2001 by the National Assembly Republic Socialist of Vietnam. Article 13 - prohibitions: possession cultural heritage; destroy or risk destruction of cultural heritage; unauthorized excavation of archaeological sites, illegal construction, encroachment occupied land of historical-cultural, scenic;

4.2.5 Several documents related to construction VIAIP project

- Decision No. 187/QD-BNN-HTQT issued on 07/08/2012 of Ministry Agriculture and Rural Development on authorize to invest and assign to project owner – Integrated Agricultural Improvement Project (VIAIP project).
- Decisions of cua Provincial People Committees’ Ha Giang, Phu Tho, Hoa Binh, Thanh Hoa, Ha Tinh, Quang Tri, and Quang Nam to propose subprojects of VIAIP project, 2012

4.2.6 Vietnamese Standard and Criteria related to environment protection

- Water resources:
  - QCVN01:2009/BYT: National technical regulations on quality of drinking water;
  - QCVN02:2009/BYT: National technical regulations on quality of domestic water;
  - QCVN08:2008 BTNMT: National technical regulations on quality of surface water;
  - QCVN09:2008 BTNMT: National technical regulations on quality of groundwater;
  - QCVN10:2008 BTNMT: National technical regulations on quality of coastal water;
- QCVN14:2008/BTNMT: National technical regulations on quality of domestic wastewater;

- Air and land ambient management:
  - QCVN 05:2008/BTNMT: Air quality – Standards for ambient air quality;
  - QCVN 06:2008/BTNMT: Air quality – Maximum allowable concentration of hazardous substances in the ambient air;
  - QCVN 07:2008/BTNMT: Air quality – Threshold of hazardous substances in the ambient air

- Solid waste management:
  - QCVN 03:2008/BTNMT: National technical regulations on limitation of heavy metal concentration in the soil;
  - TCVN 6438:2001: Vehicle on road - the maximum limit permitted emissions;
  - QCVN 07:2009: National technical regulations for the classification of hazardous waste

- Vibration and Noise:
  - QCVN 27:2010/BTNMT: national technical regulations on vibration – limitation of vibration in the community and residence;
  - QCVN 26:2010/BTNMT: national technical regulations on noise – limitation of noise (replaced TCVN 5948:1999 Acoustics - Noise from vehicles during acceleration - the permitted level);
  - TCVN 5949: 1998 Acoustics - Noise from public and resident - the permitted level

- Health and Safety:
  - Decision 3733/2002/QD-BYT issued on 10/10/2002 by the Ministry of Health on the application of the 21 health standards and labor safety related micro-climate, noise, vibration and chemicals - the threshold in the workplace.
SECTION V – PROJECT POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

5.1. Potential environmental impacts

5.1.1. Positive environmental impacts

The project will be primarily concerned with improvement of existing irrigation and drainage scheme, rather than the construction of new ones, the environmental impacts are expected to be positive in that farm incomes will rise, employment will be created and quality of farmers' lives will improve. Adverse impacts will be limited, and mainly restricted to the construction phase.

After completion of the project a total of 1,083,729 people benefit from the project, in which 29,857 ethnic minority people of SP1, SP2, SP4 and SP5 in Ha Giang and Hoa Binh provinces (around 2.75%) only. The female beneficiaries about 49-50% of total beneficiaries. The total area of irrigated farmland is 100,166 ha, and aquaculture ponds 2881.7 ha, to be divided into Sub-project Groups as follows:

**Group 1** - Rehabilitation, upgrading irrigation canals. Major improvement and modernization to existing under-performing infrastructure (SP6, SP7, SP9, SP10), all which will supply enough water for 64,013 ha farmland, and 1,737 ha aquacultural ponds, as well as domestic water uses of total beneficiaries 855,058 people in Thanh Hoa, Ha Tinh and Quang Nam Provinces.

**Group 2** - Improvement and protection works for existing dams and upgrade associated canal systems (SP1, SP5, SP8), including repairing of water leakage holes in dam bodies, increasing height and crest width of dam, consequence of more water volume will be keep in the reservoir in order to provide more water for users in the dry season and flood control. Beside that, more water can be flow into canal for irrigation to meet a designed flow, but not affected in flow regime in the downstream, which will be not affected to local communities in the downstream. After completion of these Sub-Projects, there are 113,564 beneficiaries, irrigated area 11,826 ha farmland and 1,139.7 ha aquacultural ponds, about 4,255 people can enough water for drinking and livestock development in Ha Giang, consisting ethnic minority beneficiaries living in Ha Giang, Hoa Binh province. There are 16,888 ethnic minority beneficiaries living in Ha Giang and Hoa Binh Province (36% of beneficiaries of SP1 and SP5), they are Tày, H’Mông people living in Ha Giang, and Muong, Thai people living in Hoa Binh.

**Group 3** - Upgrading and modernization of water pumps and electric pumps and associated weirs (SP4), with 21,448 beneficiaries of Hoa Binh province, in which 9,281 ethnic minority of Muong people (43%); 1,048 ha irrigated farm land, and combining with electric generation and pounding rice.

**Group 4** - Refurbish infrastructure and Modernization of pumping stations (SP3) to drain water for low land annually, and rehabilitation, upgrading of five (05) irrigation pumping plants, as well as concrete on-farm canals, in order to supply water for always drought areas. The SP3 area covers drainage area of 16,765 ha, irrigation area of 788 ha, improving environment sanitation of 76,705 people in Tam Nong and Thanh Thuy Districts, Phu Tho Province.
Group 5 - Construction of new multi-purpose village ponds (SP2). Total 17 village ponds will provide fresh water for 16,954 people in the high land areas of 04 districts, Ha Giang Province, with minority people about 90%, and they will be happy to get clean water from these ponds, located close to their houses. At present, number of these people has to travel from 8 to 10 km to get water in dry season.\(^9\)

The project would improve water productivity each year and would reduce the use of pesticides and fertilizers through balanced fertilization application and integrated pest management.

Component B of the project will not affected the natural ecological environment because almost of construction works are implemented on the existing works. None of any activity will be implemented in the protected areas. The investment project will not be affected by external factors such as climate change or development activities upstream of the system.

However, modernization of irrigation schemes would increase cropping intensity. After project completion, the irrigated area will be stable with 100,166 ha\(^10\), and consequence is eco-agriculture in the project provinces will be expanded, and more food will be produced.

5.1.2. Potential negative environmental impacts and mitigation measures

The potential negative impacts and mitigation measures are presented to three phases of Project, and predicted based on the activities of proposed 10 Sub-Projects, in which 03 Sub-Projects are implemented in the 1\(^{\text{st}}\) year\(^11\). The remaining Sub-Projects also apply these mitigation measures mentioned in Table 4 below.

### Table 4: Potential negative environmental impacts and mitigation measures

<table>
<thead>
<tr>
<th>No</th>
<th>Potential negative Impacts</th>
<th>Measures to be taken</th>
</tr>
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| 1 | Permanent and temporary land acquisition would be done before Construction Phase. (See details in the Annex 1.1) | Identify the amount and nature of land required, owner, and/or other issues and prepare a Resettlement Action Plan (RAP) to provide compensation and/or assistance following the Resettlement Policy Framework (RPF), compliance with policies of Gov., and WB.  
Apply for all Sub-Projects, which require involuntary land acquisition.  
The Procedure of involuntary land acquisition present in detail in RAP report. |
| 2 | Involuntary Resettlement (See details in the Annex 1.1) | Resettlement requires for construction works will be compensated at replacement cost, according to policies of Gov and WB. The detail steps of resettlement present in the RAP.  
Apply for Sub-Projects require relocation, in which all three (03) Sub-Projects implementation in 1\(^{\text{st}}\) year do |

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\(^9\) Source: VIAIP_SIA Report, 2013, pag 30  
\(^10\) Source: FS Report on Irrigated Agriculture Improvement Project, April 2013  
\(^11\) Aid-Memoir of WB mission, April 15-26, 2013
### Environment and Social Management Framework (ESMF)

#### Irrigated Agriculture Improvement Project (VIAIP)

<table>
<thead>
<tr>
<th>No</th>
<th>Potential negative Impacts</th>
<th>Measures to be taken</th>
</tr>
</thead>
</table>
| 25 | **not required resettlement.**  
**The procedure of resettlement present in detail in RAP report.** |
| 3) | Likely to involve ethnic minorities and/or adversely affect ethnic groups  
(See details in the Annex 1.1) | CPMU, PPMU will be put in place to address negative impacts to ethnic minorities, cultural appropriated free, prior and informed consultations. The results of consultations will be discussed among CPO/CPMU, PPMU and WB representatives and decision making if EMDP needed.  
*Apply for Sub-Projects where ethnic minority people living, and see detail in EMDP report (if any).* |
| 4) | Involve UXO risk ? for construction works requires to excavate more than 2m depth, | If identified at the feasibility stage, include the clause in the EMP. The procedures would include: contact responsible agencies and complete the clearance before conducting construction activities. The subproject will be required to provide a UXO clearance certificate before undertaking site clearance and/or construction.  
*Apply for Sub-Projects require UXO.* |

#### II - Construction Phase

| No | Water/soil pollution | • Proper collection and disposals of water and wastewater, site management  
• manage worker’s behaviours |
|----|----------------------|----------------------|
| 1 | Dust, noise and vibration  
*From materials unloadings, piling, operating construction plants etc* | • Avoid sensitive hours and locations  
• Contain granual materials  
• Inform communities about construction schedules to avoid nuisane |
| 2 | Solid waste generation  
*e.g. excavated soils, packaging materials, municipals wastes generated by the workers* | • Minimise waste generation  
• Reuse non toxic wastes where possible  
• Proper Collection and Disposal |
| 3 | Chemicals, Hazardous waste  
*Used oil, containers, fuels etc* | • Isolate  
• Warnings |
| 4 | Disruptions to traffic, existing public services: irrigation, electricity, water supply, drainage | • Consultation and get agreement with affected communities on service disruption period  
• signboards  
• Avoid sensitive hours  
• Guide traffic |
| 5 | Erosion, sedimentation and | • manage stock piles and disturbed areas, particulary slops  
• Restore/create vegetation covers  
• Trap sediments in water flows |
<p>| 6 | Localised flooding risks | • Avoid disturbance to natural drains |</p>
<table>
<thead>
<tr>
<th>No</th>
<th>Potential negative Impacts</th>
<th>Measures to be taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Social Disturbance</td>
<td>• Provide and maintain drainage ditches</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Inform affected communities about construction schedule</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Implement proper site management: construction wastes, domestic waste, wastewater,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>traffic, workers’s behaviour, working hours etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Manage construction materials and wastes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Minimise disturbed areas</td>
</tr>
<tr>
<td>9</td>
<td>Devalue landscape in the area</td>
<td>• minimise disturbed areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• landscaping and restoration of disturbed areas</td>
</tr>
<tr>
<td>10</td>
<td>Sludges from canal dredging (may be contaminated)</td>
<td>• Determine quality and proper disposals</td>
</tr>
<tr>
<td>11</td>
<td>Communities and Workers’ health and safety risks</td>
<td>• Training, awareness raising</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provide safety gears and monitor usage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• proper management of construction sites, materials and wastes: warning signs, restrict</td>
</tr>
<tr>
<td></td>
<td></td>
<td>access, fire and hazard prevention</td>
</tr>
</tbody>
</table>
12. loss or damage to cultural resources, including sites having archeological (prehistoric), paleontological, historical, religious, cultural and/or unique natural values, including physical relocation of grave.

Follow the Chance Find Procedures detailed in Annex 3

Apply for Sub-Projects causing negative impacts to Physical Cultural Resources, (SP6 in phase 1, and SP8 in phase 2).

The procedures to relocate those graves present in the RAPs of SP6, Thanh Hoa Province, and SP8, Quang Tri Province.

III- Operation phase

1. Likely to increase the use of pesticides and/or toxic chemicals (from agriculture and aquaculture production) that could affect soil quality, water quality, and/or water users downstream.

During implementation, each province will prepare a plan for IPM activities and submit a report to IDA describing the extent of the problem, training program, and recommendations for improvements.

Implement IPMP and provides training to farmers/fishers, support technology/finance. (see Annex 4)

Apply for all 09 Sub-Projects in Component B

Water quality in the multi-purpose ponds, Ha Giang Province

The monitoring program of water quality is carried out regularly to ensure that the water quality satisfies MOH’s standards.

Apply for Sub-Project 2, Ha Giang Province

5.2. Requirements of environmental safeguards instruments

The environmental safeguards instruments required to be prepared for subprojects in accordance with the Bank safeguard policies and GOV requirements are given in Table 5.

Table 5: Environmental safeguards instruments required by Vietnam Government and World Bank

<table>
<thead>
<tr>
<th>GOV’s requirement</th>
<th>WB’s requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Impacts Assessment (EIA) - The environmental assessment evaluates the project’s environmental risks and impacts in its area of influence; examines the project alternatives; identifies ways of siting, planning, design, and implementation by</td>
<td>Environmental Management Plan (EMP) - The EMP is prepared as integral part of the EIA. The EMP details (a) the mitigation, monitoring and institutional measures to be taken during the implementation and operation of the project to eliminate or offset</td>
</tr>
</tbody>
</table>
preventing, minimizing, mitigating, or compensating for adverse environmental and social impacts and enhancing positive impacts; and includes the process of mitigating and managing environmental and social impacts throughout the project implementation.

<table>
<thead>
<tr>
<th>Environmental Protection Commitment (EPC) – This instrument to address minor negative environmental impacts associated with small infrastructure investment.</th>
<th>Environmental Codes of Practice (ECOP) - Generic mitigation measures for minor construction impacts associated with small-scale infrastructure investments. Environmental Codes of Practice (ECOP) have been developed as part of the EMP and will be included in bidding documents.</th>
</tr>
</thead>
<tbody>
<tr>
<td>During implementation of project, each province will prepare a plan for IPM activities and submit a report to DARD/PPC describing the extent of the problem, training program, and recommendations for improvements before commencement.</td>
<td>During implementation of project, each province will prepare a plan for IPM activities and submit a report to IDA describing the extent of the problem, training program, and recommendations for improvements. If justified, the project will provide supplemental funding to support the IPM program.</td>
</tr>
</tbody>
</table>

- Outline of an Environmental Management Plan (EMP) is expressed in *Annex 2*;
- An Environmental Codes of Practice (ECOP) for small civil works is expressed in *Annex 3*;
- Outline of an Environmental Impacts Assessment (EIA) is given in Appendix 2.4 of Circular No. 26/2011/TT-BTNMT issued dated 18/07/2011; and
- Outline of an Environmental Protection Commitment (EPC) is given in Appendix 5.1 of Circular No. 26/2011/TT-BTNMT issued dated 18/07/2011;

The environmental safeguards instruments to be prepared for the first year sub-Projects are in *Table 6*.

**Table 6: The required environmental safeguards instruments for the first year subprojects**

<table>
<thead>
<tr>
<th>No</th>
<th>Sub-Project</th>
<th>GOV’s requirement</th>
<th>WB’s requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Instrument</td>
<td>Approval</td>
</tr>
<tr>
<td>1</td>
<td>SP6 – Improve and upgrade the South Ma irrigation scheme</td>
<td>EIA</td>
<td>Provincial DONRE and PPC</td>
</tr>
<tr>
<td>2</td>
<td>SP9 – Improve Phu Ninh irrigation scheme in Quang</td>
<td>EIA</td>
<td>Provincial DONRE</td>
</tr>
<tr>
<td>No</td>
<td>Sub-Project</td>
<td>GOV’s requirement</td>
<td>WB’s requirement</td>
</tr>
<tr>
<td>----</td>
<td>-------------</td>
<td>-------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Instrument</td>
<td>Approval</td>
</tr>
<tr>
<td></td>
<td>Nam</td>
<td></td>
<td>and PPC</td>
</tr>
<tr>
<td>3</td>
<td>SP4- Improve and upgrade small scale irrigation schemes in Mai Chau, Tan Lac, Luong Son, Cao Phong, and Lac Son districts.</td>
<td>EIA</td>
<td>Provincial DONRE and PPC</td>
</tr>
</tbody>
</table>

The environmental safeguard instruments of all phase 2 subprojects are in line with *Table 5*. 
SECTION VI – PROCEDURES FOR REVIEW, CLEARANCE AND DISCLOSURE

6.1. Procedures for Review and Clearance

- Environmental – Social Management Framework (ESMF), Resettlement Policy Framework (RPF), Resettlement Action Plans (RAPs), Ethnic Minority Development Framework (EMDF) and Ethnic Minority Development Plan (EMDP) (if any) will be submitted to WB for review and clearance, and approved by MARD.

- PPMU is responsible for preparation of subproject Environmental Impacts Assessment (EIA), Environmental Protection Commitment (EPC), Environmental Management Plan (EMP) including ECOP, as well as RPF, RAP, EMDF and EMDP. EIA will be submitted to provincial DONRE for review and clearance while the EMP and ECOP will be submitted to the Bank for review and clearance. EPC will be submitted to Division of Natural and Environment Resources at District level for review and District People Committee (DPC) for approval. RPF, RAP, EMDF and EMDP will submit to PPC and MARD for approval.

6.2. Public consultation and Information Disclosure

For meaningful consultations between project proponent and project-affected groups, and local NGOs (e.g. farmer association, women union, fatherland front, veteran association …), project proponents will provide relevant documents in a timely manner and conduct consultation with the representatives of affected groups. Consultation will be conducted in a language that is understandable and at places accessible to the groups being consulted. Concerns and issues raised by the affected groups during the public consultation meetings will be recorded, a summary will be included in the EA and the EMP of sub-projects will incorporate adequate measures to address these concerns.

According to OP/BP 4.01, once MARD officially submits final draft safeguards instruments, including ESMF, RPF, EMDF to the Bank, the Bank will disclose these documents in InfoShop and VDIC. These safeguards instruments will be made before the departure of the appraisal mission and at least 120 days before the Board date. Safeguard documents including EMP, RAP, EMDP subprojects will also be disclosed locally in project area and VDIC prior to appraisal/approval of subproject.

According to Article 22 and 34 of Decree 29/2011/ND-CP, EIA or EPC after approved by responsible agency is disclosed at communal people’s committee office where public consultations was conducted to notify local people for monitoring and supervision.
SECTION VII – INSTITUTIONAL ARRANGEMENT

7.1. The roles and responsibilities of stakeholders in the management, monitoring and supervising the implementation of safeguards policies

There are many agencies of the Ministry, Department, and the Institute for Local Government involved in implementation of safeguards policies. However, CPO/CPMU under the Ministry of Agriculture and Rural Development is responsible for overall management. At provincial level, the Provincial Project Management Unit (PPMUs) will be responsible for performing subprojects. Details are below:

1/ Central level

- **MARD** is responsible for approving the Environmental-Social Management Framework (ESMF), Environment Impact Assessment (EIA) of the Project, and providing budget for implementation of the Bank safeguard policies and national environmental protection law.
- **CPO** is responsible for (i) providing guidance on implementation environmental and social safeguards and (ii) monitoring and evaluation of project environmental and social safeguards performance.
- **CPMU** - established by CPO, is responsible for instruction, organizing and implementation of environmental and social safeguard policies at project level.

2/ Provincial level

- **PPC** is responsible to approve all documents of compensation, resettlement and ethnic minorities, and subproject Environment Assessment (EIA).
- **DARD** is responsible for ensuring compliance with the Bank safeguard policies and national environmental protection law.
- **PPMU** is responsible for instruction, organizing and implementation of environmental and social safeguard policies at subproject level in accordance with this ESMF; checking daily subproject’s activities, monitoring and management of construction quality, and monitoring compliance with environmental and social safeguards.

3/ **Construction Contractors** - responsible for implementing environmental covenants mentioned in contract signed with PPMU.

4/ **Local Community** includes locally-affected persons, local authority, local NGOs and Community Supervision Board (CSB). CSB is established by Decision No. 80/2005/QD-CP of the Prime Minister, dated 18/4/2005 on the community monitoring of investment project. Local community is responsible for monitoring PPMU and contractor’s compliance with environmental and social safeguards.

5/ **Construction Monitoring Consultants**: Hired by PPMU, has responsibility for daily monitoring and recording on contractor’s compliance;

6/ **Environment Management Consultants** (a member of the construction supervision team) will be:

- On behalf of PPMU to perform daily monitoring of contractor’s compliance with environmental covenants;
- Prepare monthly reports on contractor’s environmental compliance and submit to PPMU, this report will be used for payment of Contractors on environmental protection; and
- Report PPMUs any "chance finds" during construction.

![Diagram of implementation arrangement](image)

**Figure 2: Diagram of implementation arrangement**

7.2. **Mechanism of internal monitoring, external monitoring, and community monitoring**

- **CPO** is responsible for periodically or random internal monitoring of implementation of environmental and social safeguard policies at subproject level.

- **PPMU** is responsible for ensuring effective implementation of safeguarding measures; preparing subproject progress reports in a timely manner. PPMU will establish an Environmental-Social Unit (ESU) with at least one environmental staff in charge of environmental safeguards – he/she will monitor and supervise the contractors to comply with environmental mitigation measures.

- **Environmental Monitoring Consultant (EMC):** EMC will be mobilized by CPO/CPMU - responsible for providing guidance, monitoring and evaluation of compliance with environmental covenants of contractors and preparing necessary reports, including:
  - Periodic monitoring report on compliance with the environmental safeguard policies implemented by PPMU and Contractors (every 6 months), and follow up on the recommendations made during the previous monitoring reports;
  - Report on monitoring environment quality in the Project Areas as mentioned in the approved EMPs;
  - Report on consultations with local communities, especially project-affected persons on implementation of environmental and social safeguard policies;
  - Report on the results of resolving complaints by PPMUs and Contractors;
  - Every 6 months report on results of environmental and social safeguards implementation.
- **Community Supervision Board (CSB)** is representative of affected people and beneficiaries has a right monitoring Contractor's activities and reflecting any negative impacts or damages caused by Contractor directly or via local authority to implementing agencies (PPMU, CPMU, and PPC). CSB would do their works from starting implementation phase of sub-project.

### 7.3. Mechanism of resolving complaint and grievance

- Construction Supervision Consultants (CSC) will be responsible for day-to-day supervision of contractor’s environmental compliance. When there are complaints, the CSC together with the representative of the contractors will investigate the issues and agree on the corrective actions if necessary. The CSC will then follow up and document the corrective actions until the cases are completely resolved.

- Construction supervisors will certify the environmental mitigation tasks carried out by the Contractors in monthly payment request or recommends fines. PPMUs makes the payment and can apply fines in accordance with the compliance framework.

- The local community will be encouraged to participate in daily monitoring of contractor’s environmental compliance. Communities can make complaints to the contractor’s site Engineer, local authority or PPMU or via telephone 'hotline'. PPMU will coordinate with relevant parties to address the complaints.

### 7.4. Reporting Requirement

#### Table 7: Reporting Requirements for EMP

<table>
<thead>
<tr>
<th>Report</th>
<th>Responsibility for Preparation</th>
<th>Frequency</th>
<th>Submission to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update the Environmental Management Plans of Sub-Projects (EMP update), including Environment Codes of Practice (ECOP)</td>
<td><strong>Environmental Consultant</strong>, supported by PPMU, CPMU</td>
<td>Once during first year of implementation prior to commencement of construction. And ECOP will be included in bidding documents</td>
<td>WB, MARD, PPC, CPO/CPMU, PPMU,</td>
</tr>
<tr>
<td>Contract Specific Environmental Management Plan (CSEP)</td>
<td><strong>Contractor</strong></td>
<td>Once during first year of implementation prior to initiation of construction</td>
<td>WB, MARD, PPC, CPO/CPMU, PPMU,</td>
</tr>
<tr>
<td>Canal Lining Schedule and Detailed Implementation Plans</td>
<td><strong>PPMU, Contractor</strong></td>
<td>Once before stop providing water</td>
<td>CPMU, PPMU, Contractors, Local Authorities</td>
</tr>
<tr>
<td>Report on UXO survey and Treatment</td>
<td><strong>Contractor of Ministry of Defence</strong></td>
<td>Once during first year of implementation prior to initiation of construction</td>
<td>WB, MARD, PPC, CPO/CPMU, PPMU,</td>
</tr>
<tr>
<td>Report</td>
<td>Responsibility for Preparation</td>
<td>Frequency</td>
<td>Submission to</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Report of Dam Safety</td>
<td>Dam safety Consultant supported by PPMU, CPMU</td>
<td>Once during first year of implementation prior to initiation of construction</td>
<td>WB, MARD, PPC, CPO/CPMU, PPMU</td>
</tr>
</tbody>
</table>

### Monitoring Reports

<table>
<thead>
<tr>
<th>Report on contractor’s compliance with environmental convenants</th>
<th>CMC</th>
<th>Once a month</th>
<th>PPMU, Contractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report on project environmental safeguards performance</td>
<td>Environment Consultant supported by CPMU and PPMU</td>
<td>Once every 6 months during construction</td>
<td>WB, MARD, PPC, CPO/CPMU, and PPMU</td>
</tr>
<tr>
<td>Plan for IPM activities</td>
<td>Environment Consultant supported by CPMU and PPMU and DARD</td>
<td>Before starting IPM program at each project province</td>
<td>WB, MARD, PPC, CPO/CPMU, PPMU</td>
</tr>
<tr>
<td>Report on IPM implementation</td>
<td>DARD</td>
<td>Once a year</td>
<td>WB, MARD, PPC, CPO/CPMU, PPMU</td>
</tr>
</tbody>
</table>

### 7.5. Training and Capacity Building

- **Trainees**: Staff of CPMU, PPMU, Contractors, local authorities of province/district/commune and local communities (included affected people and beneficiaries);

- **Contents of Trainings**: Contents of trainings cover safeguard policies of WB, the role of local community in monitoring construction quality, and technical standards applying to project implementation.

- **Methods of Training**: Trainings on an in-door class in combination with field visits and exchange experiences.

- **Duration of Training**: Total 5 training courses and each course will last from 4 to 5 days, and one course per year, during project implementation.

- **Trainers**: Environmental Consultants

- **Cost estimates for training**: 150,000 USD

### 7.6. Communication Program

The Communication Program of the Project will be developed by CPMU for Sub-Projects, with the aim of propagating and disseminating information to the community frequently during project implementation.

Contents of the communication program is transferring information on Project, the proposed investments, scope of Project, land acquisition, inventory, land clearance and handing cleared land to PPMU, schedule of construction packages, and other related information. So local
authority and people have information to arrange to participate in Project implementation, and minimize any negative impact to their lives.

The main methods of media are public consultation/meeting, radio broadcasting of commune/district, and especial leaflets can be applied in remote areas where people live scattered.

The communication will be implemented in all phases of the project. The PPMU sends notice to local authorities (districts/communes), and local authorities to inform the community by local radio speaker/or village meetings, including:

1- The preparation phase of the project:
   - PPMUs notice in writing to the district government / society / local communities in project preparation, project scope, expected execution time, the issues related to land acquisition and resettlement residence (if available).
   - Notice the time of field survey, inventory and involuntary land acquisition, and ask Community Supervision Board (CSB) starting their supervising.
   - Notice the PPC Decision on land acquisition and time for inventory.

2- Implementation Phase:
   - PPMU should notice in writing to local authority/local communities about the contract package, contractor, schedule of construction works before starting at least 01 month, it will be enough time for local people harvest their crops.
   - PPMU should inform the time for testing water discharge in canal, testing pump machine operation,… to allow water users getting water for their uses.
   - Contractor must inform local communities, especially affected persons about construction schedule at least 2 weeks prior to commencing construction. Contractor must adequately provide signboard on-site.

7.7. Cost estimates

- The costs of implementing the environmental mitigation measures during construction phase are included in the total costs of construction contracts. Environmental supervision will be carried out as part of technical supervision for the civil works under the Detail Design and Construction Supervision contract, the budget of which is 1.75 millions.
- Environment and Social Safeguard Monitoring (US$500,000) will support to implement monitoring of environment and social safeguards compliance indicate in EMP/ECOP, RAP and EMDP. The monitoring would be carried out by a team of independent experts recruited by the CPO. The monitoring report would be prepared for each subproject every year. The budget for environmental capacity building including training on environmental safeguards is US$ 150,000
- Integrated Pest Management (IPM) Program Support (US$2.0 million) will support the implementation of the IPM program for the irrigation schemes (The Irrigation scheme in Thanh Thuy District, Phu Tho province, The Northern Song Chu – southern Song Ma irrigation scheme, Thanh Hoa Province, Ke Go Irrigation scheme, Ha Tinh Province, La Nga and Truc Kinh – Ha Thuong irrigation schemes, Quang Tri Province, Phu Ninh, and Khe Tan Irrigation schemes, Quang Nam province), and the effectively large demonstration farms of all 07 provinces under the Project. This activity has been designed based on the existing knowledge and experience on the IPM in the project areas and will mainly support: (a) farmer adoption of good IPM practices and safe use of pesticides; (b)
adoption of non-chemical uses and farmer outreach; (c) special assistance to the poor and vulnerable; and (c) strengthen regulatory measures.

- Land Acquisition. US$ 5.3 million (or about 3 percent of the total estimated cost of civil works under Component B) has been appropriated to be used for the appropriation of the land necessary to implement the civil works for all subprojects in 07 provinces. However, this figure may be changed during implementation phases in cases of any changes and/or addition structures in 07 provinces. The relatively low cost of the land acquisition because of all most of construction activities will be rehabilitation, upgrading the existing construction works, and less number of new constructions with small scales. The cost for the land acquisition would be exclusively financed by the Government, and this amount would be adjusted when the RAP is prepared for each subproject.
SECTION VIII – PUBLIC CONSULTATION

8.1. Requirement of Public Consultations

*Consultation:* The Bank requires public consultations with project-affected groups and local NGOs during environmental assessment process. MARD/PPMU consults project-affected groups and local nongovernmental organizations (NGOs) about the project’s environmental aspects and takes their views into account. MARD/PPMU initiates such consultations as early as possible. The public consultations would provide information on the project such as (a) the objectives of project, the proposed investments; (b) results of environmental assessment and potential negative impacts; (c) additional studies if needed, and take their views into account. The results of consultations should be incorporated in EMP/ECOP. Request extended consultation with those affected people and ethnic minorities in case Project requires relocation, land acquisition and ethnic minorities. Consultations with such groups will be carried out throughout project implementation as necessary to address EA-related issues that affect them.

8.2. Summary of public consultations during the preparation of the Environmental-social Management Framework (ESMF)

In consistency with the Bank’s requirements regarding public consultations during preparation of Project, a series of consultations have been carried out in the process of preparing above mentioned safeguard documents by Environment Consultants together with CPMU and PPMUs. The first consultation was conducted in December, 2012 with the government officials at the all 07 provinces to present the proposed investments and obtain their views. The second consultation was made in February and March, 2013 at the Sub-Project Areas inviting concerned stakeholders such as farmers and representatives of the women unions, affected people as well as beneficiaries. During the consultation, representatives expressed their general support for the proposed investments, as these investments would address their long term concerns to secure irrigation water, aquaculture development, and drinking water for people living in the high land and their livestock. But same time they have expressed their concerns about the compensation regarding the land acquisition and other measures to mitigate the short-term impacts during construction (stop continuous providing water in the canal for construction works, or construction of bypass road during breaking the dyke to sluice construction,…). In addition, a series of consultation with affected households, who may be relocated, was also conducted as part of the preparation of ESMF.

*Summary of results from public consultation in all Seven (07) provinces as follows:*

1- *Duration:* 1st consultation in December 2012, and 2nd consultation is from 27 February to 20 March, 2013

2- *Venue:* DARD offices of Ha Giang, Phu Tho, Hoa Binh, Thanh Hoa, Ha Tinh, Quang Tri, and Quang Nam provinces.

3- *Participants* in each provincial consultation.
   - Representatives of DARD, DONRE, PPMU, Irrigation Management Company.
   - Officers of DPCs in the Sub-Project Areas
   - Representatives of Commune People’s Committee (CPC) in the Sub-Project Areas
Consultants: FS Consultants, Social Consultants and Environment Consultants of Project and Sub-Project.

Total participants 558 persons, in which Ha Giang 52, Phu Tho 58, Hoa Binh 76, Thanh Hoa 83, Ha Tinh 133, Quang Tri 47 and Quang Nam 109.

4- Contents of consultation:

PPMU and Environment Consultants present (a) the objectives of Project, and proposed investments, Project Components (b) the major activities in Sub-Project implementation, (c) prediction of potential impacts and measures of potential negative impacts; and (d) additional studies if needed.

List of identified Sub-Projects in 07 provinces present in the consultation meetings:

- SP1 - Improve irrigation schemes in Bac Quang, Quang Binh and Vi Xuyen districts.
- SP2 - Improve irrigation system and construct multi-purpose village ponds in Quan Ba, Yen Minh, Dong Van, and Meo Vac.
- SP3 – Improve drainage and irrigation systems in Tam Nong and Thanh Thuy districts;
- SP4 - Improve and upgrade small scale irrigation schemes in Mai Chau, Tan Lac, Luong Son, Cao Phong, and Lac Son districts;
- SP5 - Improve small scale irrigation systems in Hoa Binh province;
- SP6 – Improve and upgrade the South Ma irrigation scheme;
- SP7 – Improve the Ke Go and Song Rac irrigation schemes;
- SP8 – Improve medium scale irrigation schemes in Quang Tri province;
- SP9 – Improve Phu Ninh irrigation scheme.
- SP10 – Improve Khe Tan irrigation scheme

5- Summary of discussions

(1) The agreement of participants

All participants (100%) agreed with proposed investments, and realized the benefits from The Project, such as:

- Supply stable water for irrigation and drinking water for people living in the mountainous area in Ha Giang Province (drinking water for people and their livestock);
- Supply stable irrigation water for agricultural development in the water shortage areas due to lack of canal, and/or canal and structures broken (SP4-Hoa Binh Province, SP6-Thanh Hoa Province, SP7-Ha Tinh province; and SP8-Quang tri province) and supply water as well as drainage water of waterlogging areas (SP3-Phu Tho Province).
- Safety of dams, weirs and supply water for irrigation in the water shortage area caused by damaged headworks (SP1, Ha Giang Province, SP5 – Hoa Binh Province, and SP8-Quang Tri Province).

(2) Environment Impacts:

Ha Giang Province:
• The project activities will do not affect forest land.
• There are ethnic minority people living in the project area, but not relocation by the project activity;
• The area of land acquisition by the project will be small scale and concentration;

Phu Tho Province:
• The project activities will do not affect forest land.
• Resettlement for 13 households. However, the land acquisition is not large because the scope of construction is small and concentration. The Local Government of Tam Nong and Thanh Thuy Districts have planed for these households relocation.

Hoa Binh Province:
• The project activities will do not affect forest land.
• Resettlement is not required. However, the land acquisition is not large because the scope of construction is small and concentration.

Thanh Hoa Province:
• The project activities will do not affect forest land.
• There are 12 graves would be relocated, none of resettlement
• Land loss is mainly along the existing canals. The resident land loss is small and some appurtenance works on the resident land affected by construction activities.

Ha Tinh Province:
• The project activities will do not affect forest land.
• The potential negative impacts such as dust, noise, and other wastes will be occurred during construction phase. However, these impacts are not much deleterious and can be mitigated.

Quang Tri Province:
• The project activities will do not affect forest land.
• No resettlement required, and land loss is not large, due to the scope of construction is small and concentration.
• There are 07 graves and 01 altar will be relocated.

Quang Nam Province:
• The project activities will do not affect forest land.
• Land acquisition of 40 households with total land loss 0.29ha for construction works.

6- Recommendation of local people in the Sub-Project Areas
• The Project Owners should practice all mitigation measures strictly;
• The Project Owners should push the Project activities to contribute for agricultural development to improve the lives of the poors.

7- Conclusions
• All participants are full agreed with proposed investments and activities of Project.
- The positive impacts of Project bring to people are much (providing stable irrigation water for farming, drinking water for people and their livestocks, drainage waterlogging in low lands), and negative impacts can be predicted and mitigated.

- The Project Owner should strictly practice mitigation measures during construction phase, which have been presented in the consultations.
ANNEXES

ANNEX 1. DESCRIPTION OF 09 SUB-PROJECTS AND LIST OF MAJOR INFRASTRUCTURES

ANNEX 1.1 - DESCRIPTION OF 09 SUB-PROJECTS

Three (03) Sub-Projects are implemented in the first year (SP6, SP9 and SP4).

1) **SP4- Improve and upgrad small scale irrigation schemes in Luong Son, Lac Son, Tan Lac, Cao Phong and Mai Chau districts.** The main objective of the SP4 is upgrading and improving of 10 weirs, 09 turbine pump stations and 01 electric pump stations which damaged by many years of operation, to supply water and electricity combined rice milling. The number of people beneficiaries after SP4 completion is 21,448 people, in which 9,281 ethnic minority people (43%).

2) **SP6- Improve and upgrade the South Ma irrigation scheme:** There are 11,154ha cultivated area and 450ha of aquaculture are irrigated by Nam Song Ma irrigation system, supplied from Ma river through by Nam Song Ma pumping station. Currently the system ensures only 6836ha irrigated area (reaching 61% of demand), the left area pumped from about 39% of river Chu, Ma, Cau Chay or pump up drainage canals. However, due to the impact of climate change in recent years, so the water level in dry season of the river is lower than the annual average of (0.3÷0.9) m, the pumps could not operate according to the designed capacity and leading to droughts occur frequently, saltwater intrusion into the interior, and water shortages affect crop yields. The sub-project area is in Yen Dinh and Thieu Hoa district. Total population is 871,401 people belong to 215,605 households. Over 80% households has income from agricultural production. 100% of households is Vietnamese, no minority in the subproject area. Poverty rate is 16.4%. The main objective of the sub-project is repairing and upgrading the canal system to get water from Cua Dat reservoir to irrigate 11.154ha and then close totally Nam Ma River pumping station. The number of beneficiaries after SP6 completion is 195,000 people.

3) **SP9- Improve Phu Ninh irrigation scheme.** The subproject area is located in the Quang Nam Province, where annual prone to natural disasters such as floods, droughts, landslides, salinity at estuarine of Phu Ninh and Khe Tan irrigation area, with command area belong to districts of Nui Thanh, Phu Ninh, Thang Binh, Que Son, Duy Xuyen and Dai Loc. Population is 385,165 people, and 100% is Vietnamese, no minority in the subproject area. It is accounted for 80% farmers in the subproject area. The poverty rate is from 10.1 to 17.3%. Phu Ninh irrigation system is irrigated for 19,427ha and supply for about 200,000 people with discharge is 0.23 m³/s. Khe Tan Irrigation system is responsible for irrigation of 3,500ha, but at present time, it can provide water for 2,100ha (obtain 60% as required); the remain area is bare land because no water for cultivation. The Phu Ninh Irrigation system was repaired, upgraded headworks and some sections of main canals, branches, hydraulic structures and installed the SCADA system by VWRAP (WB3). The major objective of SP9 is rehabilitation, upgrading several

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12 Source: Report of Overall Feasibility Study (VIAIP) - VARW, April, 2013.
broken canal sections, and construction of new irrigation canal (namely N30) with 4.5km long, in order to take water from Bac main canal cross to Ba Ren River to irrigate for 1,800ha cultivation, where always suffering with saline problem, and closing 05 irrigation pumping stations used to provide water for this area, because saline water source. Total beneficiaries after SP9 completion is 406,760 people.

The remaining Sub-Projects will be implemented in the Phase 2:

(4) **Ha Giang irrigation system (SP1 and SP2).** Ha Giang is located in the north far of Vietnam, is complicated terrain 70% hilly, can be divided into three regions: northern rocky mountain region, steep slope, river is divided. High hilly area at western part is upstream of Chay river, steep slopes, high passes, narrow valleys and stream. Lower areas is included valley of Lo River and Ha Giang City. Irrigation systems are generally small scale, domestic, livestock and irrigation is supplied from from reservoirs, dams, streams.

SP1 - improve and upgrade irrigation system in Bac Quang, Quang Binh, and Vi Xuyen district in Ha Giang province, with the main objective is to irrigate 2,771 ha of rice and crops, 17 hectares aquaculture area, and domestic water to 15,662 people. When completed SP1, it has benefited 25,771 people, of which 11,210 ethnic minority people (43%). SP1 will upgrade, improve and repair 09 small earth dams (maximum height is 14m), upgrade, repair the 23spillway, and upgrade, repair and reinforcement of the canal system and water pipe system.

SP2 – improve and upgrade irrigation systems and construct multipurpose village ponds in Dong Van, Quang Ba, Yen Minh, and Meo Vac districts. There are many ethnic groups living together as H'mong, Tay, Han, Chinese, Dao, Nung, Co Lao, San Chay, Bo Y, more than 90%. Main income is from farming cattle, goats, pigs and poultry. 19%/year rice and 79% corn production, there are also other crops such as peanuts, soybeans, vegetables. People have to get water from the stream or the lower regions, with 5-7km far. Therefore it is not enough water for drinking and livestock. Crop yields as rice, corn and legumes are uncertain due to lack of irrigation water. When completed SP2, 16,954 beneficiaries, of which 3,687 ethnic minority people (22%) have water for domestic, livestock irrigation of crops. Building scale is 16 multi-purpose reservoirs, with a capacity of 3,000-5,000m³ of water and 01 water reservoir with a capacity of 56,100m³, and concrete, rectangular cross-section canals.

(5) **SP3 – Improve Drainage and Irrigation Systems in Tam Nong and Thanh Thuy Districts.** Phu Tho is a hilly area track bond with delta, hence hilly is predominated in Phu Tho. The topography of the province is divided by large rivers such as the Thao, Lo, Da and Chay River, mountains, ... 79% moutainous area, 14.35% midlands and plain which account for 6.65% natural provincial land; agricultural land per capita is low and disperse, 526m²/person. The main objective of SP3 is drainage for 16,765hectares cultivated land of annual flooding, 788ha cultivated land due to water shortages in 14 communes in two districts Tam Nong and Thanh Thuy. Drainage catchment of Dau Duong pumping station has 78.6% agricultural land, one third of agricultural land is forest, whole of planted forest and no primary forest. Drainage catchment of Doan Ha pumping station has 65.7% of agricultural land, and forest accounts for about one fifth of agricultural land. The main income is from agriculture. Average poverty rate in the sub-project is 20%. 100% Vietnamese people is in the subproject, no ethnic minorities. SP3 is included building 02 drainage pump station to release to Da and Hong river.

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13 Source: Report of Overall Feasibility Study (VIAIP) - VARW, April, 2013.
14 Survey data of environment consultants in VIAIP project, April 2013.
improving and upgrading 05 pumping stations and permanent 3,468km on-farm canal and building 02 bridges. The total beneficiaries will be 76,705 people after SP3 completion.

(6) **SP5- Improve small scale irrigation system in Hoa Binh province** Hoa Binh is a mountainous province, combination between mountains, valleys and plains, therefore irrigation system is often in small scale and dispersed, such as reservoirs, dams, turbine pump, electric pump and small canal system. SP5- upgrading and improving the irrigation system in Hoa Binh province for 14 communes in 6 districts as Lac Thuy, Kim Boi, Luong Son, Lac Son, Tan Lac and Yen Thuy in Hoa Binh province, to supply 3.328ha of rice and vegetables, and 472.2 hectares of aquaculture. A total of 16 groups of hydraulic strutures, including 25 reservoirs and 03 weirs. The total number of beneficiaries of SP5 is 21,340people, of which 5,687 ethnic minority people (26.6%), they are majority Muong people.

(7) **SP7 - Improve Ke Go and Rac river Irrigation Systems**. Ke Go and Song Rac irrigation systems is supplied water for 26.838ha of cultivated land, 1.287ha of aquaculture, 253,298 people of 04 districts Ky Anh, Cam Xuyen, Thach Ha, Ha Tinh city (total 21 communes), with a total population of 314,053 people of 84,379 households, accounting for 58% of the total provincial population. Ke Go irrigation system supplies 20.003ha cultivated land, 1087ha aquaculture and 1.65m³/s domestic water. Ke Go irrigation system was upgraded hydraulic head, modernized main canal system, first, second and third level canal and model irrigated area N3,5 and N4,6. It has showed obvious effectively, as irrigation area increase from 12,400ha (2006) to 14,000ha (2011); Water savings for irrigation is about 40 million m³/year (before, total water consumption of both the spring and the summer-autumn crop was about 260 million m³/year and after upgrading, water consumption is only around 220 million m³/year). However, a portion of cultivated area (7,563ha) is still adequated water cause of the canal system and hydraulic work is damaged. Rac River Irrigation System supplies water for 8.150ha cultivated land, but now only meet 52% (4.200ha) of demand. At the end of the canal, water is irrigated 25 days delay, does not meet the water demand of the crop period, therefore it leads to decrease productivity and sometime entire lost. The main objective of SP7 is improving and upgrading on-canal structure and canal to supply enough water for user, and ensure water level and discharge in the canal to support effectively water management.

(8) **SP8- Medium Scale Irrigation schemes in Quang Tri;** The sub-project is located in frequent natural disasters area such as floods, droughts, landslides, ground cracks, estuarine salinity. La Nga irrigation system is included 03 communes Vinh Lam, Vinh Son, Vinh Thuy in Vinh Linh district, and Truc Kin-Ha Thuong irrigation system is included 11 communes in Gio Linh district (Gio Quang, Gio Mai, Gio Thanh, Gio My, Gio Viet, Gio Chau commune and Gio Linh town), Cam Lo district (Cam An, Cam Thanh commune), Dong Ha city (Dong Giang, Dong Thanh commune). La Nga and Truc Kinh irrigation system supply water for 4,350ha cultivated land 650ha aquaculture area and drain off 300ha. Total population is 66,453 people in the sub-project. The poverty rate is 16% in the sub-project. There are no ethnic minorities groups in the sub-project area. The number of agricultural households is 80% of the total in the area. The main goal of SP8 is upgrading main dams, auxiliary dams sluice, access road and canal systems and replacing damaged on-canal structure to ensure water supply for cultivation as required.

(9) **SP10 – Improve Khe Tan irrigation scheme**
## ANNEX 1.1 - ESTIMATION OF MAGNITUDE OF SOCIAL IMPACTS IN PROJECT (Component B)

<table>
<thead>
<tr>
<th>No.</th>
<th>Province</th>
<th>Name of Subprojects</th>
<th>Temporary land acquisition (ha)</th>
<th>Permanent land acquisition (ha)</th>
<th>Residential land acquisition (ha)</th>
<th>Total number of affected households</th>
<th>Total number of resettled households</th>
<th>Total number of affected ethnic minority households</th>
<th>Number of affected graves</th>
<th>Number of beneficiaries</th>
<th>Number of ethnic minority beneficiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hoa Binh</td>
<td>Subproject 4: Improve and Upgrade small scale irrigation schemes in Mai Chau, Tan Lac, Luong Son Cao Phong and Lac Son districts</td>
<td>1.25</td>
<td>0.0594</td>
<td>0</td>
<td>51</td>
<td>0</td>
<td>17</td>
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<td>12,873</td>
<td>21,448</td>
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<td>2</td>
<td>Thanh Hoa</td>
<td>Subproject 6: Improve and upgrade South Ma Irrigation Scheme</td>
<td>10</td>
<td>44.27</td>
<td>2.28</td>
<td>3700 (16 severely affected HH)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>115,663</td>
<td>195,000</td>
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<td>3</td>
<td>Quang Nam</td>
<td>Subproject 9: Improve Phu Ninh irrigation schemes</td>
<td>0</td>
<td>0.2498</td>
<td>0.0381</td>
<td>36</td>
<td>0</td>
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<td>0</td>
<td>250,723</td>
<td>406,760</td>
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<td></td>
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<td>Sub-total</td>
<td>11.25</td>
<td>44.5792</td>
<td>2.3181</td>
<td>3,787</td>
<td>0</td>
<td>17</td>
<td>12</td>
<td>379,259</td>
<td>623,208</td>
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</table>

Estimated number of subproject to be implemented during project preparation (Phase 2)

<table>
<thead>
<tr>
<th>No.</th>
<th>Province</th>
<th>Name of Subprojects</th>
<th>Temporary land acquisition (ha)</th>
<th>Permanent land acquisition (ha)</th>
<th>Residential land acquisition (ha)</th>
<th>Total number of affected households</th>
<th>Total number of resettled households</th>
<th>Total number of affected ethnic minority households</th>
<th>Number of affected graves</th>
<th>Number of beneficiaries</th>
<th>Number of ethnic minority beneficiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Ha Giang</td>
<td>Subproject 1: Improve irrigation schemes in Bac Quang, Quang Binh and Vi Xuyen districts</td>
<td>24.6</td>
<td>13.2</td>
<td>0</td>
<td>24</td>
<td>0</td>
<td>22</td>
<td>0</td>
<td>12,886</td>
<td>25,771</td>
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<tr>
<td>No.</td>
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<td>Residential land acquisition (ha)</td>
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<td>Total number of resettled households</td>
<td>Total number of affected ethnic minority households</td>
<td>Number of affected graves</td>
<td>Number of beneficiaries</td>
<td>Number of ethnic minority beneficiaries</td>
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<tr>
<td></td>
<td></td>
<td>Subproject 2: Improve irrigation systems and construct multipurpose village ponds in Quan Ba, Yenh Minh, Dong Van and Meo Vac districts</td>
<td>3.84</td>
<td>12.45</td>
<td>0</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>0</td>
<td>4,239</td>
<td>16,954</td>
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<td>5</td>
<td>Ha Giang</td>
<td>Subproject 3: Improve drainage and irrigation systems in Tam Nong and Thanh Thuy Districts</td>
<td>0</td>
<td>0.89</td>
<td>0.37</td>
<td>35</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>61,512</td>
<td>76,705</td>
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<td>6</td>
<td>Phu Tho</td>
<td>Subproject 5: Improve small scale irrigation systems in Hoa Binh province</td>
<td>10.54</td>
<td>8.09</td>
<td>0</td>
<td>11</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td>8,535</td>
<td>21,340</td>
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<td>7</td>
<td>Hoa Binh</td>
<td>Subproject 7: improve and upgrade Ke Go and Song Rac Irrigation schemes</td>
<td>3.2</td>
<td>3.14</td>
<td>0</td>
<td>535</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>155,738</td>
<td>253,298</td>
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<tr>
<td>8</td>
<td>Ha Tinh</td>
<td>Subproject 8: Medium scale irrigation schemes in Quang Tri Province</td>
<td>51.9</td>
<td>13.65</td>
<td>0</td>
<td>151 HH &amp; 5 CPC</td>
<td>0</td>
<td>0</td>
<td>7 graves &amp; 1 altar</td>
<td>42,069</td>
<td>66,453</td>
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<td>9</td>
<td>Quang Tri</td>
<td>Sub-Project 10: Improve Khe Tan irrigation scheme</td>
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<td>284,977</td>
<td>460,521</td>
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<td>10</td>
<td>Quang Nam</td>
<td>Sub-project 2: Improve Khe Tan irrigation scheme</td>
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<td><strong>Sub-total</strong></td>
<td>94.08</td>
<td>51.42</td>
<td>0.37</td>
<td>766 HH &amp; 5 CPC</td>
<td>13</td>
<td>41</td>
<td>7 graves &amp; 1 altar</td>
<td>284,977</td>
<td>460,521</td>
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<td>No.</td>
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<td>Name of Subprojects</td>
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<td>Number of ethnic minority beneficiaries</td>
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<tr>
<td></td>
<td></td>
<td>TOTAL</td>
<td>105.33</td>
<td>95.992</td>
<td>2.6881</td>
<td>4,553 HH &amp; 5 CPC</td>
<td>13</td>
<td>58</td>
<td>19 graves &amp; 1 altar</td>
<td>664,237</td>
<td>1,083,729</td>
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<table>
<thead>
<tr>
<th>Before project</th>
<th>After project</th>
<th>Before project</th>
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<tbody>
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</tr>
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</table>

Environment and Social Management Framework (ESMF)  
Irrigated Agriculture Improvement Project (VIAIP)
ANNEX 2 - OUTLINE OF ENVIRONMENT MANAGEMENT PLAN (EMP)

Executive summary

1. **Introduction** - provide brief but concise information on objective of the EMP and its connection with the ESMF and the Project

2. **Policy, legal and administrative framework**
   2.1 GOV’s regulations - provide brief description of GOV regulations related to EIA and standards applied for the subproject
   2.2 WB’s safeguard policy – list WB safeguard policies triggered

3. **Project description** – provide description of the subproject including location maps showing location in the project area as well as details at the subproject level; This is to provide reader who is not familiar with the area to understand the issue clearer.

4. **Baseline data** – provide key information on the environmental background of the subproject as well as its connection with the project area, including maps; Focus should be given to provide clear data on topography, major land use and water uses, soil types (Acid Sulphate Soil or not), flow of water, and water quality/pollution. Brief description on socioeconomic condition and EM should also be provided. Particularly, agricultural extension activities and arrangements with regards to Integrated Pest Management (IPM) should be included. Photos with comments showing existing conditions of project sites should be included.

5. **Potential impacts and mitigation measures** – provide results of the safeguard screening following the criteria in the ESMF, identify potential impacts (positive and negative) and mitigation measures; the impacts should be described for pre-construction, construction, and operation phases; using a matrix format could help understanding connection between the impacts and mitigation better. While commonly-known social and environmental impacts and risks of construction activities can be addressed through Environmental Codes of Practices (ECOP), specific mitigation measures should also be proposed to addressed sub-project specific impacts predicted based on site-specific conditions and typology of investments; some measures can be proposed for incorporation into engineering design to address potential impacts/risks and/or bring about added values of the works provided (e.g. road/access path improvement combined with canal lining). Mitigation measures should include communication program and grievance redress mechanism to address social impacts. Make sure that this section response to appropriate suggestions and adequately addresses the issues and concerns raised by communities as recorded in the consultation summary presented in Section 8.

6. **Monitoring** – Environmental monitoring during project implementation provides information about key environmental aspects of the project, particularly the environmental impacts of the project and the effectiveness of mitigation measures. Monitoring provides (a) a specific description, and technical details, of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits (where appropriate), and definition of thresholds that will signal the need for corrective actions; and (b) monitoring and reporting procedures to (i) ensure early detection of conditions that necessitate particular mitigation measures, and (ii) furnish information on
the progress and results of mitigation. The cost of environmental monitoring should be estimated and included in sub-project’s total investment costs.

7. **Implementation arrangement** – explain responsible agencies (including their capacity to carry out the activities identified in the EMP and the need for training), implementation schedule, total cost estimate (for EMP implementation, including environmental monitoring, capacity building, training etc.), and how the EMP will be integrated into the subproject, including explicit statement that: (a) the ECOP will be included in the bidding documents and construction contracts of contractors; (b) environmental supervision and reporting during construction phase will be carried out by engineering supervision consultants.

8. **Consultation and information disclosure** – provide summary on consultation activities to stakeholders, particularly affected households, on the final draft EMP at subproject level (This can be combined with RAP). This summary should indicate the date and location where consultation meeting took place, the number of participants from affected households/the numbers of female and ethnic minority participants, and suggestions, concerns raised and responses. Locations and dates of EMP to be disclosed should be provided.
ANNEX 3- ENVIRONMENTAL CODES OF PRACTICE (ECOP)

I. Objectives

This Environmental Code of Practices (ECOP) was prepared to guide the planning and implementation of the mitigation measures to be carried out by Contractor during construction.

II. Scope and Application

1. The ECOPs will be applied for small scale infrastructure investments in the Component B of project. ECOP will be part of construction contract, to allow contractor to implement mitigation measures in the construction phase to avoid or minimise negative impacts and risks. Engineers and construction supervisors will be responsible for monitoring of compliance with ECOP and preparing the required reports. Contractor is required to comply with ECOP.

2. There are a number of GoV regulations, standards, code of practices, etc. related to environmental, health and safety that apply to construction activities below:

   - Air and Soil Quality (QCVN 05:2008 BTNMT, QCVN 06:2008 BTNMT, QCVN 07:2008 BTNMT,
   - Solid Waste Management (QCVN 03:2008 BTNMT, TCVN 6438:2001, TCVN 6696:2009, QCVN 07:2009);

III. Responsibilities

The Sub-Project owner (PPMU) and Contractors are the key entities responsible for implementation of this ECOP. Key responsibilities of PPMU and the contractors are as follows:

(a) PPMU

   - PPMU is responsible for ensuring that the ECOP is effectively implemented. The PPMU will assign a qualified staff to be responsible for checking implementation compliance of Contractors, include the following: (a) monitoring the contractors’ compliance with the environmental plan, (b) taking remedial actions in the event of non-compliance and/or adverse impacts occur, (c) investigating complaints, evaluating and identifying corrective measures; (d) advising to the Contractor on environment improvement, awareness, proactive pollution prevention measures; (e) monitoring the activities of Contractors on reppling complaints; (f) providing guidance and on-the-
job training to field engineers on various aspects to avoid/mitigate potential negative impacts to local environment and communities during construction.

- PPMU has responsibility for preparing monitoring reports to submit to CPO.

(b) Contractor

- Contractor is responsible for carrying out civil works and informs PPMU, local authority and community about construction plan and risks associated with civil works. As such, contractor is responsible for implementing agreed measures to mitigate environmental risks associated with its civil works.

- Contractor is required to obey other national relevant legal regulations and laws.

IV. Management of Construction Sites

Contractor is required to mitigate, minimize and reduce negative environmental impacts due to construction activities. All appropriate licenses and consents of construction should be on time. The key measures are as follows:

(i) General requirements for construction site – applied for all Sub-Projects

<table>
<thead>
<tr>
<th>No</th>
<th>Items</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Site Plan.</td>
<td>- Total site plan must be designed and approved in accordance with the provisions, in accordance with the construction site plan, area of the site plan, natural climate conditions, construction, safe of machinery and vehicles on the site and surrounding areas affected by the construction.</td>
</tr>
<tr>
<td></td>
<td>Organised and arranged site.</td>
<td>- Materials must be organized well-ordered in accordance with the designed site plan that be approved. Materials and barriers do not occur to obstruct roads and escape ways. Storage of flammable and explosive materials is not located near the construction camps. Waste material must be cleaned at the right places. Drainage system must be drained frequently to ensure the site is always dry.</td>
</tr>
<tr>
<td></td>
<td>The sign boards.</td>
<td>- Following Article 74 of the Law on Construction (the Government of Vietnam), the sign boards must be having on the site. The map of site plan and working regulation will be hanging at the main entrance. Safety measures and regulations must be disseminated and publicized on the construction site for people to know and abide; at the dangerous positions on the site such as trenches, pit, manholes must have barrier, signboard, and instruction to prevent accidents, significantly have to light up in the night.</td>
</tr>
<tr>
<td></td>
<td>Environmental Protection.</td>
<td>- The contractors have to implement environmental protection measurements for workers and the surrounding environment, including measurements of against dust, noise, waste disposal and clean up site-plan. The measurements have to be done as cover, clean up for the construction projects in the residential area. Transportation of construction materials and wastes must be ensured environmental safety and protection. If the contractor does not compliance regulations on environmental protection, the investor and the office of environmental</td>
</tr>
</tbody>
</table>
management will have the right to suspend construction. The acts against environment during constructing will have to take charge of law and liable for damages.

**Electric security.**
- The dynamic electric network and the light system on the construction site have to be separately. Circuit breaker and breaker power are capable of cutting a segment or total of the construction area. Electric security has to be ensuring for workers, machinery and material on the site. The devices must be insulated safety during construction. The workers and engineers have to be trained on electric security, knowing aid electrocuted people when the accident occurred.

**Fire Prevention and Control**
- Contractor has to establish a fire prevention and control at the site. The specification of non-combustible materials, products and packaging will be pursued wherever reasonably practicable. The project will also have to comply with GOV’s requirements as may be appropriate at specific sites.

(ii) **Requirement of construction – applied for all Sub-Projects**
- **Working hours:** Working hours will be from 07:00 to 17:00 on weekdays and 07:00 to 12:00 on Saturday. Noisy operations shall not take place outside these hours without prior approval from the PMU. All construction related traffic will abide by the agreed hours of working for each site. Any exemption will require an agreement with the PMU, and/or local authorities.
- **The workers who handle machine, construction equipment and strict work requirements must be trained on labor safety and needed labor safety card as prescribed.**
- Construction machinery and equipment with strict requirements on labor safety must be inspected and registered with the competent authority, shall be allowed to operate on the site. When operating, construction machinery and equipment must comply with the procedures and measures to ensure safety.
- The participation of construction on the site must be checking health, training on labour safety and delivering personal protective equipment in accordance with the labor law.

(iii) **Clean-up and restoration of construction sites after completion**
At completion time, contractor cleans up and removes all materials and rubbish and temporary works.

V. **Management of Socio-Environmental Impacts and Risks**

<table>
<thead>
<tr>
<th>No</th>
<th>Issues/Risks</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water pollution</td>
<td>- Used oil/engine oil: The oil container at the construction site (especially when the site is located less than 10 meters from the waterways) must be of sufficient strength to ensure to prevent leakage. The container must be situated within a secondary containment system (bunded), which</td>
</tr>
<tr>
<td>No</td>
<td>Issues/Risks</td>
<td>Mitigation Measures</td>
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<tr>
<td></td>
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<td>will prevent the release of any leaked oil. The Contractor must make provisions to ensure that all hazardous substances including oil drums or containers on site are properly labeled and properly stored and that no oil or other contaminants are allowed to reach water courses or groundwater.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Wastewater from sites:</strong> The Contractor will ensure that any seepage and wastewater arising from the works and camp sites must be collected and discharged via drain network.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Septic tank toilets:</strong> Must be provided on site for construction workers. Wastewater from toilets will not be discharged directly into any waterbody.</td>
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<tr>
<td></td>
<td></td>
<td>At completion of construction works, water collection tanks and septic tanks shall be covered and effectively sealed off.</td>
</tr>
<tr>
<td></td>
<td><strong>Dust, noise, vibration</strong></td>
<td><strong>Inform the residents:</strong> Prior to commencement of work at any site, the Contractor will be required to inform the local authority and residents regarding the construction plan and potential noise and vibration that may occur from the construction activities, including measures to reduce noise and vibration.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Dust control:</strong> The Contractor will ensure that no burning of waste materials on site; adequate water supply is available on site; dry sweeping of large areas is not allowed; cover all trucks carrying loose or potentially dusty materials (soil, mud, etc.) to and from construction site; Water or sprinkle the construction areas periodically, especially at site located near residential area; avoid overloaded of trucks; routinely clean public roads and access routes;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exposed soil and material stockpiles shall be protected against dust spreading, and the location of stockpiles shall take into consideration the prevailing wind directions and locations of sensitive receptors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When needed, measures to reduce noise to acceptable levels must be implemented and could include silencers, mufflers, acoustically dampened panels or placement of noisy machines in acoustically protected areas.</td>
</tr>
<tr>
<td></td>
<td><strong>Management and treatment of solid waste</strong></td>
<td>The solid waste from construction. The Contractor must make an effort to collect wastes (stone, soil, …) and transport to required site or re-using or recycling construction and demolition waste should be explored and implemented. The Contractor will be required to comply with these procedures during site development. The contractor will not be permitted to transport contaminated materials on canals, unless appropriate handling facilities and infrastructure are agreed with the responsible agency.</td>
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<tr>
<td></td>
<td></td>
<td>the Contractor shall provide litter bins, containers and refuse collection facilities. Waste storage containers shall be covered,</td>
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</table>


<table>
<thead>
<tr>
<th>No</th>
<th>Issues/Risks</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>tip-proof, weatherproof and scavenger proof.</td>
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<tr>
<td></td>
<td></td>
<td>• Solid waste may be temporarily stored on site in a designated area approved by the Construction Supervision Consultant and relevant local authorities prior to collection and disposal through a licensed waste collector</td>
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<tr>
<td></td>
<td></td>
<td>• No burning, on-site burying or dumping of solid waste shall occur.</td>
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<tr>
<td></td>
<td></td>
<td>• Recyclable materials such as wooden plates for trench works, steel, scaffolding material, site holding, packaging material, etc shall be collected and separated on-site from other waste sources for reuse, for use as fill, or for sale.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If not removed off site, solid waste or construction debris shall be disposed of only at sites identified and approved by the Construction Supervision Consultant. Under no circumstances shall the contractor dispose of any material in environmentally sensitive areas, such as in watercourses.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Domestic solid waste. During constructing of the sub-project, the contractor must take appropriate measures to collect and treat solid waste, or bury in landfills temporarily in the area with a cover layer and when full, the landfill to landfill a coating 50cm thick. Upon completion of the construction phase of the sub-projects, to require filling up landfills, and restore landscape to the sub-project area.</td>
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<tr>
<td></td>
<td></td>
<td>• The Contractor must be responsible for compliance with the relevant Vietnamese legislation relevant to wastewater discharges into watercourses.</td>
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<td></td>
<td></td>
<td>• Portable or constructed toilets must be provided on site for construction workers. Wastewater from toilets as well as kitchens, showers, sinks, etc. shall be discharged into a conservancy tank for removal from the site or discharged into municipal sewerage systems; there should be no direct discharges to any waterbody.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• At completion of construction works, water collection tanks and septic tanks shall be covered and effectively sealed off.</td>
</tr>
<tr>
<td></td>
<td>Chemical or hazardous wastes</td>
<td>• Chemical waste of any kind shall be disposed of at an approved appropriate landfill site and in accordance with local legislative requirements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Used oil and grease shall be removed from site and sold to an approved used oil recycling company.</td>
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<td></td>
<td></td>
<td>• Used oil, lubricants, cleaning materials, etc. from the maintenance of vehicles and machinery shall be collected in holding tanks and removed from site by a specialized oil recycling company for disposal at an approved hazardous waste site.</td>
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<td></td>
<td>• Unused or rejected tar or bituminous products shall be returned to the supplier’s production plant.</td>
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<td>• Store chemicals appropriately and with appropriate labeling.</td>
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<td>- Appropriate communication and training programs should be put in place to prepare workers to recognize and respond to workplace chemical hazards.</td>
</tr>
<tr>
<td>4</td>
<td>Traffic and social</td>
<td>• Contractor is required to use the route that designed for construction works as identified by local authority.</td>
</tr>
</tbody>
</table>

53
<table>
<thead>
<tr>
<th>No</th>
<th>Issues/Risks</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>disturbance, disruptions to existing services</td>
<td>• Clear signing must be provided at all times for pedestrian routes;</td>
</tr>
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<td></td>
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<td>• After completion of the works all materials arising from the works will be left in a clean and tidy condition to the reasonable requirements of the local authorities;</td>
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<tr>
<td></td>
<td></td>
<td>• The Contractor will be responsible for any damage caused by their activities to the roads and public facilities in the vicinity of the worksite.</td>
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<td></td>
<td></td>
<td>• Place signs around the construction areas to facilitate traffic movement, provide directions to various components of the works, and provide safety advice and warning.</td>
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<tr>
<td></td>
<td></td>
<td>• Employing safe traffic control measures, including road/rivers/canal signs and flag persons to warn of dangerous conditions.</td>
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<td>• Avoid material transportation for construction during rush hour</td>
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<td></td>
<td>• Discuss and negotiate with local community about water cut-off and service disruptions period</td>
</tr>
<tr>
<td>6</td>
<td>Erosion and sedimentation control</td>
<td>• The Contractor shall follow the detailed drainage design included in the construction plans, intended to prevent storm water from causing local flooding or scouring slopes and areas of unprotected soil resulting in heavy sediment loads affecting local watercourses.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ensure drainage system is always maintained cleared of mud and other obstructions.</td>
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<td>• Areas of the site not disturbed by construction activities shall be maintained in their existing conditions.</td>
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<td>• Earthworks, cuts, and fill slopes shall be properly maintained, in accordance with the construction specifications, including measures such as installation of drains, use of plant cover.</td>
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<td></td>
<td></td>
<td>• To avoid sediment-laded runoff that could adversely impact watercourses, install sediment control structures where needed to slow or redirect runoff and trap sediment. Sediment control structures could include windrows of logging slash, rock berms, sediment catchment basins, straw bales, storm drain inlet protection systems, or brush fences.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Site de-watering and water diversions: the sediment laden water pumped from the work area must be discharged to an appropriate sediment control measure for treatment before re-release to the down stream.</td>
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<tr>
<td></td>
<td></td>
<td>• Stream diversions or construction of cofferdams would require site-specific mitigation measures in the EMP</td>
</tr>
<tr>
<td>7</td>
<td>Excavation materials</td>
<td>• Large scale borrow pits or stockpiles will need site-specific measures that go beyond those in these ECOPs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• All dredged spoil as well as excavation materials will be reused for road construction and/or land filling at or nearby the work site.</td>
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<tr>
<td></td>
<td></td>
<td>• Demolition materials must be properly disposed off.</td>
</tr>
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<td></td>
<td></td>
<td>• An open ditch shall be built around the stockpile site to intercept wastewater.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Stockpile topsoil when first opening a borrow pit and use it later to restore the area to near natural conditions.</td>
</tr>
<tr>
<td>No</td>
<td>Issues/Risks</td>
<td>Mitigation Measures</td>
</tr>
<tr>
<td>----</td>
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</tr>
</tbody>
</table>
| 8  | Management of stockpiles, quarries, and borrow pits | • Large scale borrow pits or stockpiles will need site-specific measures that go beyond those in these ECOPs.  
• All locations to be used must be previously identified in the approved construction specifications. Sensitive sites such as scenic spots, of natural habitat, areas near sensitive receptors, or areas near water should be avoided.  
• An open ditch shall be built around the stockpile site to intercept wastewater.  
• Stockpile topsoil when first opening a borrow pit and use it later to restore the area to near natural conditions.  
• If needed, disposal sites shall include a retaining wall.  
• If the need for new sites arises during construction, they must be pre-approved by the Construction Engineer.  
• If landowners are affected by use of their areas for stockpiles or borrow pits, they must be included in the project resettlement plan.  
• If access roads are needed, they must have been considered in the environmental assessment. |
| 9  | Landscape management | • Spoil heaps and excavated slopes shall be re-profiled to stable batters, and grassed to prevent erosion;  
• All affected areas shall be landscaped  
• Trees/grass shall be planted at exposed land and on slopes to prevent or reduce land collapse and keep stability of slopes  
• Prohibit cutting of any tree or removal of rocks originated at the site. This could include areas protected as a green space.  
• The Contractor shall ensure that no hunting, trapping shooting, poisoning of fauna takes place.  
• Cleared areas such as borrow pits no longer in use, disposal areas, site facilities, workers’ camps, stockpiles areas, working platforms and any areas temporarily occupied during construction of the project works shall be restored using landscaping, adequate drainage and revegetation as appropriate.  
• Spoil heaps and excavated slopes shall be re-profiled to stable batters, and grassed to prevent erosion;  
• All affected areas shall be landscaped and any necessary remedial works shall be undertaken without delay, including green-spacing and other existing works  
• Soil contaminated with chemicals or hazardous substances shall be removed and transported and buried in waste disposal areas. |
| 10 | Worker and public Safety | • Provide first aid kits at contractor’s office  
• Training workers on occupational safety regulations  
• Preparation of emergency aid service at construction site  
• If blasting is to be used, additional mitigation measures and safety precautions must be outlined in the EMP.  
• During demolition of existing infrastructure, workers and the general public must be protected from falling debris by measures such as chutes, traffic control, and use of restricted access zones.  
• Install fences, barriers, dangerous warning/prohibition site around the construction area which showing potential danger to public people  
• The contractor shall provide safety measures as installation of |
<table>
<thead>
<tr>
<th>No</th>
<th>Issues/Risks</th>
<th>Mitigation Measures</th>
</tr>
</thead>
</table>
| 11 | Management of small amounts of sludge | - Characteristics of sludge/sediment should be determined by sampling and analysis. Sludge that is heavily contaminated would require measures that go beyond the scope of these ECOPs.  
- Lixiviate from dredged materials should not be allowed to enter watercourses without appropriate filtering or treatment.  
- Collected dredged materials have to be processed, as per Vietnamese regulations on waste collection, to ensure safe and environmentally secure transportation, storage, treatment and management |

VI. “Chance find” Procedures

If the Contractor discovers archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, the Contractor will carry out the following steps:

- Stop the construction activities in the area of the chance find;  
- Delineate the discovered site or area;  
- Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the National Administration of Culture take over;  
- Notify the supervisory Project Environmental Officer and Project Engineer who in turn will notify the responsible local authorities and the Provincial Department of Culture immediately (within 24 hours or less);  
- Responsible local authorities and the Provincial Department of Culture would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archeologists of National Culture Administration. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values;  
- Decisions on how to handle the finding shall be taken by the responsible authorities and Provincial Department of Culture. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration and salvage;  
- Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities; and
- Construction work could resume only after permission is given from the responsible local authorities or Provincial Department of Culture concerning safeguard of the heritage.
PART I - OVERVIEW

1.1. Project introduction

Irrigated agriculture improvement project (VIAIP) is implemented based on the proposal of the Ministry of Agriculture and Rural Development proposes the World Bank (WB) to fund a loan of 180 million USD, carried out from 2014 to 2020. The purpose of the project is "to improve irrigated agriculture systems for sustainable development is selected in the northern mountainous provinces and central coastal provinces of Vietnam”. The project is designed to ensure sustainable and efficient access to irrigation services and support of Vietnam government in its efforts to apply a new model to improve the competitiveness (more agriculture adaptation with climate change and greenhouse gas emission reduction). This purpose will be achieved through irrigated and drainage service improvement, provide additionally consulting services and strengthen institutional capacity at province level, irrigation systems and local communities.

The total estimated cost is 210 million USD, including capital of 180 million USD from the World Bank and contributed capital of 30 million USD from Vietnam government, including funding from the State and the provinces.

The project is implemented in the 03 northern midland and mountainous provinces of Ha Giang, Hoa Binh, Phu Tho, and 04 central coastal provinces of Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam.

1.2. Project description

The project consists of 04 components, as follows:

Component A (10 million USD) - Supporting development and completing institution and policy. The main objective of this component is to support development and complete institution and policy to strengthen and improve management efficiency. Strengthening access to services through fiscal management mechanism improvement;

Component B (170 million USD) - Improving irrigation systems, with the goal of repairing, upgrading and modernizing operating irrigation systems to ensure designed irrigation area;

Component C (25 million USD) - Support for building pilot fields with high profit. The objectives of this component is to support the development of the pilot field with high effectiveness access to agriculture to adapt to climate change, in different ecosystems, supporting a variety of land use, increasing water productivity, and reducing the negative impacts when releasing greenhouse gas emissions (GHG).

Component D (5 million USD) - Project management, monitoring and evaluation.

The goal of the project is suitable for expected irrigation system restructuring system and modernization of MARD. Focusing on institutional reforms, restructuring and improving capacity for all levels is very suitable for agricultural restructuring plan and new Water Resource Law of the Ministry of Agriculture and Rural Development. The project will be implemented in 07 provinces including Ha Giang, Phu Tho, Hoa Binh, Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam.

Based on the proposals of the provinces in the project, the consultants prepare materials of project feasibility (FS) is expected to classify the works as follows:
• Group of Sub-project 1: - Rehabilitation and upgrade to canal system (sub-project 6, sub-project 7, sub-project 9 and sub-project 10).
• Group of Sub-project 2: - Upgrade and strengthening head dam of reservoir and canal system (sub-project 1, sub-project 5, and sub-project 8).
• Group of Sub-project 3: Rehabilitation and upgrade to hydraulic and electric pumping stations (sub-project 4).
• Group of Sub-project 4: Building up new drainage pumping station (sub-project 3).
• Group of Sub-project 5: Building up new multi-purpose village ponds (sub-project 2).

1.3. Agricultural development status of project area

In general, the provinces in the project area are slow-growing economy over the country, in agriculture production, the share of industry and services is low in the structure of the whole economy. Agriculture is mainly cultivation at small level, less intensive investment. Average area of agricultural land per capita in the project area is lower than the average over the country. The structure of land use in the provinces shown in the following table:

Table 4.1 - Soil structure the project provinces

<table>
<thead>
<tr>
<th>Province</th>
<th>Total area</th>
<th>Agricultural land</th>
<th>Forest land</th>
<th>Specialized land</th>
<th>Housing land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ha Giang</td>
<td>791.5</td>
<td>152.7</td>
<td>530.4</td>
<td>12.4</td>
<td>6.7</td>
</tr>
<tr>
<td>Phu Tho</td>
<td>353.3</td>
<td>98.7</td>
<td>178.4</td>
<td>26.4</td>
<td>9.4</td>
</tr>
<tr>
<td>Hoa Binh</td>
<td>460.9</td>
<td>65.3</td>
<td>285.9</td>
<td>24.2</td>
<td>19.3</td>
</tr>
<tr>
<td>Thanh Hoa</td>
<td>1113.2</td>
<td>247.6</td>
<td>600.1</td>
<td>70.8</td>
<td>52.0</td>
</tr>
<tr>
<td>Ha Tinh</td>
<td>599.7</td>
<td>120.6</td>
<td>350.9</td>
<td>42.9</td>
<td>8.7</td>
</tr>
<tr>
<td>Quang Tri</td>
<td>474.0</td>
<td>88.5</td>
<td>290.2</td>
<td>16.5</td>
<td>4.3</td>
</tr>
<tr>
<td>Quang Nam</td>
<td>1043.8</td>
<td>112.8</td>
<td>682.3</td>
<td>34.2</td>
<td>21.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4836.4</strong></td>
<td><strong>886.2</strong></td>
<td><strong>2918.2</strong></td>
<td><strong>227.4</strong></td>
<td><strong>121.5</strong></td>
</tr>
</tbody>
</table>

Source: GSO. Statistical Yearbook 2011

Regarding the structure of plants, mainly producing short-term crops such as rice, corn, potatoes, cassava, peanuts…Some provinces have long-term crops such as tea, rubber, coffee … and some citrus fruits such as oranges, grapefruits...

Table 4.2- Area, productivity, output of major crops in provinces of the project area

<table>
<thead>
<tr>
<th>Province</th>
<th>Rice</th>
<th>Corn</th>
<th>Peanut</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A (1000 ha)</td>
<td>P (I ha)</td>
<td>O (1000 tons)</td>
</tr>
<tr>
<td>Ha Giang</td>
<td>36.5</td>
<td>53.2</td>
<td>194.2</td>
</tr>
<tr>
<td>Phu Tho</td>
<td>68.8</td>
<td>51.2</td>
<td>352.3</td>
</tr>
<tr>
<td>Hoa Binh</td>
<td>39.8</td>
<td>48.8</td>
<td>192.7</td>
</tr>
<tr>
<td>Thanh</td>
<td>253.6</td>
<td>55.1</td>
<td>1398.6</td>
</tr>
</tbody>
</table>
1.4. Current status of using fertilizers and pesticides in the project area

1.4.1- Fertilizer use status:

The provinces of Ha Giang, Phu Tho and Hoa Binh use average of 320 kg of inorganic fertilizer, 2-3 tons of organic fertilizer for 1 ha/crop. The provinces of Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam use average of 350 kg of inorganic fertilizer, 3-4 tons of organic fertilizers for 1 ha /crop (Table 3).

Thus, the actual amount of fertilizer to crops in the provinces in the project area is still much lower than the nutritional requirements as well as engineering process. Caused by high fertilizer prices increases so that fertilizer invests for most crops to tend to decrease compared with the previous years; especially fertilizer for rice, and fruits.

Technical improper fertilizer use in farming is leading to low fertilizer effectiveness, with over 50% of surplus protein, 50% of surplus potassium and approximately 80% of surplus phosphate directly or indirectly causes land environment pollution...

Many of plant areas with the number of fertilizer is still very low as cassava, arrowroot ... but there are also a number of plants with fertilizer is quite high, as vegetable growing areas and orange growing areas.

About fertilization method, most farmers in the provinces have grasped technical requirements for crops but also many farmers use fertilizer not in accordance with requirements such as imbalance nutrient fertilization, use much protein, little potassium, most fields with high acid parameter do not add lime, use less organic fertilizer...

Table 4.3: Average amount of fertilizer and pesticide per 1ha of project area

<table>
<thead>
<tr>
<th>Province</th>
<th>The amount of fertilizer / ha</th>
<th>Pesticides (kg / ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Organic (tons)</td>
<td>Inorganic (kg)</td>
</tr>
<tr>
<td>Ha Giang</td>
<td>5.6</td>
<td>300</td>
</tr>
<tr>
<td>Phu Tho</td>
<td>5.3</td>
<td>350</td>
</tr>
<tr>
<td>Hoa Binh</td>
<td>3.1</td>
<td>310</td>
</tr>
<tr>
<td>Thanh Hoa</td>
<td>4.2</td>
<td>380</td>
</tr>
<tr>
<td>Ha Tinh</td>
<td>4</td>
<td>320</td>
</tr>
<tr>
<td>Quang Tri</td>
<td>3.8</td>
<td>340</td>
</tr>
<tr>
<td>Quang Nam</td>
<td>4</td>
<td>360</td>
</tr>
<tr>
<td>Average whole project</td>
<td>3.5</td>
<td>335</td>
</tr>
</tbody>
</table>

Source: Survey data 3/2013
1.4.2 Pesticide use status

According to the survey results in Table 3: Ha Giang, Phu Tho and Hoa Binh use average of 1.3 kg of pesticides for 1.0 ha of plants. The provinces of Thanh Hoa, Ha Tinh, Quang Tri and Quang Nam use average of 1.5 kg and 0.6 kg of herbicide for 1.0 ha of plants.

According to data from Department of plant protection and DARD of Hoa Binh, safe management of pesticide use for agricultural activities is not good, many pesticides have not declared yet or have not declared that the authorities are not in control.

Trends in herbicide use increase strongly in recent years, especially in the mountainous areas in the majority of intensive corn area.

Many provinces have positive measures in order to recommend people to implement integrated pest measure, limit use of pesticides in agriculture.

In Quang Tri province, pesticide use is guided by directed notice of Department of Plant Protection, the status rampant pesticide use has reduced significantly, only when disease threatens to production people conduct to spray on infested plants. Therefore, the use of pesticides on main crops is low.

The mountainous areas use pesticide usually lower than in the lowland provinces, but if there is no measure to control and closely examine the risk of contamination can still occur.

1.5. Forecast to increase fertilizer and pesticide after the project

When the project implements, area of land increases by 29,391 ha (Table 4), in which, in Ha Tinh province adds 10,538 ha, Quang Nam adds 6,389 ha, Hoa Binh adds 3575 ha, the remaining provinces add from 1,000 to 4,318 ha.

<table>
<thead>
<tr>
<th>No.</th>
<th>Province</th>
<th>Positive irrigation area (Ha) 2011</th>
<th>Positive irrigation area (Ha) 2020</th>
<th>Additional area (ha) 2020/2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ha Giang</td>
<td>1,610</td>
<td>3,025</td>
<td>1,415</td>
</tr>
<tr>
<td>2</td>
<td>Phu Tho</td>
<td>716.6</td>
<td>1,716.6</td>
<td>1,000</td>
</tr>
<tr>
<td>3</td>
<td>Hoa Binh</td>
<td>14,362</td>
<td>19,738</td>
<td>5,376</td>
</tr>
<tr>
<td>4</td>
<td>Thanh Hia</td>
<td>6836</td>
<td>11,154</td>
<td>4,318</td>
</tr>
<tr>
<td>5</td>
<td>Ha Tinh</td>
<td>19,523</td>
<td>30,061</td>
<td>10,538</td>
</tr>
<tr>
<td>6</td>
<td>Quang Tri</td>
<td>2,630</td>
<td>5,400</td>
<td>2,770</td>
</tr>
<tr>
<td>7</td>
<td>Quang Nam</td>
<td>16,633</td>
<td>23,022</td>
<td>6,389</td>
</tr>
<tr>
<td></td>
<td>Total:</td>
<td>59,984</td>
<td>89,375</td>
<td>29,391</td>
</tr>
</tbody>
</table>

Source: Project Report FS VIAIP

With an average of 320kg of inorganic fertilizer/ha, 3 tons of organic fertilizer/ha and 1.3 kg of pesticides/ha for mountainous areas and 350 kg of inorganic fertilizer/ha, 4 tons of manure/ha and 2.1kg pesticide/ha in the central region, the amount of fertilizers and pesticides increase after implementation of the project is 10,898 tons of chemical fertilizers, organic fertilizers 119 433 tons and 60.56 tons of pesticides (Table 5)
Table 4.5: The amount of fertilizers and pesticides increase after project completion

<table>
<thead>
<tr>
<th>No.</th>
<th>Province</th>
<th>Increased area (ha)</th>
<th>Increased volume (tons)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chemical fertilizers</td>
<td>Organic fertilizers</td>
<td>Pesticide</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Ha Giang</td>
<td>1,415</td>
<td>452.8</td>
<td>4,245</td>
<td>1.84</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Phu Tho</td>
<td>1,000</td>
<td>320.0</td>
<td>3,000</td>
<td>1.3.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hoa Binh</td>
<td>5376</td>
<td>1720.3</td>
<td>16,128</td>
<td>6.98</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Thanh Hoa</td>
<td>4,318</td>
<td>1511.3</td>
<td>17,272</td>
<td>9.08</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Ha Tinh</td>
<td>10,538</td>
<td>3688.3</td>
<td>42,152</td>
<td>22.13</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Quang Tri</td>
<td>2,770</td>
<td>969.5</td>
<td>11,080</td>
<td>5.82</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Quang Nam</td>
<td>6389</td>
<td>2236.1</td>
<td>25,556</td>
<td>13.42</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>29,391</td>
<td>10,898.3</td>
<td>119,433</td>
<td>60.56</td>
<td></td>
</tr>
</tbody>
</table>

With fertilizers and pesticides increase as predicted in Table 5, if there is not controlled and have the mitigation measures will impact negatively on the quality of the environment and people's health in the project area.

However, the irrigation systems improved is base to achieve optimum on water regulation according to SRI principle. Therefore, if farmers in the project area are participated field courses (Farmer Field School - FFS) on Integrated Pest Management IPM is integrated with System Rice Intecsfication (SRI), minimum tillage, biological prevention measures ... they will improve their knowledge and skills to grow crop health, recovery and develop soil ecosystem. Crop health will withstand the pests, extreme weather, increase crop output, reduce the use of chemicals, especially pesticides, fungicides, reduces greenhouse gas emissions. Also due to the effect of IPM, less harmful chemical use to health, the environment will gradually replace the toxic chemicals. Parallel to the training for farmers on IPM/SRI/minimum tillage, community activities on Pesticide risk reduction-PRR such as training for local leaders, pesticide users, pesticide sales ... the regulations on pesticide management, the risks from pesticides and implement measures of labor protective when exposing to pesticides, pesticide packaging collection after using ... will have integrated effects to reduce risks from pesticides in the project area.

PART II: INTEGRATED PEST MANAGEMENT (IPM)

2.1. Objectives

a, General objectives

Strengthening flora protection at local level, reducing pesticide use in the field, improving the efficiency of prevention, managing well pesticide and pesticide use process to reduce the risk of contamination pesticides on the environment and affect human health

b, Specific objectives

- Support of the Department of Plant Protection of 7 provinces in strengthening pest management and pesticide management in accordance with the national action plan on food hygiene and safety, food security, adaptation to climate change and the concerned international conventions that the Government has approved;
- Strengthening the capacity of IPM in Vietnam, including farmer groups to implement training IPM and research activities with farmers producing rice, vegetables ... to improve life, better and more sustainable crop production, minimizing the from pesticides.

- Strengthening environmental protection, food safety through strengthening the role of predators; reduce pesticide residues to ensure food hygiene and safety, reduce environmental pollution (water, land, air)

- Improving farmers' knowledge: distinguish the major pests, secondary; identify predators and their role in the field, clearly understand the effect of two colors of pesticides, property use, know how to survey pest and use threshold control; understand and apply pest control measures in IPM to increase income for farmers.

2.2. The basic principles of IPM framework

The following principles will be applied to all sub-projects likely to increase the use of fertilizers and pesticides:

a. "Prohibited list": As defined in the screening criteria in Environmental and social Management Framework (ESMF), the project will not finance the purchase of pesticides in large quantities. However, if there is a serious infestation of pests in the region, the project will support to buy small quantities of pesticides; The acquisition, pesticides, storage and transportation will be subjected to the provisions of the Government and without objection of the Bank, the purchase of pesticides can be done. The list of banned pesticides will not be used and circulated.

b. IPM program and project support: All the benefits of sub-projects from the renovation of irrigation systems are supported by the project and implementation of IPM program is part of the EMP for the sub-project. Support project will include technical assistance (consulting) to perform the non-chemical options, and priority support for agricultural extension services, including additional operating costs. The bank support fee for integrated prevention program of all sub-projects and will be required or approved an independent program or as a part of EMP. A proposed budget has been allocated for the implementation of IPM programs for the project area (in the component C). Detailed planning work will be completed through consultation close to farmers, local authority/PCP organization.

c. The project will apply IPM programs as a method to minimize the potential negative impact of the increased use of fertilizers and chemicals. However, the improvement of knowledge and experience in the use of fertilizers and chemicals are through research surveys and training courses in the work as well as selecting safe use of non-chemicals, other techniques, is being investigated and/or applied in Vietnam. National IPM Program has also summarized the results of the implementation and the lessons of experience. The project will apply National IPM program results and detailed technical guidance.

d. IPM Program subproject can be set up to support the implementation of the Government's policy and objectives focusing on reducing the use of chemical fertilizers and pesticides.

e. In normal conditions, if pesticide use is considered to be a necessary option, only pesticides registered with the government and the international recognition in use and project will also provide technical and economic information for chemicals use demand. It should consider the options in the management of not harmful chemicals and can also reduce reliance on the use of pesticides. The measures will be incorporated into the project.
design to reduce risks related to the handling and use of pesticides to allowed possible level and managed by users.

f. The planning and implementation of mitigation measures and other activities will be carried out closely with the authorities, powers and stakeholders, including suppliers of chemicals, to facilitate cooperation and understanding each other.

2.3. The approach of IPM

Focus more on the risks of abuse and excessive use chemical of plant protection products. The concerned plant are rice, vegetables, tea ... these plants tend to be sprayed more of pesticides.

Focus on community education, the initial survey will be incorporated into the task with the aim of clarifying the root cause of the abuse and excessive use of plant protection products and the associated risks. Support the capacity building of the instructor (trainer) IPM. The current program will need to be reviewed and new modules will be supplemented to increase the portion related to reducing the risk of plant protection products. The training program will be enriched with the integration of many activities such as System Rice Intensification (System Rice Intensification - SRI), minimum tillage (minimum tillage), production community and use of bio-products replacing plant protection chemicals ... the training activities, the application will be made in the wide area application of the model.

To perform this content, it should perform the following steps:

- **Step 0:** Hiring consultants: A group of consultants (IPM consultants) will be hired to assist PMU in implementing IPM programs including ensuring results and cooperation among the agencies, farmers, and other stakeholders. The task for the consultant will be implemented at an early stage of project implementation.

- **Step 1:** Set up the basic requirements of the register the program of farmers. This step should be implemented as soon as possible with appropriate questionnaire to establish base in 2013 for the use of fertilizers and of pesticides in the project area. Consultation with key agencies in the conduct of training, registration of participating farmers.

- **Step 2:** Set program goals and prepare a work plan. Based on the results from the questionnaire and consultation at Step 1, work plan and schedule will be prepared, including budgeting and implementation object. The work plan will be submitted to the PMU and approved by the World Bank for review and comment.

- **Step 3:** Implementation and annual review. After approval of the work plan, the activities will be implemented. Implementation progress will be included in the project progress reports. An annual evaluation report will be implemented by PMU and Sub-Department of Plant Protection.

  Step 4: Evaluate the impact. An independent consultant will be hired to carry out the impact assessment. This is to assess the performance of the project and to provide lessons. PMU will hire a national consultant to perform impact assessment of IPM the program

2.4. The contents of the sub-projects

(i) Collection of information and selection of solutions

Before implementing IPM program, consultants must have the original investigation to have the necessary information such as:
o Survey to collect data on: staple crops have economic significance in the project area: seeds, crop, growth characteristics, farming techniques,
o Survey to collect data on soil conditions, pedology, local climate
o Investigate the situation of the pest, harmful rule arises, their economic damage causing on the major crops in the project area
o Investigate the role of natural enemies parasitic of pests on the major crops in the project area
o Investigate the actual situation of pest control measures, pesticide use and their effect at the local
o Investigate the socio-economic conditions, income, technical knowledge, and practices ...

On the basis of these findings, a proposal to evaluate IPM measures will apply on specific crops in regions and localities implement the project through the following measures:

- Cultivation methods: Soil, field sanitation, crop rotation, intercropping, crop seasons, reasonable sowing and planting density, rational use of fertilizers; appropriate caring measures
- Using seed: the tradition seed and the proposed seed in use
- The biological measures: taking advantage of available natural enemies in the field, using probiotics...
- Determination of the level of harm and prevention threshold
- Chemical measures: safe using with natural enemies, the economic threshold; 4 correct use of medicines;

(ii) Develop of demonstration models IPM

This section done by the Department of Crop Production, based on soil characteristics, climate, farming skills ... Department of Crop Production will propose to the TDA of pilot field for agricultural development with the highly effective main crops. IPM activities in the pilot field will serve for sightseeing and guidance of practice.

Some of the main contents when building the IPM in the pilot field, as follows:

- Construction of demonstration models for applying IPM measures proposed above
- Building model involved by the people with the guidance of technical staff
- In the model, there need to build nuclear farmers, group leader
- In addition to technical assistance there should be support materials, ... for households participating in demonstration models
- Compiling IPM guiding documentation for major crops: rice, vegetables ...
- Scale of model: depending on crops,... specific economic conditions, models were constructed using different scales: 5-10 ha / model.

(iii) Coaching and training of IPM staff

TOT (Training of trainers) and Farmer Field School (FFS):
• Each sub-project will organize workshops and staff training of IPM. The content of the training includes:
  o Distinguish the major and secondary pests
  o Identify the natural enemies of pests and diseases in the field
  o Investigate methods to detect worms and diseases
  o Understand the impact of two pesticides, using appropriate pesticides
  o The techniques pest control under IPM principles
  o Advanced farming techniques

• The understanding must be trained in theory and practical application in the field. The contents above can be trained under thematic groups: farming thematic, identification thematic and detection methods of pests and their natural enemies, the thematic of IPM techniques in production …

• Training object: The technical staff of the Department of Agriculture, Sub-department of plant protection, agricultural extension of districts, communes, and cooperatives. These students will train the farmers in the project area, the implementing of models.

• The size of each class is from 20 to 30 students, held in each district. Learning time in each stage. According to the thematic training session, each session may last 3-5 days on both theory and practice.

• Lecturer: hire experts from University/Research institute/Agricultural Extension Center...

(iv) Coaching and training of farmers

Training of Farmers (TOF) follows Farmer Field School (FFS):
  o Method: Combine theoretical training and base on practical fields of farmers and demonstration model on demonstration IMP in the pilot field;
  o Contents are the same as IMP staff training;
  o Participants: participating farmers, farmers who direct implement the models and farmers outside if interested;
  o Classes are organized in each commune.
  o Lecturer: staffs attended TOT classes

(v) Evaluate and visit the field based on of demonstration models and field applied of IPM following the models of farmers

Visit the coast conference, farmers performing the demonstration models are reporters. The farmers implement the model directly with the participants; visiting farmers will calculate, compare economic performance and identify lessons, limitations and the work being done and not being done

(vi) Scientific seminar, evaluation of result and exchange of experience and information, expand the model

Invite experts in related fields participating in the assessment, analysis and additional evaluation, perfecting the processes; the mass media, the propaganda extension organization,
expansion and transfer the result, the technical advances to farmers, and production areas with similar conditions

2.5. The expected results and activities of the project

The project is expected to achieve the following results:

- The risk of food safety and the environment are minimized through the implementation of existing regulations in business management and use of plant protection products and other provisions in national policy and the implementation.

- The capacity of the provincial PPD, farmer trainers are enhanced meeting training work, IPM training and IPM practice advocacy are maintained.

- Support for farmer groups after learning IPM to continue experiment to determine the application technical advances more effectively in production and popular in the community.

- Support for strengthening commune locality, strengthening pesticide management including the implementation and enforcement of legislation controlling plant protection products. Construction and distribution of a short list of specific plant protection products proposed use for rice and safe vegetables production.

2.6- Implementation of IPM programs

Currently, Vietnam is implementing the national IPM program, so sub-projects requires coordinated planning and integration of the IPM program of the project with the National IPM program to perform more effectively within of each sub-project.

- Central Project Office (CPO):
  - Guide subprojects in building program of integrated pest management IPM
  - Responsible for overall supervision and monitoring progress of the IPM program of subprojects.

- Provincial Project Management Unit PPMU:
  - Developing and implementing IPM program
  - To be responsible for the preparation of periodic reports on the implementation and submitting to CPO, WB. Final plan and budget will be completed and discussed with the CPO. All documents will be stored in the project file.

- Sub-Department of Plant Protection (BVTV):
  - Provide policy and technical guidelines for the implementation of the IPM program.
  - Join in IPM model building
  - Join coaching and staff training IPM

- Plant Protection Station at district level
  - Coordinate with IPM staff to implement coaching and trained of farmers implemented IPM through the approach and provide of knowledge, support for of farmers on the safe use of pesticides when necessary.
  - Guide the list of banned pesticides
Examine the distribution facility providing pesticides to ensure the provision of safe pesticides for farmers

- People’s committee at commune level

Organizing for farmers decided to maintain the routine IPM was formed from a training course by organizing IMP-clubs or groups of farmers with the different levels of organization and structure, along with many activities (including the integration of the contents of cattle, credit, market access, etc.,)

- Households in the project area:
  - Implementing IPM program has trained
  - The members of the IPM club support together to develop agricultural activities. They also play a central role in the task of organizing community IPM program and general agricultural planning of commune and district as well.

- Environmental Safety Monitoring Consultant
  - Monitoring the implementation of IPM program of sub-projects
  - Guides local PMU in the implementation
  - To recommend measures to improve the efficiency of implementation of IPM program of sub-projects

2.7- Funds for implementation of IPM program

Funding estimates of the sub-projects implement IPM program includes the following categories:

(i) Funds for research and initial testing

(ii) Funds for Building of demonstration models

(iii) Funds for coaching and IPM staff training: Calculated for the classes held in each district = unit price x number of district of each sub-project

(iv) Funds for coaching and training of farmers: Calculated for the organization of class in each commune = unit price x number of commune in each sub-project

(v) Funds held assessment and the shore tours based on demonstration models and field applying IPM following models of farmers. Each district held a conference for shore tours in 1 day

(vi) Scientific conference, evaluating results, information and experiences exchange, expanding the model. Each District held a scientific conference

Table 4.6: Number of districts and communes in the project area

<table>
<thead>
<tr>
<th>No.</th>
<th>Province</th>
<th>Number of district</th>
<th>Number of commune</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ha Giang</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>2</td>
<td>Phu Tho</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Hoa Binh</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td>Thanh Hoa</td>
<td>2</td>
<td>34</td>
</tr>
<tr>
<td>5</td>
<td>Ha Tinh</td>
<td>4</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>Quang Tri</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-----------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>7</td>
<td>Quang Nam</td>
<td>7</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td><strong>Sum:</strong></td>
<td>32</td>
<td>221</td>
</tr>
</tbody>
</table>

Depending on the number of administrative units in the sub-projects, Department of Agriculture held training courses, reasonable, economical and effective seminars.

ANNEX 4.1 -NORMS OF FERTILIZER FOR SOME MAJOR CROPS

1/ Norms of Fertilizer

a, For direct sowing rice:

- The amount of fertilizer is 1ha (8-10 tons) of manure, 250 kg Urea, 500 kg superphosphate, K chloride 150kg.
- Whole basal fertilizing of manure, phosphate + 20% urea + 30% K.
- Additional fertilizing tillering 60-70% urea + 20% K.
- Note: The spring crop only put down fertilizer when the weather is not too cold and nitrogen fertilizer limited when rice is in ear to avoid fall in the end of the crop pests.

b, For transplanted rice

Amount of the fertilizer for 1 acres: 4-5 kg decomposed manure, urea nitrogen 8-12 kg 6-12 kg K chloride, Lam Thao superphosphate 15-25 kg. Specific fertilizer depending on the frame with rice, soil properties:

- High-yielding hybrid rice varieties grown on sandy soils, silver colored, fertilize with manure maximum.
- Domesticated rice varieties, nutrient-rich soil fertilizer with a minimum quantity.
- Sandy soil, silver colored, with mineral fertilizer ratio 1 N: 1 K2O: 1 P2O5 (1 protein: 1 K: 1 time per pure fertilizer concentration).

Boggy land, wetlands regularly, typically acidic, rich in protein, lack of time, lack of potassium fertilizer lime powder before transplanting 7-10 days and reduced nitrogen fertilizers, increasing phosphorus, K, etc. ....

- Recommendation on manufacturing: For initiative water soil, the total amount of fertilizer deeply lined manure, 30-40% protein + phosphate, K before transplanting harrow. None initiative water land is not nitrogen fertilizer liner to prevent cold rice death..
- The 1st additional fertilizing when rice plants have taken root in green (15-20 days after transplanting). Apply 50-80% protein 20-40% + K, water levels flooded 5cm.
- Additional fertilizing Series 2: When the rice stand, about 1-4 to 10-4 every year, 10% nitrogen fertilizer notes and other potassium. Nitrogen pay attention to the color of the leaf, if the leaf is dark green, do not apply nitrogen fertilizer to increase the amount of K, so until flowering rice, the leaves are green ginger is good, keep humidity saturated soil (soft land, subsidence feet).
- In addition to ensuring high yield and stability need to better control some pests and diseases of rice such as BPH, stem borer, sheath blight, blast, ...

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Note: only rice cultivation and nitrogen fertilizer when the outdoor temperature is greater than 15°C.

c) Hybrid maize crops:
   - The amount of seed for 1 ha: 15 kg
   - Organic manure: lowland areas reach at least 4-5 tons, and highland areas 3-4 tons or more.
     - Urea 300 kg
     - Phosphate 400 - 500 kg
     - Potassium fertilizer 150 kg

d) Domesticated maize crop:
   - The amount of seed for 1 ha: 25 kg
   - Organic manure: lowland areas reach at least 4-5 tons, and highland areas 3 tons or more.
     - Urea 200 - 250 kg
     - Phosphate 350 - 400 kg
     - Potassium fertilizer 100 - 120 kg

(If using other kinds fertilizer to apply, must taken to ensure the regularization the amount of according to 3 kinds of NPK fertilizer)

2/ The requirement intensive technical guidance

Department of Agriculture, Agricultural Extension Station in collaboration with the Agricultural Extension training for hamlets extension workers understand the tasks required to perform work at the facility. Mastering the knowledge and basic technical requirements for intensive rice, maize.

Intensive technical guidance in hamlets. Printing leaflets to guide the production, intensive rice plant and maize farmers for each.

a) The rice plants:
   - About seed; cultivated by the new hybrid rice varieties, limit the use of the old hybrids, Steering simultaneously sowing of seasonality, monoculture on the same field, due to time of growth, leading to different characteristics difficult disease management, water control and take care.
   - Regarding technical aspects;
     - For rice sowing: Continue to apply the sowing areas with convenient conditions to ensure irrigation water, flat land (with accompanying technical process).
     - For rice plants: a new technique is applicable implanted moderately high density 55-60 clusters / m2, less transplant dedicated to saves Seed and time shorten the tillering, apply enough fertilizer under the guidance of technical staff
     - Apply day intensive from Seed stage, saving seeds, apply integrated pest management (IPM), reduced plant pesticide to reduce input costs.

b) Maize crop:
• About seeds; lowland areas and upland in the uplands and upland villages of communal planting some of the maize hybrids. The area is not cultivated maize, maize buy pure, pure, high yield potential. Maize must originate clear, good quality seeds, the specialized agencies testing before supply for sowing.

• Technique: Planting density from 5.5 to 6 thousand plants / ha, only 1 tree / hole, the upland districts in density from 5 to 5.5 thousand plants / ha (1-2 plants / hole), enough organic fertilizers and inorganic fertilizers are balance, Arlier additional fertilizing as instructed.

To be suitable to each sub of the communes climate in the district. Suggest People's Committees of communes selected for the 1 to 3 seeds of rice, maize applied to the area of their communes.

ANNEX 4.2 -INTEGRATED PEST MANAGEMENT IPM FOR THE RICE CROPS

1- Definition, basic principles of integrated pest management

1.1. What is Integrated Pest Management (IPM)?

According to the expert group of the Food and Agriculture Organization (FAO), "Integrated Pest Management" is a pest management system that in the specific the context of the environment and the population dynamics of the species causing damage, using all the techniques and appropriate measures can be, in order to maintain the density of the pest below cause economic damage.

Abbreviation

Thus, IPM stands for Intergrated Pest Management

1.2. Five basic principles of integrated pest management (IPM)

(i). Planting and health care of crops:
   o Choose good seed, suitable for local conditions.
   o Choose healthy and qualified crops.
   o Planting, cared for properly techniques to grow good crops which are resistant and high yielding.

(ii) Check fields regularly, understand the progress of the growth and development of plants, pests, weather, land, water ... to take timely remedial measures.

(iii) Farmers become experts field: Farmers’ technical knowledge, management skills need to advocacy field for many other farmers.

(iv) Pest prevention
   o Using appropriate preventive measures, depending on the severity of disease, parasitic natural enemies in each stage.
   o Using of chemical drugs has reasonable and proper technique.
(v) Protect natural enemies: Protecting the beneficial organisms to help farmers kill pests.

2- Contents of integrated pest management

2.1. Farming methods

(i) Early land preparation and field sanitation

- Land preparation and field sanitation soon after planting to kill many caterpillars and pupae live in the rice stem borer and rice stubble, loss of shelter and food source of the brown planthopper, green hoppers... Brokers are the transmission of viral diseases for rice as dangerous illness blighted gold, rice ragged stunt disease.

- Principles of impact of field sanitation measures and handling crop residues after harvest is cut off the ring cycle of pests from the crop to other crops and pests limited source accumulation, transmission spread at beginning of the crop.

(ii) Crop rotation

Rice rotation with other crops to avoid pathogen accumulation in rice from the crop to other crop.

(iii) Appropriate Planting

Planting rice to ensure appropriate growth and good development, achieve high productivity, avoids the risk of the weather. The determination of appropriate the crop having to rely on the characteristics of the damage incurred pests important to ensure that rice avoiding peak of the epidemic.

(iv) Use healthy seeds, pest resistant and short seeds

- Healthy seeds, free disease helps to rice facilitate development

- Using resistant rice seeds reduce drug use chemical pest control, reduce pollution, protect natural enemies; keep balance agricultural ecosystems.

- Rice seed with short growth period of about 100-110 days, plant earlier in the season could have been avoided borer, deep bite panicle. Rice seed with extremely short growing period is 80-90 days brown planthopper prevention measures effective for brown plant hopper could not accumulate in sufficient quantities to cause severe damage in extremely short day breeds.

(v) Cultivation density is reasonable

- The density and sowing techniques, depending on the rice seeds transplanting, crop, soil and nutrition, aged rice, rice quality, process agricultural intensification...

- The density is too thick or too little will affect productivity, while also affecting the generation and development of pests, weeds.

- The rice fields are often sown too thick closed up early, causing high humidity, creating conditions for sheath blight and brown plant hopper damage incurred at the end of the crop.

(vi) Using reasonable fertilizers

Fertilization excessive or unreasonable fertilizer will make plants grow normally and not prone to pest infestation. Rice fields fertilization are more susceptible to infectious diseases rice blast, sheath blight, leaf blight...

2.2. Manual methods
Light traps catch butterflies, break eggs, rub stripping foil fencing using leaf spray, dig down to catch mice …

2.3. Biological methods

(i) Creating a favorable environment for beneficial organisms are natural enemies of pest development to contribute to kill pests:

- Protection of natural enemies to avoid toxic chemicals by using selective medication drugs, narrow-spectrum drugs, drugs used when absolutely necessary and should be based on economic thresholds...
- Create habitat for natural enemies after planting by intercropping, planting legumes on bunds, disintegrator for lurking natural enemies...
- Application of cultivation techniques facilitate reasonable development natural enemies.

(ii) Priority use drugs Biological Plant Protection;
The medicines is effective only biological pest control, non-toxic to beneficial organisms, safe to human health and the environment

ANNEX 4.3 - LIST OF PLANT PROTECTION DRUGS BANNED IN VIETNAM

<table>
<thead>
<tr>
<th>COMMON NAMES - TRADE NAMES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pesticides, preservatives forest</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
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<td>20</td>
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</tbody>
</table>

**Crops Fungicides**

<table>
<thead>
<tr>
<th></th>
<th>Chemicals and Pesticides</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arsenic compound (As) except Dinasin</td>
</tr>
<tr>
<td>2</td>
<td>Captan (Captane 75 WP, Merpan 75 WP,...)</td>
</tr>
<tr>
<td>3</td>
<td>Captafol (Difolatal 80 WP, Folcid 80 WP,...)</td>
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<tr>
<td>4</td>
<td>Hexachlorobenzene (Anticaric, HCB...)</td>
</tr>
<tr>
<td>5</td>
<td>Mercury compound (Hg)</td>
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<tr>
<td>6</td>
<td>Selenium compound (Se)</td>
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</tbody>
</table>

**Rodenticides**

<table>
<thead>
<tr>
<th></th>
<th>Chemicals and Pesticides</th>
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<tbody>
<tr>
<td>1</td>
<td>Talium compound (TI);</td>
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<tr>
<td>2</td>
<td>2.4.5 T (Brochtox, Decamine, Veon ...)</td>
</tr>
</tbody>
</table>