THE SOCIALIST REPUBLIC OF VIET NAM
MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT

ENVIRONMENTAL IMPACT ASSESSMENT FOR VIET NAM
WATER RESOURCES ASSISTANCE PROJECT

EXECUTIVE SUMMARY

PREPARED BY
CENTRAL PROJECT OFFICE

November 2003
VWRAP Subproject Project Locations

China

Hoa Binh

Laos

Thailand

Cambodia

Hanoi

Yen Lap Scheme

Cau Son Scheme

Ke Go Scheme

Quang Hue River

Phu Ninh Scheme

Da Ban Scheme

Dau Tieng Scheme

HOMC
Vietnam Water Resource Management Project (VWRAP)

ENVIRONMENTAL IMPACT ASSESSMENT: EXECUTIVE SUMMARY

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## Abbreviations

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<tr>
<td>EMDP</td>
<td>Ethnic Minority Development Plan</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>EMP</td>
<td>Environmental Management Plan</td>
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<td>ESSF</td>
<td>Environmental and Social Safeguards Framework</td>
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<td>EVN</td>
<td>Electricity of Viet Nam</td>
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<td>IDA</td>
<td>International Development Association</td>
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<td>IEE</td>
<td>Initial Environmental Examination</td>
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<td>MARD</td>
<td>Ministry of Agriculture and Rural Development</td>
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<td>OD/OP</td>
<td>Operational Directive/Operational Policy</td>
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<td>PMO</td>
<td>Project Management Office</td>
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<td>PMU</td>
<td>Provincial Management Unit</td>
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<td>RAP</td>
<td>Resettlement Action Plan</td>
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<td>RPF</td>
<td>Request for Proposal</td>
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<td>SIO</td>
<td>Strategic Environmental Action Plan</td>
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<td>SEAP</td>
<td>Sub-Implementation Office</td>
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<td>VWRAP</td>
<td>Vietnam Water Resources Assistance Project</td>
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### Currency Equivalents

- 15,500 Dong = US$1
EXECUTIVE SUMMARY

I. Introduction

This report is a summary of the Environmental Impact Assessment (EIA) for the Viet Nam Water Resources Assistance Project (VWRAP). It summarizes the key findings from the seven EIAs for the individual subprojects that have been identified during the preparation of the project. Consultations with the concerned agencies and key stakeholders were also carried out during the studies and a consultation report was prepared separately. The EIA report for VWRAP comprises Main Report (volume 1), EIAs for Seven Subprojects (volume 2), and Public Consultation Report (volume 3).

OBJECTIVES AND SCOPE OF VWRAP

Main objectives of VWRAP are to:
- Support the modernization of Vietnamese agriculture and enhance water resources management by improving irrigation services through the introduction of modern hydraulic infrastructure and management;
- Reduce flood and disaster risk by improving dam safety and management; and
- Promote the environmentally sustainable development of Thu Bon Basin through integrated development and management of water resources.

VWRAP is comprised of the following four components, with a total cost of US$176 million. (The underlined sub-components have independent EIAs presented in Volume 2):

Component 1: Irrigation Modernization in six irrigation schemes: (US$153 million)
- Dau Tieng (Tay Ninh Province and Ho Chi Minh City)
- Da Ban (Khanh Hoa Province)
- Phu Ninh (Quang Nam Province)
- Ke Go (Ha Tinh Province)
- Yen Lap (Quang Ninh Province)
- Cam Son - Cau Son (Bac Giang Province);

Component 2: Dam Safety Management: (US$10 million)
- MARD Dam Repair Fund
- EVN Hoa Binh Dam Safety
- National Dam Safety Unit

Component 3: Thu Bon Basin Development (Quang Nam Province): (US$4 million)
- Quang Hue River Flow Stabilization
- Thu Bon Investment Preparation

Component 4: Project Management and Capacity Building: (US$9 million)
- Technical Assistance for VWRAP
- Provincial and MARD Incremental Costs
- Training and Capacity Building

IMPLEMENTATION OF VWRAP ACTIVITIES

For the six irrigation subprojects under Component 1, the activities will proceed in phases. The first phase activities would include rehabilitation and/or upgrading of the head works, main canals, and about 20% of command area, representing approximately half of the total investment costs. The remaining 80% of the command areas would be rehabilitated.
and/or upgraded during the follow-on phases (phase 2 and Phase 3). This will allow the modernization process to proceed in phases, and to make adjustments as lessons are learned.

Component 2, Dam Safety, consists for two subcomponents. For MARD Dam Safety Fund component, the first phase activities will focus on building capacity of a MARD dam safety unit, and the review of priority dams outside the scope of Component 1. Priority investment will be identified and prepared during the first few years of the project and activities will be carried out in phases. The EVN subcomponent consists of upgrading the existing dam safety instrumentation and data acquisition system for Hoa Binh dam, the largest dam and reservoir in Vietnam.

Component 3, Thu Bon Basin Development, finances river control works for the Quang Hue river, which supplies Da Nang's water supply, and initiates a river basin management program through institutional development and preparation of pre-investment studies.

Component 4, Project Management and Capacity Building, provides technical assistance, training, monitoring and evaluation, and project management support.

EIA STUDIES AND REPORTS

Individual EIA was prepared for each of the irrigation scheme (referred to as irrigation subproject) under Component 1 and for Quang Hue River Flow Stabilization under Component 3. The other sub-component activities consist of either works still to be identified, or activities that do not require environmental assessment such as technical assistance or planning studies. The studies were conducted based on the project descriptions in the feasibility studies and the secondary data and information collected by the EIA Consultants through review of documents, maps, field visits, interviews with local officials, and other similar sources. The current status of the physical, biological, and socioeconomic resources of the subproject areas was reviewed and presented in the report. The assessment was made using the best available information of what engineering works are to be constructed; quantities of materials to be required; and potential changes in water uses, land uses, and chemical uses in the command areas. The EIA methodology as well as the professional judgment of the EIA consultants were applied as needed. An Environmental Management Plan (EMP) comprising the recommended mitigation measures and monitoring program (including the implementation arrangement and cost estimate) has been developed. Recommendations were made to ensure effective execution of the final EMP. Key findings of the EIA studies for the seven subprojects are summarized in Sections II through IX below.

The EIA report was prepared in line with the national legal, policy, and regulatory requirements for environmental management and protection in Viet Nam i.e. the National Law on Environmental Protection (29L/CTN, 1994); Decree 175/CP/1994 on Implementation of the NLEP; Circular 490/1998/TT-BKHCMNT on Setting Up and Appraising Environmental Impact Assessment Reports; and Vietnamese Environmental Standards (TCVN- 1995, 2001).

Due consideration was also given to comply with the directives and guidelines for environmental impact assessment and natural resource management, including all relevant IDA operational safeguard policies (OP 4.01, OP 4.36, OP 4.03, OP 4.37, OP 4.12, OP 11.03, OP 4.04).
II. Overview of the Subprojects

2.1. Component 1 Subprojects:

Main objectives of the six irrigation subprojects are to improve reliability, flexibility, and effectiveness of the existing irrigation systems through the modernization of the technical infrastructure from the head works to the farm fields and the improved efficiency of the irrigation management system. Safety of the dams involved in the subprojects will also be part of the subprojects.

The subproject areas will cover both command areas and reservoirs (all are large earth dams). Most of the existing canals, head works, and other infrastructure are old and in poor conditions. Of the six subproject, one (Cam Son-Cau Son) is located in the north near Hanoi. Four subprojects (Yen Lap, Ke Go, Phu Ninh, and Da Ban) are located along the central coast and one subproject (Dau Tieng) is located in the south near Ho Chi Minh City.

These subprojects lie in the tropical monsoon climate with two distinct seasons (rainy and dry). The duration varies with specific locations of the subprojects. There are a number of national forest reserves located in the catchment areas of the subprojects, but not in the command areas. A number of cultural heritage sites also exist nearby the command areas. Most of the forest areas cover with secondary or regeneration forest and limited natural cover in the hill areas. Most of the land use in the command areas is for agriculture (rice, bean, vegetable), however, there are also other industries, communities, and aquaculture development.

Almost 3.8 million people reside in the subproject’s catchment and command areas. Nearly 99% of the residents in the command areas are Kinh, whereas 35% of the population in the reservoir catchment area are members of a recognized ethnic minority group, most of whom reside in the higher areas surrounding the command area. Population density in the catchment area will be 100 persons/km² while that of the command area will be 562 persons/km². The total command areas of the subprojects within the project will be about 130,000 ha.

Water quality in most reservoirs generally good, however have a tendency towards eutrophication. Phu Ninh subproject has a serious problem with aquatic weeds both in the reservoir and irrigation canals. Water quality in most command areas is generally acceptable. In the area with high residential population (Cam Son-Cao Son and Ke Go), the irrigation canals also receive wastewater and other wastes from industry and communities. For Yen Lap and Dau Tieng, industries discharge large amount of wastewater either into the command areas or downstream of the command areas. Many of these industries are old with no capacity for wastewater treatment. Pesticide levels in surface waters of the command areas are unknown.

Groundwater quantity, particularly the shallow aquifers, has improved after the operation of the scheme. Pesticide levels are unknown. There are salinity intrusion problems at a lower end of the schemes which are located near or in the coastal areas.

Some specific details of the subprojects are briefly described below.

Cam Son - Cau Son scheme is situated at the edge of the Red River Delta in Bac Giang Province. The Cam Son Reservoir (30 years, 227 million m³, 41m high) receives water from a catchment area of about 378 km². The scheme was designed to supply water to 24,100 ha of irrigation area. During 1999 to 2000, irrigation water was delivered to about...
10,300 ha. The area is fully agriculture and the population density is 590 person/km². There are 10 km of main canal, 75 km of primary canal, and 258 km of secondary canal.

About 0.6 million people reside in the command areas and 0.3 million in the catchment area. There are also a large industry (Bac Giang Fertilizer which discharge about 65 million m³/yr of effluent) at the end of command area. Bac Giang Town and a number of breweries are located down stream of the area. Due to limited availability of water available for irrigation in the lower end of the scheme, about 42% of untreated wastewater from the fertilizer plan (about 27.3 million m³/yr) is used for irrigation. This results in poor water quality in the irrigation canal. Wastes from residential and industrial sources are discharged untreated to the irrigation canals.

Cam Son reservoir and weir is assigned as a Cam Son Historical and Cultural Site, as it was constructed in the early 1900s and is one of the oldest large-scale irrigation schemes in Vietnam.

Yen Lap scheme is situated in Quang Ninh Province in the northeast coast about 170 km north-east of Hanoi. It is part of the coastal fringe of the Red River Delta, which is a strong tidal influenced delta environment. The Yen Lap reservoir (20 years, 118 million m³, 37 m high) receives water from a catchment areas of about 183 km². The system was originally designed to gravity irrigate an area of 10,097 ha and supply water at a rate of 9.5 million m³/year for domestic and industrial purposes (in Yen Hung district and Cat Hai Island). Present water supply for industrial and domestic use is about 22% of the design target and provision of bulk water supply to Cat Hai Island has not yet been achieved, but will be provided under the project.

The irrigation system covers an area of 8,320 ha and covers 3 districts in which about 0.2 million people reside. Majority of the residents are Kinh with a small number of ethnic minority group. There are 29 km of main canal, 68 km of primary canal, and 119 km of secondary canal.

Historically, the coastal wetland was more than 35,000 ha. At present, however, there is only 10,000 ha left in the Yen Hung District. The losses due to conversion to aquaculture, fire wood exploitation, agriculture, alteration of tidal regime caused by dike construction. Data indicate that biodiversity value is significant. A number of protected areas are located in the catchment and downstream of the subproject (Bai Chai Cultural and Historic Site, Ky Thoung Nature Reserve, Cat Bai National Park, Halong Bay, Yen Lap Protection Areas).

Ke Go scheme is located in Ha Tinh Province in north central Viet Nam about 300 km south of Hanoi. The Ke Go Reservoir (20 yr, 320 million m³, 37m) is located about 20 km south of Ha Tinh Town. Ke Go Nature Reserve is located in the catchment. The scheme was designed to supply water to an irrigated area of 21,140 ha. Currently the irrigated area is only 17,000 ha (about 80% of the design area).

The irrigation system covers and area of 21,136 ha. There are about 17 km of main canal, 96 km of primary canal, and 77 km of secondary canal. Over 0.35 million people reside in the subproject area (population density is 1,080 people/km²). All residents are of the Kinh.

The Phu Ninh is located in Quang Nam Province and is a large irrigation scheme in the Thu Bon-Vu Gia River Basin. The Phu Ninh Watershed Protection is located in the catchment. The Reservoir was designed to irrigate 23,000 ha, provide 1.6 m³/s of domestic and industrial water supply, and to generate an electricity of about 1890 KW. There are 55 km of main canal (some part are concreted-lined), 135 km of primary canal, and 227 of secondary canal.
Currently irrigated areas cover about 14,500 ha and the scheme provides 3,000 m³/day of water supply to Tam Ky Town (population density is 600 persons/km²). About 0.4 million people reside in the subproject area. The scheme will be upgraded to increase irrigation water to the original designed area and to provide water to aquaculture and industrial development in Quang Nam Province as needed. The Reservoir also plays a key role in flood mitigation. At present, there are about 100 ha of mangrove intact in the area -- used to be 1,000 ha.

The Da Ban scheme is located in Khanh Hoa Province on the south central coast of Vietnam (about 500 km north of Ho Chi Minh City). This is a water-scared area and very little development was present before the operation of the scheme. The Da Ban Reservoir (22 yr, 42 m high, 70 million m³) is located about 35 km north of Nha Trang, the provincial capital. The catchment (358 km²) is located in the Vong Phu Mountain Range. Physical condition of the dam is very poor (crack/seepage) and need remedial works soonest.

The scheme was designed to irrigate an area of 7,800 ha and to supply water for industrial and domestic uses. At present, the scheme supplies water to 4,327 ha (55%) of rice cultivation land, domestic use for 60,000 people, some industries, and about 350 ha of aquaculture area. There are 1 km meter of main canal, 20 km of primary, and 62 km of secondary canal. About 0.2 million people reside in the area (density 332 persons/km²). The residents are almost exclusively of the Kinh. Over 80% of the labor force works in agriculture and aquaculture production. There are a number of major industrial facilities in these districts (sugar factory, ship-repair company).

Dau Tieng scheme is the largest irrigation scheme in the country. The scheme is located in Tay Ninh province and Dau Tieng district (Binh Duong province). The Reservoir (18 yr, 28 m high, and 1,110 million m³) is sited on the Sai Gon River, 20 km kilometers east of Tay Ninh town and 120 km north of Ho Chi Minh City. The Dau Tieng Reservoir and associated irrigation scheme was the first water resources project in Vietnam financed by the IDA. Because the scheme was constructed in the late 1970s and early 1980s, when financial and technical resources were scarce in Vietnam, relatively low design and construction standards were used, resulting in less than optimal performance and an urgent need to upgrade the infrastructure. Currently, the Dau Tieng system provides water for approximately 54,000 ha in Tay Ninh province, and 11,000 in Chu Chi District in Ho Chi Minh City. The scheme also supplies municipal and industrial water for Tay Ninh and Ho Chi Minh City, as well as providing salinity control and flood protection services for the greater Ho Chi Minh City area. There are plans to expand the irrigation area by approximately 45,000 ha in Tay Ninh and Binh Duong provinces by transferring water from the Song Be river into the Dau Tieng reservoir.

The area is situated in the moist forest ecological region and relatively rich in biological value. Lo Go-Sa Mat National Park is located in the upper catchment while Duong Minh Chau Cultural and Historic Site; Nui Ba Den Cultural and Historic Site; Boi Loi Cultural and Historic Site; and Can Gio Biospere Reserve are located nearby the subproject.

2.2. QUANG HUE RIVER FLOW STABILIZATION SUBPROJECT

The subproject is located on the central west coast of Vietnam at the connection between the Quang Hue River and Vu Gia River. The Quang Hue-Vu Gia River Basins cover practically all the area of Quang Nam Province. A total drainage area is 11,510 km² of which nearly half drain from the Vu Gia River. The area is highly complex and subject to major storms. The high flood in 1999, 2000, and 2001 hit the subproject site and formed natural "short-cut channel" between the two rivers. This new channel has severely...
reduced the dry season flow of the Vu Gai River which is an important source of freshwater for irrigation downstream and for Da Nang City. Low water flow has also increased the sedimentation in the river and increased salinity intrusion. The subproject will restore water flow in Vu Gia river by constructing river revetment works, flow control structures, and land reclamation. Two options will be considered in detail during VWRAP implementation: i) using the new "short-cut"; and ii) redirecting the river back to the old river course. Option 2 is cheaper and less socially disruptive, but more hydrodynamic modeling is necessary to select the best option.

III. Alternatives Analysis

Given that the project activities will be limited to rehabilitation and upgrading of the existing irrigation areas, site selection alternatives are limited. Significant considerations, however, has been given to select the construction technology and construction planning (i.e. using canal lining material, concentrate construction activities during off-farm or rainy season when water user having alternative water source, etc.) that minimize the need for land acquisition and/or reduce the impacts due to disruption of water supply during the construction. The key alternatives considered during the design of VWRAP can be summarized below:

Sub-Project Selection:

A national screening process was made during project preparation to identify suitable subprojects under Component 1: Irrigation Modernization. The criteria used to select the six subprojects included: i) high priority dam safety works; ii) need to upgrade the irrigation systems; and iii) potential for multi-purpose water use. Approximately 20 irrigation schemes were reviewed and six selected.

Under Component 2, a comprehensive analysis of EVN’s dam safety needs throughout the country was conducted by EVN, and included approximately ten dams. The Hoa Binh dam was selected for the project because it has outdated instrumentation, is a multi-purpose dam jointly managed by MARD and EVN, and because of its critical importance both for flood protection in the Red River Delta and for national energy production.

For Component 3, another extensive screening process was undertaken to determine the most suitable basin in the Central Coastal area of Vietnam. Since all of the central coast basins reviewed have a need for new reservoirs, a key selection criteria was to identify basins where there was sufficient time and scope to do integrated planning and options assessment for proposed dams. Other criteria included multi-sector water management needs and strong demand from the provinces. Based on this criteria, the Thu Bon basin was selected for the project.

Subproject Investments:

For investments in the Irrigation Modernization subprojects, consideration was given to expanding the design command area. The selected alternative, however, was to maintain the existing command area but ensure complete canal network development and efficient water distribution. Even when sufficient water resources are available, expansion of the command area was rejected for two reasons. First, the economic returns on modernizing existing canals is much higher than constructing new canals. Second, there are much greater environmental and social impacts from constructing new canals as opposed to rehabilitating existing canals.

For investments in Component 3, although a Thu Bon Basin Framework Plan was developed during project preparation, and recommended a number of medium-sized new
reservoir in the basin, the decision was made not to finance the construction of a new reservoir under the project. Although the reservoir proposals appear to be economically justified, there is a need to extensive social and environmental preparation work before appraisal can place. During project implementation, funds will be available to do further planning and pre-investment work for water resources infrastructure.

Implementation Arrangements:

In the past, MARD was responsible for implementing irrigation projects at the provincial level. Under the new GOVN policy of decentralization and VWRAP's emphasis on improving the performance of existing system, the decision was made to allow provincial governments to be the implementing agency for irrigation modernization works. Dam safety works and inter-provincial works, due to their more complicated nature, will still be the responsibility of MARD. Decentralization to provincial authorities will allow them to respond more effectively to local social and environmental issues associated with the project.

Project Length:

A normal irrigation project in Vietnam is four to five years, but VWRAP was lengthened to seven years. The long duration was considered necessary to progressively introduce irrigation modernization concepts and build capacity to support the reform efforts. In addition, canal construction work will take place intermittently and seasonally to minimize adverse impacts on farmers, thus prolonging the construction period.

No Project Alternative

Under the no project alternative, existing irrigation schemes will continue to under perform and deteriorate. As the irrigation infrastructure deteriorates, water supply for irrigation and municipal and industrial uses will decrease causing economic and social hardship for millions of people. In addition, without necessary investments in dam safety, the risk of dam failure will remain high and potentially result in a disaster.

A number of potential secondary impacts associated with scheme operations are identified in the EIA, including increased pesticide use, aquaculture development, municipal and industrial pollution, etc. These impacts are considered "secondary impacts" because they are not directly related to irrigation scheme operation. But rather are associated with the supply of water for irrigation, municipal, industrial, and aquaculture uses. To mitigate the impacts during operations, several approaches have been considered. The EIAs recommended the extension of IPM, monitoring of water quality, control of aquatic weeds, review and monitoring of impact due to aquaculture development, and strengthening governance on pollution control, etc. Discussion with the project proponent suggested that while most of these recommendations are acceptable, limited activities can be carried out under VWRAP to address secondary impacts due to aquaculture development and pollution control given the complexity of the issues and constraints with the institutional structure and fund flow. During appraisal, it was agreed that a two-step action will be carried out to address the potential negative impacts during operations. The two-step actions are:

Step 1: Prepare a "Strategic Environmental Action Plan" that analyzes the following issues in so far as they relate to irrigation scheme operation: (a) Design of Water Quality Monitoring Program; (b) Aquaculture; (c) Municipal and Industrial Pollution Control; (d) Reservoir Watershed Management; and (e) Other issues. The Action Plan should identify immediate actions necessary to address identified problems, and also prepare funding request for VWRAP support.
**Step 2:** VWRAP will provide financing, to the extent possible, for the action items identified in Step 1. Each province will be preset funding limit for these activities.

This agreement has been included in the final EMP for VWRAP.

**IV. Summary of Impact Assessment of the Subprojects**

**4.1 OVERALL CONCLUSIONS**

Implementation of the subprojects is environmentally feasible and will have a number of significant positive benefits:

- Increase in beneficiary income and reduction of poverty throughout the command area through improved and reliable water supply for agricultural production;
- Increases in employment and labor in a region with very high levels of unemployment and underemployment; and
- With respect to the Quang Hue-Vu Gia River Control Works, restoration of hydrological conditions to pre-2000 conditions enabling a restoration of water supply to Da Nang City and to Hoi An District for agriculture and aquaculture uses.

All of the potentially significant environmental impacts identified for the seven subprojects can be mitigated through effective execution of the proposed EMP.

Based on the current information regarding the proposed activities of the six irrigation subprojects, no adverse negative impacts are anticipated and therefore additional environmental assessment of the follow-on investments of these subprojects would not be necessary.

However, given that VWRAP will also provide financing to other subcomponents in which the nature and extent of the activities and locations will not be known until after the first year of VWRAP implementation, IDA requested that a screening process be prepared and applied to all the activities to be identified and executed during the follow-on phases, especially the MARD Dam Repair Fund subcomponent and the ENV dam safety subcomponent. This is to ensure that implementation of VWRAP will not cause any adverse impacts on the local environment and local communities. A policy framework and guidelines for the environmental assessment and impacts mitigation plan for the follow-on investment (80% of the command areas) of the six irrigation subprojects has been provided in this EIA report.

It is anticipated that specific requirements of the EMP for each subproject and the action plans and the safeguard screening process and policy framework, namely the Environmental and Social Safeguard Framework (ESSF), will be prepared separately and they will be submitted to IDA as an addendum to this EIA report.

**4.2 SUMMARY OF IMPACTS AND PROPOSED MITIGATIONS**

The sections below summarizes the main findings of the impacts assessment, basic elements of the EMP, organizational arrangement, indicative requirements for bidding documents, capacity building and training needs, policy framework, and summary of the application of IDA safeguard policy focusing on the seven subprojects. These information will be reviewed and discussed by concerned entities and if necessary, they will be modified in line with the final agreements.
**Pre-Construction Phase**

**Impacts of the Legacy of Conflict** -- There is a risk that unexploded ordnance will be uncovered during excavation, but this risk is assessed as Mitigable. As a precautionary measure, it will be necessary to detect and clear unexploded ordnance in the Project Area for those construction activities that will occur at depths greater than 2 m.

**Requirement for Resettlement and Land Acquisition** -- These impacts are assessed as Mitigable. Land acquisition will be required for all subprojects. About 324 ha of land will affected in Phase I (94 ha of permanent land loss and 230 ha of temporary loss), affecting 53,600 people in 12,319 households. The majority of them will only lose a marginal amount of land. Seven RAPs have been prepared for Phase I investment. For Phase II activities to be identified and designed, a Resettlement Policy Framework (RPF) to guide planning of the follow-on investments has been formulated.

**Construction Phase**

The major engineering civil works of the Project will create the need for temporary construction worker camps. These construction camps will have negative impacts on the environment through land disturbance, generation of waste (solid and liquid), use of heavy vehicles and other machinery (increased noised levels localized air pollution, particularly in areas of human habitation), and requirements for domestic and drinking water supply. Despite the fact that the size and proposed location of the construction camps is unknown at this time, all these impacts are mitigable through good construction camp practices. In addition, there will considerable disturbance of soils in all aspects of head works and canal system upgrading. There will need to be effective handling of soils so that they cause minimal disturbance to the environment, particularly with respect to sedimentation of water courses, and degradation of water quality. These impacts are assessed as Mitigable.

**Surface Water Quality** -- Although water quality data for the Sub-Project Area suggests the larger-scale effects of disturbing acid sulfate soils is very moderate, there may be localized increased generation of acidity as a result of construction activities, and mitigation measures are recommended to deal with these possible increases in acidity. Large quantities of soil, rock, and other material with be excavated (total of 9.5 million m$^3$) and provided as fill (total of 7.5 million m$^3$) for the head works and canal upgrading. Soils to be excavated and/or used as fill are unlikely to be contaminated as the entire Sub-Project Area has had little, if any, economic activities that would generate such contaminants. However, the large quantities of soil likely to be disturbed during construction are such that proper disposal, storage, and management of these soils are recommended as mitigation measures. Part of the mitigation measures will need to be ensuring that contaminated soil does not make it onto the Sub-Project site as earth-fill.

**Surface Water Hydrology** -- Improper timing of the construction activities associated with main canal reinforcement and lining may negatively affect water supply to farmers downstream. On the one hand, construction of canal reinforcements in the dry season can proceed very quickly, but water supply needs to be turned off during the construction periods; the dry season is the season when water supply via the irrigation scheme is most critical. On the other hand, water supply to the farmers via the irrigation scheme is not as critical in the rainy season and yet construction is much more problematic and expensive given the larger amounts of water in the system at that time. It will be necessary to develop rigid construction timetables for canal lining to minimize disruption to the beneficiaries and at the same time have efficient implementation of this part of the Project. In addition, consultation with all affected parties will be required in order to reach agreement how much impact will be accepted by the affected groups.
Sedimentation and Erosion -- The disturbance to Sub-Project soils as a result of expanding existing spillways in the Ke Go and Dau Tieng subprojects, as well as construction of the new emergency spillway in the Yen Lap subprojects will increase sedimentation into the respective reservoirs and possibly the main canal of these schemes as a result of construction activities, including site preparation and pumping. These effects can be mitigated with properly constructed and maintained sedimentation basins that would be used during the construction phase. There will be considerable moving and handling of soils involved with dredging in the main canals as well as raising the canals and strengthening them at locations that have eroded over time. The quantities of soil likely to be involved are such that proper disposal and management of these soils is recommended in order to minimize incremental sedimentation into the canals and other water bodies of the project. Most of the construction activities associated with upgrading the entire canal distribution systems – completion of the canal distribution systems at the lower levels, canal reinforcement, canal lining, and management road construction and upgrading - could cause local disturbance to soils and thereby increase sediment content of the main canals. Minimization of soil disturbance during the construction activities through the application of standard good practice techniques during construction is recommended in order to minimize additional sedimentation into the canals of the subproject.

Surface Water Quality -- There is a risk that upgrading of existing canals and construction of new canals in the Dau Tieng subproject in areas of acid sulfate soils will increase the acidity of surface waters and of runoff from any spoils. The following mitigations are recommended in areas containing acid sulfate soils:

- For spoil that is excavated using a grab dredger, it would be the neighboring farmers' responsibility to dig a small ditch between the spoil and their fields to direct sewage and runoff back into the canal;
- For spoil that is excavated using a cutter dredger, containment with surrounding embankments would be built to control the spread of the spoil and to direct runoff back into the canal;
- Where feasible and advantageous, contractors would be required to dredge one side of an existing canal to minimize exposure of and leaching from acid soils;
- The contractors would be responsible for mitigation and compensation for any damage to farmers' land or other assets due to excavation, based on conditions that would be specified in the contractual agreements; and compliance with contract specifications would be monitored during Project implementation.

While there is some risk that surface water quality in the command areas may change significantly as a result of the Project, it is unlikely that this will be the case with water quality downstream of the command areas. Sediment, nutrient, and pesticide concentrations will almost certainly change in the surface waters within the Sub-Project, particularly in the dry season. This, however, is unlikely to significantly affect water quality downstream of the command areas because of the dilution of pollutants that would occur. However, the absence of any surface water quality monitoring information means that these predictions are uncertain. It would be prudent, therefore, to conduct surface water quality monitoring downstream of the command areas to confirm the assessments of cumulative impact made above.

Groundwater Resources -- Effects resulting from increasing application of Fertilizers and Pesticides, herbicides is Unknown because of absence of good groundwater quality baseline information makes assessment of Project impacts on groundwater resources
very difficult. Groundwater quality monitoring is recommended within the Project to confirm this assessment.

Terrestrial Biological Resources -- Terrestrial Ecosystems and Terrestrial biodiversity, Permanent Loss of Terrestrial Ecosystems because the upgrading of the management roads along the canals will permanently alienate a small area relative to the total catchment area plus the full command area; these effects are assessed as Insignificant.

Alteration of Landscapes During Extraction of Construction Materials - Mitigable Earth-fill, sand and other materials to be excavated will cause disturbance to landscapes. For example, 50% of the earth-fill and sand to be used in the Yen Lap Sub-Project is to be extracted from the Song Khoai Hill area (about 280,000 m3). This will disturb approximately 10 ha of land. Mitigation will be required to restore vegetation at these sites after construction is completed and to return the landscapes to their original condition.

Disturbance of Terrestrial Ecosystems During Construction - Mitigable Construction activities will temporarily disturb terrestrial ecosystems within the Project Area at and downstream of the dams and into the command areas. Also, areas used for earth storage will also disturb landscapes within the Project Area; it is estimated that about 670 ha of land will be temporarily required for construction activities. Even though compensation will be paid for the temporary use of this land, mitigation will be required to restore these sites after construction is completed and to return the landscapes to their original condition.

Aquatic Biological Resources -- There will be considerable moving and handling of soils involved with dredging in the canals as well as raising the canals and strengthening them at locations that have eroded over time (total of 8.6 million m3 of earth to be excavated and almost 7.0 million m3 of earthfill to be provided). The quantities of soil involved are such that proper disposal and management of these soils is recommended in order to minimize additional sedimentation into the main canals of the Sub-Project and minimize consequent negative impacts on aquatic ecosystems and biodiversity. Effects on aquatic ecosystems downstream of the command areas would be indirect and mediated through changes in surface water quality. As the effects of the Project on surface water quality outside of the Project are assessed to be likely insignificant, it is also likely that the impacts of the Project on aquatic ecosystems downstream of the command areas will also be significant. The recommended surface water quality monitoring downstream of the command areas will enable these assessments of insignificant cumulative impact to be confirmed.

Infrastructure Facilities -- There may be damage caused to existing infrastructure, particularly roads, road signage, and bridges, caused by construction activities associated with implementation of the Project. These impacts are assessed as Mitigable

Historical and Cultural Resources -- While the exact location of the each of the cultural and historic sites in the Project Area is known and the locations are maintained in the DoC1 offices of each province the location of many of the Project activities is not yet known in detail. Despite this, it will be possible to mitigate against any possible loss of or damage to the cultural and historical sites by adjusting the siting of Project civil works as necessary. It is recommended that this be incorporated into the detailed design of the physical works, in accordance with IDA Operational Policy OP 11.03 - Cultural Property. In addition, it is recommended that terms and conditions be included in the construction contracts to ensure the integrity of these historical and cultural resources. In Quang Hue-Vu Gia River Control Works, no designated historic and cultural resources in the River Control Works area. However, there is a new temple that local residents erected at the beginning of the New Quang Hue River after the events of 2000. This temple is some distance away from the area to be backfilled and so it will not need to be moved. The
obvious importance of the temple to the residents of Village No. 9 requires that great care be taken during construction so as to not disturb or damage the temple site.

Operation Phase

Surface Water Quality – Although future cropping patterns are difficult to forecast, under a high cultivation scenario with significant rice production, it is estimated that there will be significant increases in fertilizer and pesticide use due to the intensification of agricultural production. These impacts are assessed as Unknown but potentially Significant without mitigation or monitoring. Both mitigation and monitoring are recommended for incremental fertilizer and pesticide inputs. With respect to mitigation, IPM extension services should continue to be provided to project beneficiaries as a part of the subproject in accordance with the requirements of IDA OP 4.03 - Pest Management Safeguards. While there is some risk that surface water quality in the command area may change significantly as a result of the operation of the upgraded irrigation schemes, this may not be the case with water quality downstream of the command areas. Nutrient and pesticide concentrations will almost certainly change in the surface waters within the project, particularly in the dry season. This, however, may not significantly affect water quality downstream of the command areas, because of the dilution of pollutants that would occur. However, the absence of any surface water quality monitoring information means that these predictions are uncertain. It would be prudent to conduct surface water quality monitoring downstream of the command area to confirm the assessments of cumulative impact made above.

Groundwater Resources -- Effects of increasing application of fertilizers and pesticides is Unknown because of absence of good groundwater quality baseline information makes assessment of project impacts on groundwater resources very difficult. Groundwater quality monitoring is recommended within the project to confirm this assessment.

Biological Resources – The application of fertilizer, pesticides or herbicides with Project as result of changes in land use and commodity production may negatively affect the integrity of the aquatic ecosystems of the project. Mitigation and monitoring recommendations made above pertaining to provision of extension services for pesticide use and IPM apply here as well and would likely mitigate any negative effects on aquatic ecosystems.

Socioeconomic Resources -- Degradation of groundwater resources that may occur as a result of increased application of fertilizer and pesticides may negatively affect domestic and drinking water quality. Successful application of IPM extension services will ameliorate any negative effects of increased application of chemical inputs to domestic and drinking water quality. The effects monitoring recommended for groundwater resources will enable confirmation of these assessments and of the success of the IPM extension services.

Secondary Impacts – Due to the natural growth in population and industrial development in the vicinity of the irrigation schemes, the subproject will supply an increasing quantity of water for municipal and industrial uses. The environmental issue concerning incremental environmental impacts of municipal and industrial water use is largely with the industrial sector. Increasing the supply of water for domestic use will have substantial human health and other benefits. An expanding industrial sector will also provide many incremental socioeconomic benefits but will create incremental environmental impacts that may be difficult to control and manage. While it is completely impractical for WWRAP to finance the construction and operation of industrial pollution control facilities, because such a high proportion of the subproject benefits accrue from municipal and industrial water supply, under the Strategic Action Plan approach described above, WWRAP could provide support
to provincial departments (DoSTEs, Dolts, etc.) for strengthening their monitoring and enforcement capacity, raising awareness of industrial users, and strengthening the overall environmental governance of the industrial sector. The first priority provinces would be those that are currently relatively unpolled from industrial activity (i.e., Quang Nam, Tay Ninh, and Ha Tinh), followed by Bac Giang and finally by Quang Ninh Province and Ho Chi Minh City.

Increasing water supply to brackish water aquaculture both within and downstream of the command areas of the four subprojects (Da Ban, Phu Ninh, Ko Go, Yen Lap) will support expansion of this economic activity in the coastal zone of the provinces (Quang Ninh, Ha Tinh, Quang Nam, and Khanh Hoa) in which these subprojects are located. Aquaculture is an important economic activity in Viet Nam in general and is extremely important for economic development in these four provinces. It is one of the largest sources of foreign exchange for Viet Nam. However, there are costs of aquaculture expansion, including loss of coastal wetlands and water pollution. Under the Strategic Action Plan approach, the VWRAP could support the following activities:

- conduct an environmental review of those parts of the respective Provincial Aquaculture Programs that will benefit from improved water supply from the VWRAP to ensure proper pond arrangements, wastewater management, and pond sediment management are put into place and to determine the additional amount of coastal wetlands that will be lost as a result of the expansion of coastal aquaculture; and
- monitor the increases in aquaculture area and the water quality of waters downstream of the aquaculture areas during VWRAP.

V. The Environmental Management Plan (EMP)

The EMP for the seven subprojects consists of an environmental mitigation program and an environmental monitoring program.

The environmental mitigation program consists of:

(a) Implementation of a comprehensive resettlement and compensation action plan;
(b) Proper environmental management of construction worker camps, including minimization of disruption to local residents from construction activities to limit localized environmental degradations and disturbance to local communities;
(c) Maximization of employment opportunities for local residents to take full benefit of the employment opportunities created by the project;
(d) Survey for and treatment of unexploded ordnance;
(e) Prevention of disruption to designated cultural and historical sites;
(f) Proper management and disposal of dredged and excavated soils to minimize degradation of water quality;
(g) Compensation for lost forest resources due to VWRAP construction activities through re-forestation of similar areas (Yen Lap, Dau Tieng);
(h) Implementation of a Emergency Preparedness Plan for managing dam flood safety risk;
(i) Development of a Strategic Action Plan for each subproject province that analyzes the following issues in so far as they relate to irrigation scheme operation: (a) Design of Water Quality Monitoring Program; (b) Aquaculture; (c) Municipal and Industrial Pollution Control; (d) Reservoir Watershed Management; and (e) Other issues. The Action Plan should identify immediate actions necessary to address identified problems, and also prepare funding request for VWRAP support.

Another important mitigation measure for the irrigation subprojects will be the minimization of disruption to water users during canal lining. Improper timing of the construction
activities associated with canal reinforcement will negatively affect water supply to farmers downstream. On the one hand, construction of canal reinforcements in the dry season can proceed very quickly, but water supply needs to be turned off during the construction periods; the dry season is the season when water supply via the irrigation scheme is most critical. On the other hand, water supply to the farmers via the irrigation scheme is not as critical in the rainy season and yet construction is much more problematic and expensive given the larger amounts of water in the system at that time. It will be necessary to develop rigid construction timetables for main and primary canal reinforcement to minimize disruption to the beneficiaries and at the same time have efficient implementation of this part of the Sub-Project. In addition, consultation with all affected parties will be required in order to reach agreement on exactly how canal lining will proceed.

The recommended environmental monitoring activities are:

(a) Compliance monitoring of the environmental mitigation program;
(b) Surface and groundwater quality monitoring program to assess incremental effects of sedimentation, erosion, and fertilizer and pesticide use;
(c) Monitoring of reforestation success (Yen Lap and other subprojects as necessary);

The total cost of VWRAP EMP would be about US $1.1 million. A preliminary cost estimate has been formulated for the various mitigation and monitoring activities, but the exact activities and costs will be developed through the Strategic Action Plan process for each subproject. The following table summarizes the key issues for each subproject with an “X” and provides a preliminary cost estimate for each subproject and across issues. Environmental consultants will be contracted by the project to lead the Strategic Action Plan process in each province, and provide implementation supervision and support. The Strategic Action Plan will define the precise activities and costs in more detail, and the following table should be considered indicative:

<table>
<thead>
<tr>
<th>EMP Estimated Costs (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigation Program</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>Afforestation</td>
</tr>
<tr>
<td>Aquatic Weed Control</td>
</tr>
<tr>
<td>Integrated Pest Management</td>
</tr>
<tr>
<td>Monitoring Program</td>
</tr>
<tr>
<td>Construction Contracts</td>
</tr>
<tr>
<td>Coastal Aquaculture</td>
</tr>
<tr>
<td>Industrial Pollution Control</td>
</tr>
<tr>
<td>Water Quality Monitoring</td>
</tr>
<tr>
<td>Subproject Allocations</td>
</tr>
<tr>
<td>Project-Wide Costs</td>
</tr>
<tr>
<td>Environmental Consultants</td>
</tr>
<tr>
<td>Total EMP Costs</td>
</tr>
</tbody>
</table>

VI. Institutions Responsible for Implementing the EMP

Effective implementation of the EMP of these subprojects will involve several ministries, departments, institutes, and local governments. However, the overall responsibility rests with the project proponents who are responsible for implementation of VWRAP activities. There will be one Project Management Office (PMO) in MARD's Central Project Office with overall management responsibility. At the subproject level, for dam safety and inter-provincial works, such as Dau Tieng dam and main canals, MARD sub-implementation offices (SIOs) will be responsible. Provincial project management units (PMOs) will responsible for canal works in all subprojects. The following institutions will be responsible for the successful implementation of the VWRAP EMP:
VWRAP PMO – responsible for overall VWRAP implementation management and will contain environmental safeguard staff. VWRAP PMO will be responsible for overall quality assurance of EMP implementation.

SIO/PMOs – staffed by personnel from provincial DARD offices and the particular IMCs (or existing MARD SIOs for more complicated construction works), and will be responsible for daily implementation activities of VWRAP. As a consequence, it will supervise and control the quality of construction and physical implementation of the individual Sub-Project EMPs.

Vietnamese Environmental Regulators – MoNRE and provincial/city DoSTEs will be responsible for all regulatory reviews and approvals of VWRAP in accordance with the national legal framework for environmental protection and management. DOSTE’s will also participate in the formulation and implementation of the Strategic Environmental Action Plans.

Provincial and City Organizations – Other provincial/city departments will have important responsibilities such as implementing specific components of the mitigation program (such as the Integrated Pest Management or IPM), ensuring their particular safeguards are being properly implemented (i.e. DoCls) and providing supplementary and secondary data to assist in the implementation of the Subproject EMPs (e.g., land use and commodity production data).

IDA – IDA will review the implementation of the overall VWRAP EMP. Problems and issues that are identified will be raised to MARD as part of the regular VWRAP review process.

Environmental Consultant– At least one Environmental Consultant will be selected from the qualified national organizations in Viet Nam. The Environmental Consultant will act as general contractor for primary data collection surveys and for preparation and submission of various compliance and effects monitoring assessment reports. They will also be responsible for leading the formulation of Strategic Action Plans, and supervising and supporting the Action Plan implementation. The Environmental Consultant will be supported as and when necessary from the overall Project Management Technical Assistance consultants.

VII. Indicative Requirements for Biddinq Documents

The construction bidding documents will require terms and conditions for the following environmental mitigation measures:

- To detect and clear unexploded ordnance (UXO) in the sub-project Areas;
- To implement mitigation measurements at sites of temporary construction worker camps to minimize the negative impacts on the environment through land disturbance, generation of waste (soil and liquid), use of heavy vehicles and other machinery, and requirements for domestic and drinking water supply;
- To implement the resettlement and compensation for land acquisition in compliance with VWRAP resettlement requirements;
- Soil, rock, and other material with be excavated, dredged and provided as fill for the head works and canal upgrading in compliance with mitigation measures of the proposal disposal and management of these soils;
- Rehabilitate all agricultural and other land affected by construction activities associated
with engineering civil works to pre-construction conditions;

- To develop rigid construction time for canal lining to minimize disruption to the beneficiaries and consultation with all affected parties will be required in order to reach agreement on the duration of water disruption between construction contractors and affected households;
- The contractors would be responsible for mitigation and compensation for any damage to farmers' land or other assets due to excavation, based on conditions that would be specified in the contractual agreements;
- To restore the temporarily sites used for construction activities after construction is completed and to return the landscapes to their original condition; and
- Terms and conditions for historical and cultural sites in accordance with IDA Operation Policy OP 11.03 – Cultural Property to ensure the integrity of these historical and cultural resources.

VIII. Recommended Training and Capacity Building

The Environmental Consultants will prepare and implement a training program and capacity building program as outlined below:

PMOs/SIOS – PMOs/SIOSs will receive training and capacity building in the following areas:

(a) preparing and working with terms and conditions to be included in construction contracts. These terms and conditions will include as required responsibility for mitigation and compensation for non-compliance;
(b) for technical supervision staff training on how to conduct civil works monitoring and supervision to ensure environmental mitigation measures are being properly implemented (frequency of monitoring, type of works to be supervised, assessment and reporting); and
(c) preparation of compliance monitoring reports in accordance with VWRAP reporting requirements.

Also, construction contractors may require training on the proper implementation of the environmental mitigation measures in order to meet the terms and conditions included in their contracts and on the preparation of Site Environmental Management Plans. This training will need to be conducted at field locations with demonstrations of mitigation measures as required. The training will be designed so that technical supervision staff from the construction supervision entities will be able to deliver such training to additional contractors as they are engaged for construction works.

Provincial Environmental Professionals. Training and capacity building will be provided in environmental monitoring. This training will focus on detailed design of the environmental monitoring system, including:

(a) specification of environmental impacts;
(b) clear set of indicators or criteria, such as water quality standards, or species richness indices, for example, which are used to evaluate changes in environmental conditions;
(c) preparation of environmental baselines for environmental conditions in VWRAP against which changes in environmental conditions may be assessed;
(d) spatial and temporal controls for environmental monitoring to make it possible to ascribe changes in environmental conditions to Project effects rather than changes in factors unrelated to the Sub-Project;
(e) design for the data gathering or data analysis;
(f) QA/QC;
(g) analysis and presentation of data and results;
(h) development of database information systems; and
(i) reporting structures and formats in accordance with VWRAP reporting requirements.

VWRAP PMO. Technical assistance will be provided to environment (and other) staff in VWRAP PMO in incorporating the results of environmental management programs (such as VWRAP EMP) into water resources project management decision making. Considerable on the job training will be provided through implementation of the environmental components of the Design and Supervision Technical Assistance.

IX. Policy Framework and Guidelines

New investments, such subsequent phases of Component 1 or the MARU dam safety fund, will be screened against the IDS safeguard policies (environment, forestry, natural habitats, cultural property, and pesticide management) and an EMP will be prepared for the package if the existing EMP is not sufficient. The details of the EMP will be designed in parallel with the detailed technical and engineering design for the investments.

During the screening and preparation of the EMP, the following principles should be applied:

Screening –While additional environmental assessment is not anticipated for the follow-on investments of the remaining 80% of command areas, VWRAP PMO will formally confirm this conclusion prior to the detailed design of the engineering works by performing a screening checklist on the IDA safeguards (see below). If the nature and extent of the impacts are similar to those identified during the EIA study of the subproject, the VWRAP EMP will be applied as appropriate. VWRAP PMO will prepare and submit a report on the screening and proposed EMP (if necessary) for the new investment to IDA for no objection. If the quality of the review is satisfactory, prior approval from IDA for the follow-on investment of similar nature of activities may not be required. However, a report will have to be prepared and properly kept for post review by IDA. The initial criteria, special study or IFEs, and consultation will be carried out during the preparation of the Screening Report and/or EMP. Information disclosure and IDA clearance may be required. Implementation and monitoring will be carried out.

X. Application of IDA Environmental and Social Safeguard Policies to VWRAP

Application of IDA Environmental and Social Safeguard Policies to VWRAP is summarized below.

<table>
<thead>
<tr>
<th>IDA Safeguard Policy</th>
<th>Summary of Assessment and Rationale</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP 4.01 – Environmental Assessment – Triggered</td>
<td>While VWRAP is classified as Category A, requiring a full-scale environmental assessment, the results of this EIA indicate that the scale and magnitude of the expected environmental impacts of VWRAP are more like that of a Category B project. Environmental impacts of VWRAP are site-specific; none are irreversible; very few direct impacts are on environmentally important areas such as wetlands, forests, or other natural habitats, all are preventable, and</td>
<td>Implement VWRAP Environmental Management Plan (EMP)</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>---------</td>
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<td></td>
</tr>
<tr>
<td>OP 4.04 – Natural Habitats – Triggered</td>
<td>Mitigation measures have been designed for all possible environmental impacts. No impacts predicted for catchments of Irrigation Scheme reservoirs, where all of the intact natural terrestrial habitats of the Project Area occur (except for Yen Lap catchment, see below). There may be loss of natural habitats from excavation of soil to be used as earth-fill. There will be loss of natural habitats in the Yen Lap Watershed Protection Forest from the construction of the emergency spillway. Yen Lap, Ke Go, Phu Ninh, and Da Ban Sub-Projects will provide increased water supply to expanding provincial coastal aquaculture programs which were not assessed for possible environmental impacts. There may be a risk of losing coastal wetland resources. Mitigation required to rehabilitate and restore all areas of excavation to conditions prior to construction. Reforestation of 20 ha within Yen Lap Watershed Protection Forest as compensation. Environmental review of Quang Ninh, Ha Tinh, Quan Nam, Khanh Hoa provincial aquaculture programs to prepare guidelines for ensuring coastal aquaculture is environmentally sustainable and to restore degraded wetlands as compensation. Monitoring of water quality in estuarine areas of Yen Hung (Quang Ninh), Thach Ha (Ha Tinh), Nui Thanh (Quang Nam) and Ninh Hoa (Khanh Hoa) Districts is recommended as part of environmental effects monitoring program.</td>
<td></td>
</tr>
<tr>
<td>OP 4.09 Pest Management – Triggered</td>
<td>It is forecast that there will be a significant increase in pesticides and herbicides due to agricultural intensification. This impact is assessed as Unknown but potentially Significant without mitigation or monitoring. Existing baseline information on pesticide concentrations in the Project environment is non-existent and so current conditions can not be estimated, but the expected increase is substantial, particularly as 50% of VWRAP beneficiaries have not yet received training in IPM methods. Both mitigation and monitoring are recommended. With respect to mitigation, the national IPM extension services should continue to be provided to Project beneficiaries as a part of the Project in accordance with the requirements of IDA OP 4.09. Extension services should include topics of appropriate selection and application of biocides as well as basic techniques of and approaches to IPM.</td>
<td></td>
</tr>
<tr>
<td>OP 4.12 – Involuntary Resettlement – Triggered</td>
<td>While only ten households need to be resettled in the Yen Lap scheme, there is a requirement to pay compensation for permanent and temporary land acquisition for all subprojects. Resettlement and Compensation Action Plan prepared as part of VWRAP Feasibility Study.</td>
<td></td>
</tr>
<tr>
<td>OP 4.20 – Indigenous Peoples – Triggered</td>
<td>There are some members of recognized ethnic minority groups living in the command areas of most of the Irrigation Scheme Sub-Projects. Ethnic Minority Development Plans prepared as part of VWRAP Feasibility Study.</td>
<td></td>
</tr>
<tr>
<td>OP 4.36 – Forestry – Not Triggered</td>
<td>10 ha of Yen Lap Watershed Protection Forest will be lost as a result of construction of the new emergency spillway. There may be loss of natural habitat in the Duong Minh Chau and Boi Lai Local Nature Reserves from the completion of the canal system. These losses will be mitigated under the Natural Habitat Policy above. Reforestation of 20 ha within Yen Lap Watershed Protection Forest as compensation. Reforestation of Duong Minh Chau and Boi Lai Local Nature Reserves to compensate for losses of natural habitat.</td>
<td></td>
</tr>
<tr>
<td>OP 4.37 – Safety of Dams – Triggered</td>
<td>Upgrading Dam safety a major component of first investment phase. Specific engineering works are provided for increasing dam safety.</td>
<td>Prepare Dam Emergency Preparedness Plans as needed. Establish an Independent Dam Safety Review panel for the project.</td>
</tr>
<tr>
<td>---</td>
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<td>---</td>
</tr>
<tr>
<td>OPN 11.03 – Cultural Property – Triggered</td>
<td>The impacts are assessed as <strong>Unknown</strong> because, while the exact location of the each of the cultural and historic sites in the Project is known, the specific location of the Project activities is not yet known in detail, particularly for the second phase of investments.</td>
<td>Mitigation recommended against any possible loss of or damage to nationally or locally designated cultural and historical sites by adjusting the siting of civil works, if necessary, to be incorporated into the detailed design of the physical works. Terms and conditions be included in construction contracts to ensure integrity of these historical and cultural resources.</td>
</tr>
<tr>
<td>OP 7.50 – International Waterways – Not Triggered</td>
<td>Not triggered as none of the water bodies or their tributaries associated with the irrigation schemes of the VWRAP form a boundary between, or flow through the territory of another country or are recognized as a necessary channel of communication between the open sea and other states countries or of any river flowing into such waters. The activities expected to be carried out under the Dam Safety Fund will be limited only on rehabilitation of existing structure and will not affect either quantity and quality of the water. ESSF will screen out any possible relationships with the international waterways issues.</td>
<td></td>
</tr>
<tr>
<td>OP 7.60 – Projects in Disputed Areas – Not Triggered</td>
<td>Not triggered as none of the Project Area or the area of influence of the Project is part of a territory whose jurisdiction is disputed by another country. ESSF will screen out any possible relationships with any disputed areas.</td>
<td></td>
</tr>
</tbody>
</table>
## Basic Project Data

### A.1. Project Statistics

| **Country** | Vietnam |
| **Project ID** | PO56898 |
| **Project** | Vietnam Water Resources Assistance Project |
| **TTL** | Greg Browder |

### Total project cost (by component): 

- Component 1: Irrigation modernization (US$153.7 million)
- Component 2: Dam Safety Management (US$10.2 million)
- Component 3: Thu Bon Basin Development (US$3.9 million)
- Component 4: Project Management (US$8.7 million)

### Appraisal Date: October, 2003

<table>
<thead>
<tr>
<th>Source/US$Million</th>
<th>Local</th>
<th>Foreign</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>10.2</td>
<td>7.6</td>
<td>17.8</td>
<td>10%</td>
</tr>
<tr>
<td>IDA</td>
<td>69.7</td>
<td>89</td>
<td>158.7</td>
<td>90%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>79.9</td>
<td>96.6</td>
<td>176.5</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

### RVP Approval:

- [ ] Yes
- [x] No

### Other financing amounts by source: 

- Managing Unit: EASRD
- Lending Instruments: SIL
- Environmental Category: A
A.2. Project Objectives:

- Support the modernization of Vietnamese agriculture and enhance water resources management by improving irrigation services through the introduction of modern hydraulic infrastructure and management;
- Reduce flood and disaster risk by improving dam safety and management; and
- Promote the environmentally sustainable development of Thu Bon Basin through integrated development and management of water resources.

A.3. Project Description:

**Component 1: Irrigation Modernization (US$153.7 million):** The component will renovate and modernize the infrastructure and management of six of the largest schemes in Vietnam:

<table>
<thead>
<tr>
<th>Subproject</th>
<th>Province</th>
<th>Command Area (ha)</th>
<th>Reservoir Storage (MCM)</th>
<th>Current IMC Contract Area (ha)</th>
<th>Cost US$ Millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dau Tieng</td>
<td>Tay Ninh</td>
<td>54,500</td>
<td>1,580</td>
<td>11,000</td>
<td>63.5</td>
</tr>
<tr>
<td>Cau Son-Cam Son</td>
<td>Bac Giang</td>
<td>22,416</td>
<td>240</td>
<td>9,500</td>
<td>26.4</td>
</tr>
<tr>
<td>Phu Ninh</td>
<td>Quang Nam</td>
<td>18,000</td>
<td>273</td>
<td>7,750</td>
<td>19.0</td>
</tr>
<tr>
<td>Ke Go</td>
<td>Ha Tinh</td>
<td>19,500</td>
<td>320</td>
<td>9,100</td>
<td>18.2</td>
</tr>
<tr>
<td>Yen Lap</td>
<td>Quang Ninh</td>
<td>8,350</td>
<td>127</td>
<td>4,400</td>
<td>14.0</td>
</tr>
<tr>
<td>Da Ban</td>
<td>Khanh Hoa</td>
<td>8,200</td>
<td>75</td>
<td>6,000</td>
<td>12.0</td>
</tr>
</tbody>
</table>

130,966 2,623 47,750 153.7

`Excludes Chu Chi in HCMC (11,000 ha), includes Tan Hung (10,701 ha); excludes future expansions`

The hydraulic infrastructure will be upgraded to make water delivery more reliable, flexible, efficient, and equitable. This will be achieved by renovating degraded canals, installing new types of water control and flow measurement structures, and developing lower level canal systems. The safety of dams supplying water for the schemes will be improved through remedial works, such as emergency spillways, slope reinforcement, motorizing spillway gates, and repairing outlet works. Modernizing the infrastructure will enable the schemes to supply more water to a wider variety of agricultural, municipal, and industrial users, and enhance overall water resource management capacity. The project also aims to improve the management of the schemes so new infrastructure can be effectively utilized. Implementation of the subprojects will proceed in phases. The first phase consists of dam safety works, main canals, and approximately 20% of the distribution area for each subproject. The remaining 80% of the command area would be upgraded in subsequent phases.

**Dam Safety (US$10.2 million):** US$7.0 million will be reserved for upgrading additional, to-be-identified, dams during implementation. A MARD national dam safety unit will be established under the project to improve the management of all MARD-affiliated dams, with a focus on the six dams in Component 1, including preparing dam safety and emergency management plans, dam safety inspections, and formulating and enforcing laws and regulations. Approximately US$1.0 million will be used for supporting the start-up of the dam safety unit.

The component also finances the improvement of the Hoa Binh dam safety instrumentation system (US$1.2 million). The reservoir is owned and operated by the Electricity Authority of Vietnam (EVN), but is under the control of the Central Committee for Flood Protection during the wet season.
Component 3: Thu Bon Basin Development (US$3.9 million): The component will fund the high priority Quang Hue River Flow Stabilization ($2.9) works, which controls the flow of water to the cities of Danang and Hoi An. Approximately US$1.0 million will be reserved for planning and pre-investment studies for priority projects identified in the Thu Bon River Basin Master Plan, which could be considered for follow up financing by the World Bank.

Component 4: Project Management and Capacity Building (US$8.7 million): Training (US$2.4 million) and technical assistance (US$3.5 million) are essential to implementing the project and will be funded this component. The project will also help cover incremental operating costs for the various project management units ($2.8 million).

A.4. Project Location and Salient Physical Characteristics:

Component 1: Of the six irrigation subprojects, four (Yen Lap, Ke Go, Phu Ninh, and Da Ban) are located along the central coast, one subproject (Cam Son-Cau Son) is located in the north near Hanoi, and one subproject (Dau Tieng) is located in the south near Ho Chi Minh City. These subprojects lie in the tropical monsoon climate with two distinct seasons (rainy and dry), but the duration varies with specific locations of the subprojects. There are a number of national forest reserves located in the reservoir catchment areas of the subprojects, but not in the command areas. A number of cultural heritage sites also exist near the command areas. Most of the forest areas are covered with secondary or regeneration forest and limited natural cover in the hill areas. Most of the land use in the command areas is for agriculture (rice, bean, vegetable), however, there are also industries, communities, and aquaculture development.

The six subprojects have a command area of 133,000 ha, with approximately 125,000 farmer household beneficiaries (approximately 600,000 people). Since the reservoir/irrigation schemes serve multiple uses such as flood control, municipal and industrial water supply, etc. the estimated number of beneficiaries is 3.6 million. Approximately 98-99% of the residents in the irrigation command area are Kinh people, but there are significant populations of ethnic minorities living in the higher areas surrounding the irrigation schemes.

Water quality in most reservoirs generally good, however there is tendency towards eutrophication. Phu Ninh subproject has a serious problem with aquatic weeds both in the reservoir and irrigation canals. Water quality in most command areas is generally acceptable. In the area with high residential population (Cam Son Cau Son and Ke Go), the irrigation canals also receive untreated wastewater and other wastes from industry and communities. For Yen Lap and Dau Tieng, industries discharge large amount of wastewater either into the command areas or downstream of the command areas.

- Many of these industries are old with no capacity for wastewater treatment. Pesticide levels in surface waters of the command areas are unknown. Groundwater quantity, particularly the shallow aquifers, has improved after the operation of the scheme. There are salinity intrusion problems at a lower end of the schemes which are located near or in the coastal areas. Some specific details of the subprojects are briefly described below.

Cam Son - Cau Son scheme is situated at the edge of the Red River Delta in Bac Giang Province about 50 kms from Hanoi. The Cam Son Reservoir receives water from a catchment area of about 378 km2; the 37 meter high dam is in generally good condition but needs minor renovations. The beneficiary population is estimated to be 650,000, with around 100,000 people farmer-households in the command area. A number of industries are located near Bac Giang town, including fertilizer
plant, breweries, etc. Due to limited availability of water available for irrigation in the lower end of the scheme, about 42% of untreated wastewater from the fertilizer plan (about 27.3 million m³/yr) is presently used for irrigation; with improved water management under the project this will be replaced by clean water. Cam Son Weir was constructed in the early 1900s and has been assigned as an Historical and Cultural Site.

Yen Lap scheme is situated in Quang Ninh Province in the northeast coast about 170 km north-east of Hanoi. The scheme is part of the coastal fringe of the Red River Delta, which is a strong tidal influenced delta environment. The Yen Lap reservoir receives water from a catchment area of about 183 km². The 37 meter high dam needs substantial renovation. The project will supply bulk water supply to Cat Hai Island, which is approximately 500 meter off the mainland. Historically, the coastal wetland was more than 35,000 ha. At present, however, there is only 10,000 ha left in the Yen Hung District. The losses are due to conversion to aquaculture, fire wood exploitation, agriculture, alteration of tidal regime caused by dike construction. Data indicate that regional biodiversity value is significant. A number of protected areas are located in the catchment and downstream of the subproject (Bai Chai Cultural and Historic Site, Ky Thuong Nature Reserve, Cat Bai National Park, Halong Bay, Yen Lap Protection Areas).

Ke Go is located in Ha Tinh Province in north central Viet Nam about 300 km south of Hanoi. The Ke Go Reservoir (20 yr, 320 million m³, 37m) is located about 20 km south of Ha Tinh Town, and needs substantial renovation. There are approximately 300,000 project beneficiaries and about 20,000 farmer-households (100,000 people) in the command area. The 223 km catchment area contains the Ke Go Nature Reservoir. Ha Tinh province is rather isolated and has low levels of economic and agricultural development.

Phu Ninh scheme is located in Quang Nam Province, approximately 50 kms south of Da Nang. The catchment area of the reservoir is 235 km and the dam (40 m high) is in generally good condition. There are approximately 18,000 farmer-households (90,000 people) in the command area and 411,000 project beneficiaries. The province has an ambitious industrial and aquatic development program, although the economic viability of these plans are uncertain.

Da Ban scheme is located in Khanh Hoa Province, on the south central coast of Vietnam (about 500 km north of Ho Chi Minh City). This is a water scare area and very little development was present before the operation of the scheme. There are approximately 250,000 beneficiaries and 8,000 farmer-households in the command area. The Da Ban Reservoir is located about 35 km north of Nha Trang, the provincial capital. The catchment area of the reservoir is 126 km², located in the Vong Phu Mountain Range. Physical condition of the dam (42 m high) is very poor (crack/seepage), the spillway is under-designed, and the dam needs immediate remedial works. The area around Nha Trang is a major tourist destination; the province also has a large and fastest growing aquaculture industry but provincial authorities are committed to making Khanh Hoa a model for good aquaculture development in Hanoi.

- **Dau Tieng** is the largest irrigation scheme in the country, and covers Tay Ninh province and Ho Chi Minh City Municipality. The Reservoir, with a main dam 28 m high, 1.1 km long and an embankment dam 10 m high and 26 km long, is sited on the Sai Gon River, 20 km kilometers east of Tay Ninh town and 120 km north of Ho Chi Minh City. The dam structure is stable after some emergency works in 2000, but needs substantial renovation to achieve acceptable levels of safety.

- The Dau Tieng scheme was financed by the IDA in the early 1980s. There are
approximately 1.6 million project beneficiaries, and about 50,000 farmer-households (250,000 people) in the command area. The area is situated in the moist forest ecological region and relative rich in biological value. Lo Go-Sa Mat National Park is located in the upper catchment while Duong Minh Chau Cultural and Historic Site; Nui Ba Den Cultural and Historic Site; Boi Loi Cultural and Historic Site; and Can Gio Biosphere Reserve are located nearby the subproject. The greater Ho Chi Minh City is growing rapidly and the scheme currently provides significant amounts of municipal and industrial water to Tay Ninh and the Chu Chi District in HCMC. There are plans to make inter-basin transfers of water into Dau Tieng reservoir to expand the irrigated area and supply more municipal and industrial water to HCMC.

Component 2: Under the MARD Dam Safety Component, approximately 3-5 high priority dams, in addition to the six dams under Component 1, will be identified for remedial safety works financed by the project. The location of the dams at this time, therefore, can not be ascertained. The nature of the remedial works is expected to be similar to the dams under Component 1.

Under the EVN Dam Safety Component, Hoa Binh is the largest dam, reservoir, and electric power plant in Vietnam. The earth and rock fill dam is 123 meters high and 743 meters long, with a reservoir capacity of 10 billion cubic meters and 1920 MW of installed capacity. In addition to its national economic value, the scheme is located approximately 75 kms upstream of Hanoi, making safety of the dam and flood management operations of paramount concern for the entire Red River delta. Hoa Binh was commissioned in the early 1990s and was constructed with the assistance of the former Soviet Union. The Da total catchment is about 51,700 km2 of which about 48% of the upper watershed is located in China. Approximately 60,000 people were dislocated by the project, most of them Tai ethnic minority, and with minimal resettlement support. The Government of Vietnam has taken steps to address the resettlement problems in recent years, but there are still lingering legacy issues.

Component 3: The Quang Hue River subproject is located on the central west coast of Vietnam at the connection between the Quang Hue River and Vu Gia River. The Quang Hue-Vu Gia River Basins cover practically all the area of Quang Nam Province. A total drainage area is 11,510 km2 of which nearly half drain from the Vu Gia River. The area is highly complex and subject to major storms. High floods recently formed a natural "short-cut channel" between the two rivers, and severely reduced the dry season flow of the Vu Gia River which is an important water source for irrigation downstream and Danang City. Low water flow has also increased the sedimentation in the river and increased salinity intrusion. The subproject will restore the water flow in Vu Gia river by constructing river training works.

B. Check Environmental Category

A [X], B [], C [], F I []

Comments: The EIA studies were carried out for the six subprojects under Component 1 and the Quang Hue-Vu Gai subproject under Component 3. The studies commented that according to the nature of the activities, mostly rehabilitation and upgrading of existing schemes, the negative impacts would be similar to those of the category "B" type and no adverse impacts that are irreversible are anticipated. Most of the impacts can be mitigated through effective implementation of the environmental management plans. The following activities, however, have not been fully formulated during project preparation, and thus were not subject to full environmental assessment: i) subsequent phases of irrigation upgrading under Component 1; ii) remedial safety works for dams to be identified in the MARD Dam Safety Program; and iii) construction of very small hydro-met stations in the Da catchments in phase 2 of the EVN Hoa Binh activity. The impacts of the unidentified investments are expected to be relatively small and similar in nature to those identified in the EIA.
order to address this issue, it was proposed that an Environment and Social Safeguard Framework (ESSF) will be prepared and applied to all the new investments to be identified during the follow-on phases. A number of other related reports i.e. Consultation Report, Social Assessment Reports, Resettlement Action Plan, Resettlement Policy Framework, Ethnic Minority Development Plan were also prepared and submitted to the Bank. Assignment for “A” is appropriate.

C. Safeguard Policies Triggered

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<td>Involuntary Resettlement (OP/BP 4.12)</td>
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<td>Projects on International Waterways (OP/BP/GP 7.50)</td>
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Section II - Key Safeguard Issues and Their Management

D. Summary of Safeguard Issues

- **OP4.01** - EAs/SAs. While the project is classified as category A, result of the EIA suggested that the scale and magnitude of the potential impacts are more like category B. Most of the impacts are site-specific, none are irreversible. Direct impacts on environmental sensitive areas such as wetlands, forests, or other natural habitat is very limited, and will be compensated as much as possible. The EMP for the project include the actions to mitigate the impacts during pre-construction and construction stages as well as those to reduce the incremental impacts from irrigation and other non-irrigation uses. The investment activities to be identified and carried out during the follow-on phases of the project will be subject to Environmental and Social Safeguards Framework (ESSF), Resettlement Policy Framework (RPF), and Ethnic Minority Development Plan (EMDP) as needed.

- **OP 4.04** - Natural Habitat. There will be loss of natural habitats in the Yen Lap Watershed Protection Forest from the construction of the emergency spillway, which will be compensated for by reforestation in the Yen Lap Watershed Protection Forest. For other subprojects there may be a loss of natural habitat due to to extraction of construction materials and excavation of soil for earth-fill. Enforceable contract provisions governing the transport, as well as the sources of construction materials, are specified in the EIA. Bid documents and construction contracts will require the acquisition of construction material (sand, gravel and other materials) to meet stipulated environmental management standards, and only existing authorized borrow pits and licensed quarries are to be used. Measures for timely site stabilization and erosion control, rehabilitation and restoration to original are included in the EMP.

- **OP 4.09** - Pesticide management. The project will not finance procurement of pesticides, but modernization of irrigation schemes would increase crop diversification and cropping intensity.
which could lead to increased pesticide use. Under current cultivation practices, pesticides are used extensively, and it is estimated approximately two-thirds of farmers in the project area have not received training in integrated pest management (IPM). The Ministry of Agriculture and Rural Development (MARD) will expand and intensify its national IPM program in the subproject provinces, and the project will monitor, and support if necessary, these activities.

- **OP4.36 --Forestry.** Not triggered, but approximately 10 ha of degraded watershed protection forest will be lost due to the new construction of emergency spillway at Yen Lap which will be compensated for by reforestation of an equal or larger amount of land in the vicinity. Loss of forest cover in any subproject, although unlikely, will also be compensated by reforestation.

- **OPN 11.03 --Cultural property.** Impacts are assessed as Unknown because, while the exact location of each cultural and historic sites in the project is known, the specific locations of activities for the follow-on phases is not yet known in detail. Safeguard screening will be made during the implementation to ensure that this policy will not be triggered. Terms and conditions be included in construction contracts to ensure integrity of these resources.

- **OP4.12 --Involuntary Resettlement.** Land acquisition will be required for all subprojects. About 324 ha of land will be affected in Phase 1 (94 ha of permanent land loss and 230 ha of temporary loss), affecting 53,600 people in 12,319 households. The majority of them will only lose a marginal amount of agricultural land on a temporary basis. Seven RAPs have been prepared for Phase I investment. For Phase II activities to be identified and designed, a Resettlement Policy Framework (RPF) to guide planning of the follow-on investments has been formulated.

- **OP 4.37 --Safety of Dams.** Applied for all subprojects, except for Quang Hue river works. The dam safety aspects have been integrated in the Project and dam safety activities will be implemented in the project. An Independent Dam Safety Review panel will be established under the project.

- **OP 4.20 Indigenous Peoples.** Social assessment exercises have been carried out in the project areas to identify and assess project impacts on them. There are ethnic minority groups in the project areas and they are expected to benefit from the project. There are ethnic minority groups in Phase I areas for the Cam Son subproject, and an ethnic minority development plan has been prepared. A policy framework for ethnic minority people’s development has been prepared to guide planning of investment activities in Phase II.

- **OP7.60 Projects in Disputed Areas.** Not triggered since none of the activities would involve disputed areas.

- **OP 7.50 International Waterways.** Not triggered. Although nearly 50% of the Da watershed (Hoa Binh dam safety/flood forecasting) is located in China, the project activities will not (a) change the quality or quantity of water flows to the other riparians; and (b) affect other riparians possible water use. During Phase II of the EVN Hoa Binh component, there may be discussions with China on cooperation related to flood forecasting.

**D.2. Describe any potential cumulative impacts due to application of more than one safeguard policy or due to multiple project component.**

Cumulative impacts would be associated with the operational phase. Although the project develops no new sources of water, modernization of the irrigation schemes would improve reliability and efficiency.
of overall water use. This would contribute to increased water use by municipalities and industries, and in the absence of effective wastewater management, contribute to water pollution. Likewise, more reliable water supply would be a contributing factor to aquaculture development, potentially resulting in coastal/wetland degradation. Pesticide use could also increase due to cropping intensification. For the Cam Son subproject, more wastewater from Bac Giang Fertilizer Plant will be discharged into the Bac Giang river since the wastewater will not be longer used for irrigation.

To address these indirect impacts, the Environmental Management Plan will review and support as necessary the following activities for each subproject: i) pesticide management; ii) water quality monitoring; iii) aquaculture; and iv) monitoring and enforcing compliance of wastewater discharges.

**D.3. In light of 1, describe the proposed treatment of alternatives (if relevant):**

- Given project activities will be limited to rehabilitation and upgrading of the existing irrigation areas, site selection alternatives are limited. Significant consideration, however, has been given to construction and planning (i.e. using canal lining material, concentrate construction activities during off-farm or rainy season when water user having alternative water source, etc) to minimize the need for land acquisition and/or reduce the impacts due to disruption of water supply during the construction.

**D.4. Describe measures taken by the borrower to address safeguard issues. Provide an assessment of borrower capacity to plan and implement the measures described.**

To ensure effective implementation of the EMPs, during appraisal, the following actions will be discussed and confirmed with MARD and its Project Management Office (PMO):

**Environment**

- During appraisal, the PMO will prepare draft TORs for the Safeguard Consultants, finalize the specific environmental requirements to be included in the bidding document, and initiate a plan to build MARD capacity to implement the EMP and address the safeguard issues.

- Within three months of effectiveness, PMO will mobilize the Safeguard Consultant to be attached to PMO and the bidding document for the first investment package will include the environmental requirements.

- Before construction, the MARD PMO, MARD Sub-Implementation Offices (SIOs), and provincial project management units (PMUs) will complete resettlement and land acquisition, prepare construction plan in consultation with local authority and water users groups. Close consultation with the local authority and communities will be maintained throughout the project.

- During construction stage, PMUs and SIOs will ensure that the contractors are aware of their environmental obligations and ready to comply before signing the contracts. Field engineer will monitor the environmental performance of the contractors on a daily basis. Records must be kept in the monitoring file. The Safeguard Consultants will review the monitoring records and monitor the environmental condition, including the borrowing pits, and submit the monitoring reports. The monitoring plan will be prepared in line with the construction plan. For Yen Lap, 10 ha of forest land are expected to be cut, PMO/PMU will ensure that at least 20 ha of forest area will be replanted to compensate for the forest loss.
To reduce the impacts due to the increased use of pesticides and fertilizers during operations, PMO will prepare a plan for IPM activities in the subproject provinces and submit a report to the Bank describing the extent of the problem, training program, and recommendations for improvements, including justification for financial support from VWRAP, a limited allocation of fund can be provided to the provinces;

To reduce other indirect impacts during operations, the Safeguard Consultants will assist PMO in the preparation of a "Strategic Environmental Assessment and Action Plan" that analyzes the following issues in so far as they relate to irrigation scheme operation:
(a) Design of Water Quality Monitoring Program;
(b) Aquaculture;
(c) Municipal and Industrial Pollution Control;
(d) Reservoir Watershed Management; and
(e) Other issues.

The Action Plan should identify immediate actions necessary to address identified problems, and also prepare funding request for VWRAP support.

PMO will monitor the implementation progress of the EMP every six months and submit an annual EMP monitoring report to IDA not later than 2 months after the end of the fiscal year. The lesson learned and experience from the community participation process during the first phase implementation should be taken into account.

During follow-on phases, PMO assisted by the Safeguard Consultant will undertake screening process and the EMP as described in the ESSF. If the impacts are significant, consultation with IDA will be necessary and assistance from international consultants may be required. Monitoring of the agreed mitigation plans will be carried out throughout the project.

PMO will establish a safeguard unit to be responsible for planning, supervision, and monitoring of the EMP and other safeguard activities. All the key staff from PMO and PMUs/SIOs will be trained on the EIA, ESSF, and other aspects of the safeguard and the training results should be included in the annual EMP monitoring report. Training of other MARD staff both at the central and provincial levels on safeguards, including dam safety, will be desirable.

Resettlement:

- **Information Dissemination Prior to Detailed Design.** Prior to the commencement of detailed design, MARD will provide information about the Project throughout the project area. Information meetings will be held in all potentially affected commune to inform the communities about (i) the project scope, (ii) impacts, (iii) entitlements for all categories of loss, (iv) schedule of activities beginning with the detailed design survey, (iv) institutional responsibilities, and (v) the grievance mechanism. The PIB will be prepared and distributed to all affected communities during the meetings.

- **Establishment of Resettlement Committees.** All provinces will establish their resettlement committees at provincial and district level as soon as the Project has been approved.
- **Training for Resettlement Staff.** Within 2 months of mobilization of the resettlement consultants for the PMO, all local resettlement staff at PPMU/SIO, PRC, DRC, and commune levels will be trained by the PMO assisted by the consultants. Training subjects will include
  - procedures for preparing the RAPS;
  - consultation and information dissemination methods;
  - principles, policies, and entitlements of the RAPS;
  - implementation steps, procedures, and schedule;
  - grievance redress mechanism; and
  - powers and obligations of individuals/agencies involved in the process of resettlement programs.

- **Updating Compensation Rates.** During the preliminary detailed design process, the PPCs will update unit rates at replacement cost for all categories of loss and adjust allowances to account for inflation. This will be done in consultation with PAP and local government agencies.

- **Detailed Measurement Survey (DMS).** Before each new phases of the VWRAP new DMS will be conducted in each subproject area after completion of the detailed design. These surveys will serve as a basis for compensation and new RAPs. Data will be computerized by PMO.

- **Pricing Application and Compensation to PAP.** Resettlement committees at all levels will be responsible for pricing application and preparing compensation charts for each affected commune/district. These will be subject to verification by PPMU/SIO, PPC’s, and PMO of unit prices, quantity of affected assets, PAP entitlements, etc. before posting them at each commune for the people to review and comment. All compensation forms must be checked and signed by the PAP to indicate their agreement.

- Compensation and Allowances will be handled at commune level under the supervision of representatives of DRCs and PPMU/SIO. Guidance will be given by PPMU/SIOs to aid local resettlement committees in making payments to PAP.

- **Monitoring and Evaluation.** Internal and external monitoring shall start as soon as the updated RAPs have been approved. Monitoring will continue throughout the construction period. A replacement cost survey should be conducted by the external monitoring organization prior to or during DMS to update and advice PPC on compensation rates. A post-resettlement evaluation will also be undertaken by the external monitoring organization 6 to 12 months after completion of all resettlement activities.

- **Safeguard Consultants** will develop action plans and oversee implementation of (a) integrated pest management training in project areas, (b) water quality monitoring program; and (c) other items indicated in the EMP. An annual management reports should be submitted to IDA not later than 2 months after the end of the fiscal year.

- During follow-on phases, PMO assisted by the Safeguard Consultant will undertake the screen screening process for currently unidentified investments per the ESSF. If the impacts are significant, consultation with IDA will be necessary and assistance from international consultants may be required. Monitoring of the agreed mitigation plans will
Capacity of the provincial (PMUs) and national implementing agency (MARD PMO and SIOs) is limited, but they are committed to carry out the agreed mitigation and management plans. The project will finance training for the implementing agencies, as well as contracts, and provincial staffs. The PMO will contract international and national consultants to assist in the implementation of the EMP.

D.5. Identify the key stakeholders and describe the mechanisms for consultation and disclosure on safeguard policies, with an emphasis on potentially affected people.

Key provincial stakeholders include farmer groups, Irrigation Management Companies (IMCs), project-affected people, provincial governments and their agricultural and rural development departments. At the national level, the various MARD departments and Ministries of Finance, Planning and Investments, and Environment are important stakeholders.

A number of consultations with concerned agencies and affected population were carried out during the preparation of the EIAs/SIAs and RAPs. The first round consultation was made during the initial stage of the EIAs/SIAs/RAPs through questionnaires and selective meetings and discussion with the local authorities, identified project affected people, and relevant stakeholders of the pilot areas. The second consultation was carried out through a workshop with provincial and national officials at Dao Son in Haiphong province in July 2003 when the draft final EIAs/RAPs were available. A consultation report was submitted to the Bank before appraisal. Additional consultation will be made in September 2003 to discuss the EIA findings, and the respective EMPs and RAPs with the local authorities and communities. The results will be used in finalizing the EMPs and RAPs and will be included (as an addendum) to the consultation report. The EMP will be finalized during appraisal after discussion and confirmation with the agencies and completion of the consultation with the stakeholders.

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<th>E. Disclosure Requirements</th>
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<td>Date of “in-country” disclosure</td>
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Section III – Compliance Monitoring Indicators at the Corporate Level

This section should be completed by the safeguard review secretariat

**OP/BP 4.01 - Environment Assessment:**
Does the project require a stand-alone EA (including EMP) report?
If yes, then did the Regional Environment Unit review and approve the EA report?
Are the cost and the accountabilities for the EMP incorporated in the credit/loan?

**OP/BP 4.04 - Natural Habitats:**
Would the project result in any significant conversion or degradation of critical natural habitats?
If the project would result in significant conversion or degradation of other (non-critical) natural habitats, does the project include mitigation measures acceptable to the Bank?

**OP 4.09 - Pest Management:**
Does the EA adequately address the pest management issues?
Is a separate PMP required?
If yes, are PMP requirements included in project design?

**Draft OP 4.11 (OPN 11.03) - Cultural Property:**
Does the EA include adequate measures?
Does the credit/loan incorporate mechanisms to mitigate the potential adverse impacts on physical cultural resources?

**OD 4.20 - Indigenous Peoples:**
Has a separate indigenous people development plan been prepared in consultation with the Indigenous People?
If yes, then did the Regional Social Development Unit review and approve the plan?
If the whole project is designed to benefit IP, has the design been reviewed and approved by the Regional Social Development Unit?

**OP/BP 4.12 - Involuntary Resettlement:**
Has a resettlement action plan, policy framework or policy process been prepared?
If yes, then did the Regional Social Development Unit review and approve the plan / policy framework / policy process?

**OP/BP 4.36 - Forests**
Has the sector-wide analysis of policy and institutional issues and constraints been carried out?
Does the project design include satisfactory measures to overcome these constraints?
Does the project finance commercial harvesting?
If so, does it include provisions for certification system?
**OP/BP 4.37 - Safety of Dams:**
Have dam safety plans been prepared?
Have the TORs as well as composition for the independent Panel of Experts (POE) been reviewed and approved by the Bank?
Has an Emergency Preparedness Plan (EPP) been prepared and arrangements been made for public awareness and training?

**OP 7.50 - Projects on International Waterways:** Not Applicable

Have the other riparians been notified of the project?
If the project falls under one of the exceptions to the notification requirement, then has this been cleared with the Legal Department, and the memo to the RVP prepared and sent?

What are the reasons for the exception? Please explain:

Has the RVP approved such an exception?

**OP 7.60 - Projects in Disputed Areas:** Not Applicable

Has the memo conveying all pertinent information on the international aspects of the project, including the procedures to be followed, and the recommendations for dealing with the issue, been prepared, cleared with the Legal Department and sent to the RVP?
Does the PAD/MOP include the standard disclaimer referred to in the OP?

**BP 17.50 - Public Disclosure:**
Have relevant safeguard policies documents been sent to the World Bank’s Infoshop?

Have relevant documents been disclosed in-country in a public place in a form and language that are understandable and accessible to project-affected groups and local NGOs?

**All Safeguard Policies:**
Have satisfactory calendar, budget and clear institutional responsibilities been prepared for the implementation of the safeguard measures?
Have safeguard measures costs been included in project cost?
Will the safeguard measures costs be funded as part of project implementation?
Does the Monitoring and Evaluation system of the project include the monitoring of safeguard impacts and measures?
Have satisfactory implementation arrangements been agreed with the borrower and the same been adequately reflected in the project legal documents?

Signed and submitted by: [Signature]
Task Team Leader: [Signature]  Date 11/14/03

Approved by:
Regional Safeguards Coordinator: [Signature]  Date 11/14/03
Safeguards Specialist: [Signature]  Date 11/14/03
Safeguards Specialist: [Signature]  Date 11/14/03
Sector Manager: [Signature]  Date 11/14/03
Safeguards Sector Unit Director: [Signature]  Date 11/14/03