

**REPORT AND RECOMMENDATION
OF THE
PRESIDENT
TO THE
BOARD OF DIRECTORS
ON A
PROPOSED LOAN
TO THE
SOCIALIST REPUBLIC OF VIET NAM
FOR THE
PHUOC HOA WATER RESOURCES PROJECT**

October 2003

CURRENCY EQUIVALENTS

(as of 15 October 2003)

Currency Unit	–	dong (D)
D1.00	=	\$0.00006425
\$1.00	=	D15,564

For the purpose of calculations in this report, the rate of \$1.00 = D15,200 was used, the rate generally prevailing at the time of loan appraisal.

ABBREVIATIONS

ADB	–	Asian Development Bank
AFD	–	Agence Française de Développement
BLIS	–	Binh Long irrigation system
CPO	–	Central Project Office
DARD	–	department of agriculture and rural development (provincial level)
DHIS	–	Duc Hoa irrigation system
DMI	–	domestic, municipal, and industrial
DOSTE	–	department of science, technology, and environment (provincial level)
DTIS	–	Dau Tieng irrigation system
EIA	–	environmental impact assessment
EIRR	–	economic internal rate of return
EMP	–	environmental management plan
HCMC	–	Ho Chi Minh City
IA	–	implementing agency
ICB	–	international competitive bidding
IMC	–	irrigation management company
LCB	–	local competitive bidding
MARD	–	Ministry of Agriculture and Rural Development
MONRE	–	Ministry of Natural Resources and Environment
O&M	–	operation and maintenance
OSDP	–	onfarm and social development program
PMB416	–	Project Management Board 416
PMU	–	project management unit
PPMB	–	provincial project management board
RP	–	resettlement plan
SEIA	–	summary environmental impact assessment
TBIS	–	Tan Bien irrigation system
VCD	–	Vam Co Dong (river)
VWRAP	–	Viet Nam Water Resources Assistance Project
WRL	–	Water Resource Law
WUG	–	water users group

NOTES

- (i) The fiscal year (FY) of the Government ends on 31 December.
- (ii) In this report, "\$" refers to US dollars.

This report was prepared by a team consisting of P. Logan (team leader up to 4 February 2003), P. Smidt (team leader after 4 February 2003), M. Huddleston, R. O'Sullivan and D. Tang.

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LOAN AND PROJECT SUMMARY

Borrower	Socialist Republic of Viet Nam
Classification	Poverty Classification: Poverty intervention Thematic: Economic growth
Environment Assessment	Category A An environmental impact assessment was undertaken (the summary environmental impact assessment was submitted to the Board on 8 May 2003).
Project Description	The Project will develop water resources infrastructure, comprising the Phuoc Hoa barrage and transfer canal to divert and convey water from the Be river to the existing Dau Tieng reservoir on the Saigon river in the neighboring basin. From there it will be diverted through the existing Dau Tieng irrigation system for multiple uses: irrigated agriculture, supplementary water for urban and industrial use, and salinity control in the Saigon and Vam Co Dong river basins. Three new irrigation areas will be developed with a total net area of 48,130 hectares: Binh Long irrigation system in the provinces of Binh Phuoc and Binh Duong, Tan Bien irrigation system in Tay Ninh province, and Duc Hoa irrigation system in Long An province.
Rationale	<p>The Dong Nai river basin consists of four major subbasins: the Dong Nai, Be, Saigon, and Vam Co Dong rivers covering 10 provinces including Ho Chi Minh City (HCMC). It contains the country's largest urban and industrial development areas that are expanding, and water demands have increased and will continue to increase. While there has been recent development of the water resources in the Dong Nai and Be river basins through construction of reservoirs, shortages in the Saigon and Vam Co Dong river basins have become more critical over recent years. This is constraining existing and future development in HCMC and its surrounding provinces.</p> <p>Water shortages in the Saigon and Vam Co Dong river basins are causing saline advance during the dry season and users in the lower reaches frequently suffer from deteriorating water quality. It has already reached a stage where the municipal water supply authorities of HCMC are experiencing unacceptable salinity levels at the proposed intakes for new urban water supplies that are urgently needed to provide for the increasing demands. With higher priority given to supplying water for urban and industrial uses, the current situation rules out the potential for further agricultural development in rural provinces surrounding HCMC. Potential irrigation development cannot proceed due to lack of fresh water, even though rural development is seen as an essential balance to the concentration of urban growth in HCMC.</p> <p>A number of studies have been undertaken to consider options for development within the Dong Nai basin. The Dong Nai Water Resources</p>

Master Plan concluded that development objectives within the basin will require further regulation of the Be river and transfer of water to the Saigon river to control salinity intrusion and provide water for urban, industrial, and agricultural uses. This was further supported by recent water balance studies covering the Be, Saigon, and Vam Con Dong river systems, which show that without the basin transfers, shortages of fresh water will increase significantly within the next 4–5 years in the face of rapidly increasing demands. These shortages will not only constrain new development, but also impinge on existing development. It will become increasingly necessary to substantially reduce cropping areas in existing irrigation areas, particularly the Dau Tieng irrigation system, in favor of urban users competing for the limited water resources, thus imposing hardship on the rural community.

Objective	The objective of the Project is to provide additional water in the Saigon and Vam Co Dong river basins for development of irrigated agriculture and to supplement existing supplies for salinity control and domestic, municipal, and industrial use in HCMC and the surrounding provinces.
Cost Estimates	The Project is estimated to cost \$164.6 million equivalent, of which \$60.0 million is the foreign exchange cost and \$104.6 million equivalent is the local currency cost.
Financing Plan	The Asian Development Bank (ADB) will provide a loan of \$90.0 million equivalent from its Special Funds resources to finance about 54.7% of the project cost and Agence Française de Développement will cofinance about \$34.0 million (20.7%) through two other loans. The Government will finance about \$35.6 million equivalent in local currency (21.6%), and the beneficiaries will contribute a further \$5.0 million (3.0%).
Loan Amount and Terms	It is proposed that ADB provide a loan of various currencies equivalent to \$90.0 million from its Special Funds resources. The loan will have a term of 32 years, including a grace period of 8 years, with an interest charge of 1.0% per annum during the grace period and 1.5% per annum thereafter.
Period of Utilization	Until 31 March 2011
Estimated Project Completion Date	30 September 2010
Executing Agency	The Ministry of Agriculture and Rural Development (MARD). The concerned provincial governments will assist as implementing agencies (IAs).
Implementation Arrangements	The Central Project Office (CPO) of MARD (based in Hanoi) will oversee project implementation and will be responsible for overall management and administration. It will arrange procurement of consulting services, and contracts for civil works and equipment under international competitive bidding (ICB) and international shopping. The CPO will establish a multidisciplinary subunit for day-to-day supervision (based in HCMC).

along with the project consultants) to be known as the project management unit (PMU). The PMU will be headed by a full-time manager supported by about five full-time technical and administrative staff. The PMU will subcontract implementation of the environmental management plan to an appropriate local institute as agreed by ADB. The CPO/PMU will guide and support five IAs including the existing Project Management Board 416 and existing provincial project management boards in each of the four participating provinces of Binh Phuoc, Binh Duong, Tay Ninh, and Long An.

Procurement

Goods and services financed by ADB will be procured in accordance with ADB's *Guidelines for Procurement*. Civil works contracts for major works estimated to cost more than \$2 million equivalent will be procured through ICB among prequalified firms. Civil works contracts estimated to cost \$2 million or less will be procured through local competitive bidding (LCB) procedures. Equipment packages over \$500,000 will be procured through ICB while smaller packages will be financed through international shopping or direct purchase.

Consulting Services

The Project will require approximately 961 person-months of consulting services: 214 international and 747 domestic. Expertise will be required in the fields of integrated management, institutional development, participatory irrigation, resettlement, irrigation, social support (including gender), finance, environmental management, agriculture, monitoring and evaluation, water systems management, hydraulic structures design, irrigation and drainage system design, geotechnical and mechanical engineering, construction supervision, and contract management. Consultants financed under the loan will be engaged in accordance with ADB's *Guidelines on the Use of Consultants* and other arrangements satisfactory to ADB for engaging domestic consultants. Consultants will be recruited using ADB's quality and cost-based selection method.

Project Benefits and Beneficiaries

The main quantified benefits of the Project are incremental outputs of agricultural products from 48,130 hectares in the three irrigation subproject areas, and increased production of fish from paddy fields and ponds. Significant benefits will also come from supply of raw water to HCMC for urban and industrial use. The Project is economically viable with an economic internal rate of return of 14.2% for the base case.

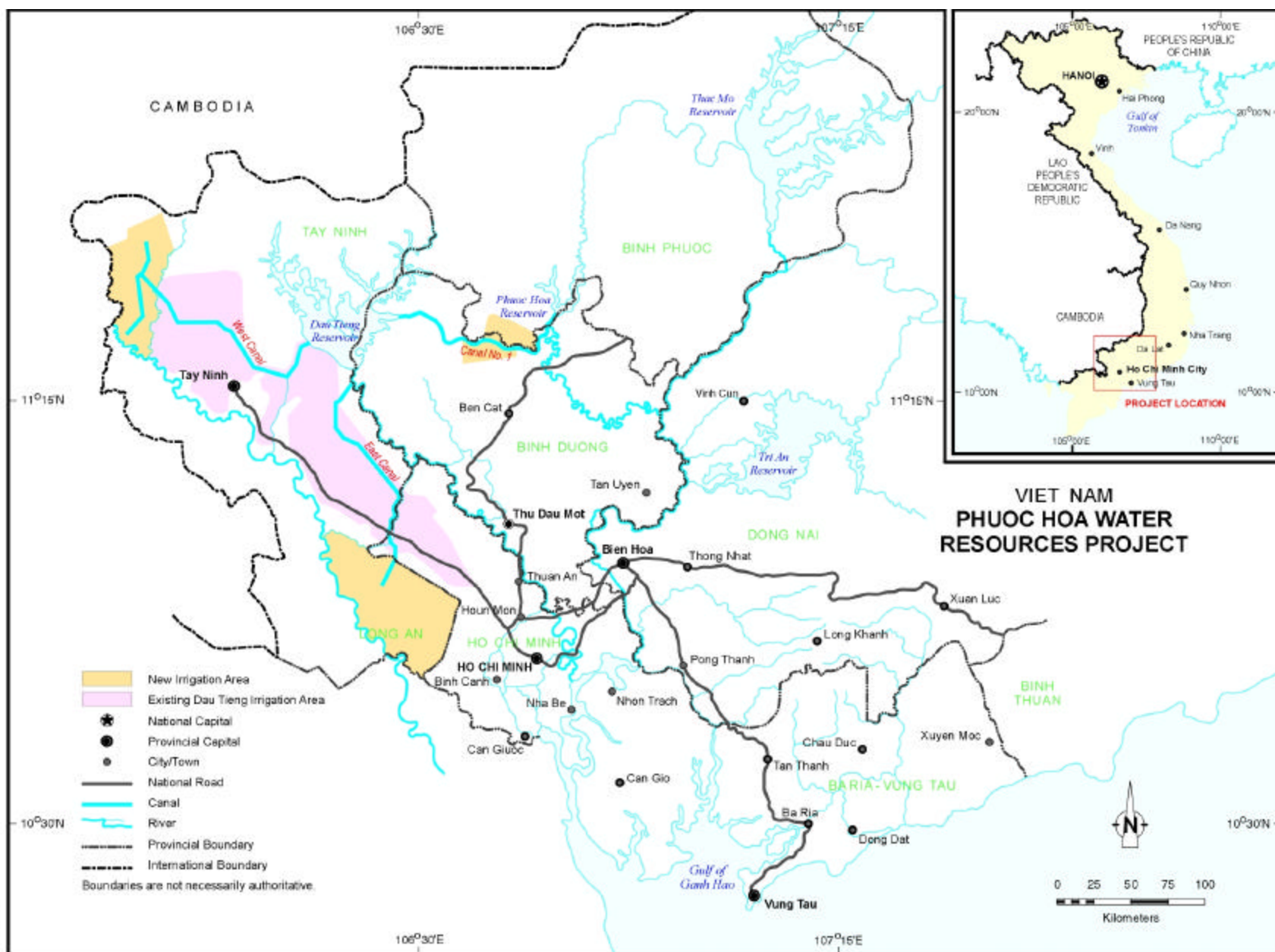
About 30,200 households (about 169,100 persons) in the three irrigation subproject areas will benefit directly from the Project. About 39% of these households live below Viet Nam's national poverty line. It is estimated that improved agricultural production will increase average incomes of beneficiaries by about 40%, and that this will at least halve the number of households that live below the poverty line. In addition, a large number of households will benefit from improved supplies of water for domestic and industrial use and from improved salinity control in downstream reaches of rivers.

The social analysis also confirmed that the burden of poverty in the project area is disproportionately borne by women and other vulnerable

and disadvantaged groups (poor, landless, elderly, and illiterate). A social support program will be implemented to assist these people to benefit either directly or indirectly from the Project. They will be assisted to improve income-earning opportunities, access credit, and develop new livelihood skills. The same program will aim to improve the health and education of these groups through the provision of reliable domestic water supplies and literacy training.

Risks and Assumptions

The main risk for the Project is delay in realizing the expected benefit stream, since the economic viability is sensitive to this. This could occur if (i) project implementation is delayed, especially as a result of difficulties in finalizing resettlement, since award of civil works contracts is conditional upon this being achieved; (ii) farmers are slow to adopt the new irrigated agricultural production systems; and (iii) irrigation management companies (IMCs) are unable to deliver the required quality of irrigation services. These risks will be minimized by provision of resources to assist with implementation of the resettlement plan, and a community support program with emphasis on institutional development of water user groups, ensuring that they participate in decision making at an early stage of project preparation and implementation. The capacity of the IMCs will be developed to undertake their responsibilities for future system management and operation.



I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to the Socialist Republic of Viet Nam for the Phuoc Hoa Water Resources Project.¹ The project framework is given in Appendix 1.

II. RATIONALE: SECTOR PERFORMANCE, PROBLEMS, AND OPPORTUNITIES

A. Sector Performance Indicators and Analysis

2. Viet Nam ranks among the poorest countries in the region. Sustained economic growth and poverty reduction depend on improved access to and management of the country's water resources. This is required to ensure efficient use and availability of water supplies for agricultural and industrial development, for increased municipal and domestic water demands, and for flood control. The government investment strategy in the water resource sector has traditionally focused on subsector interventions for irrigation, hydropower, water supply, and flood control, rather than focusing on an integrated approach for utilizing water resources. This, combined with the large number of subsector-based agencies involved in management and use of water resources, has resulted in a lower priority being given to the establishment of integrated water resource planning and regulatory systems, and to efficient water resource use.

3. To address these constraints, the Government has introduced reforms and is developing new policies to improve the efficiency of management and use of water.² The reforms have been initiated through the Water Resource Law (WRL), which became effective in 1999. It defines the role of the National Water Resource Council, which was subsequently established in 2000, to advise the Government on water resource management, related national strategies, and action plans. It also provides for the establishment of river basin organizations as the institutions responsible for river basin management. In November 2002, the Government transferred the responsibility for water resource management from the Ministry of Agriculture and Rural Development (MARD) to the newly established Ministry of Natural Resources and Environment (MONRE) thereby separating the functions of water resource management from water service delivery, an important step in the process of implementing the WRL.

4. Achievement of the objectives outlined in the WRL requires extensive capacity building of both MARD and MONRE, including the provincial counterpart departments, river basin organizations, irrigation management companies (IMCs), and local district and commune irrigation enterprises. With support of its development partners, MARD has started to implement a comprehensive strategy for capacity building in water resource management. However, with the recent establishment of MONRE, responsibilities for implementing the strategy will be shared by both MONRE and MARD. Further analysis of the water sector is presented in Appendix 2.

5. The Asian Development Bank (ADB) has provided substantial assistance to the water sector in Viet Nam and plans to continue this support as reflected in the Country Strategy and Program (2002–2004) and the subsequent updates. The sector is also supported by several other external funding agencies; the major participants are Australia, Denmark, France, Japan,

¹ The Project is included in the Country Strategy and Program, 2002–2004, of the Asian Development Bank (ADB). It was prepared under TA 2575-VIE: *Phuoc Hoa Multipurpose Water Resources*, for \$600,000 approved on 31 May 1996. This resulted in Loan 1598–VIE: *Phuoc Hoa Multipurpose Water Resources Engineering Project*, approved on 18 December 1997 for \$2.6 million.

² Assistance for policy work is being provided by ADB under TA 3528-VIE: *Capacity Building in Water Resources Management*, for \$3.8 million, approved in October 2000.

Kuwait, Netherlands, and the World Bank. A summary of assistance in the water resources sector is presented in Appendix 3.

B. Analysis of Key Problems and Opportunities

6. The Dong Nai river basin has a catchment area of 47,300 square kilometers (^{km²}), making it the third largest in Viet Nam. It consists of four major subbasins: the Dong Nai, Be, Saigon, and Vam Co Dong rivers covering 10 provinces including Ho Chi Minh City (HCMC). The basin contains the country's largest urban and industrial development areas that are expanding, and water demands have increased and will continue to increase. Shortages of fresh water are being experienced and the existing water resource management practices are unsustainable. While there has been recent development of the water resources in the Dong Nai and Be river basins through construction of reservoirs, shortages in the Saigon and Vam Co Dong river basins have become more critical over recent years. This is constraining existing and future development in HCMC and its surrounding provinces.

7. The impact of water shortages in the Saigon and Vam Co Dong river basins is being felt in a number of ways. Flows in both of these rivers are under threat from saline advance during the dry season to the extent that users in the lower reaches frequently suffer from deteriorating water quality. It has already reached a stage where municipal water supply authorities of HCMC are experiencing unacceptable salinity levels at proposed intakes for new urban water supplies, which are urgently needed to provide for the increasing demands. With higher priority given to supplying water for urban and industrial uses, the current situation rules out the potential for further agricultural development in rural provinces surrounding HCMC. Potential irrigation development cannot proceed due to lack of fresh water, even though rural development is seen as an essential balance to the concentration of urban growth in HCMC.

8. This rapid growth in demand and increasing pressure on the water resources have been highlighted by a number of water resources planning studies in the Dong Nai river basin over recent years.³ To meet the increasing water demands, the Government has adopted a holistic approach in determining suitable development options. A first key step was the Dong Nai Water Resources Master Plan prepared in 1996. Taking a basin perspective, it identified the key water-related issues constraining development of urban and industrial areas, and considered various options to transfer water from the Be to Saigon basins. The basin approach will be further strengthened through the Dong Nai river basin organization, which will coordinate and improve river basin planning and management. This organization was established in 2001 but is not yet active.⁴ The second important step is the Government's proposal to improve the efficiency of existing water resource systems. As part of this process, the existing Dau Tieng irrigation system (DTIS) will be upgraded and modernized under the Vietnam Water Resources Assistance Project (VWRAP) supported by the World Bank to optimize water use and secure its dam safety (see para. 36).

9. **Lessons Learned.** These are drawn mainly from large-scale irrigation and flood control projects financed by ADB and the World Bank. In general, implementation progress and quality

³ *Dong Nai Water Resources Master Plan*, May 1996, financed by the Japan International Cooperation Agency; *Master Plan for Ho Chi Minh City* for \$600,000, under TA 2000-VIE (ADB. 1993. *HCMC Water Supply Master Plan*. Manila.); and the *Master Plan for Southern Economic Focal Zone*, September 1996, financed by the Australian Agency for International Development.

⁴ Under TA 3528-VIE (ADB. 2000. *Proposed Technical Assistance to the Socialist Republic of Viet Nam for Capacity Building for Water Resources Management Project*. Manila), ADB is assisting the Dong Nai river basin organization to (i) develop its institutional framework; (ii) establish processes for river basin planning and improved water resource management; (iii) undertake hydrological modeling and watershed planning; and (iv) improve water quality.

of completed infrastructure is satisfactory. However, the earlier projects suffered from startup delays because MARD was unfamiliar with ADB's procurement procedures. Experience and capacity has now improved to adequate levels. While monitoring surveys indicate that the target communities do benefit from these projects, the benefits usually fall short of projections because of failure to address both the physical and institutional issues related to onfarm development. Emphasis is placed on construction of the major works components, while the minor works and related institutional issues, although equally important in terms of realizing project benefits, tend to be given insufficient emphasis. As a result, lower-order canals are often left incomplete because the provinces, which are responsible for implementation of this work, usually lack the necessary funding. This problem is highlighted in the project completion report of the Red River Delta Water Resources Sector Project, and also DTIS. Although DTIS was constructed almost 20 years ago, it has only partially accomplished the envisaged benefits because onfarm infrastructure is incomplete over a large proportion of the target command area and thus remains unserved. This has caused low water use efficiencies and constrained agricultural production. This highlights the need to ensure that there is adequate funding to complete the onfarm canal system during project implementation. Other lessons learned highlight the need to involve farmers at an early stage of project planning and design, adopting an integrated and participatory approach to facilitate development of institutional capacity of water user groups (WUGs) to sustainably manage their irrigation system. This should be coupled with provision of agricultural support for farmers to consider realistic options for developing optimum farming systems. The lessons learned so far from the Second Red River Basin Sector Project (approved in November 2001) illustrate the need for implementation requirements and approval procedures to be kept as straightforward as possible to avoid startup delays experienced by that project. The project design has made provisions to address these issues.

10. **Project Rationale.** The Dong Nai Water Resources Master Plan (1996) concluded that the development objectives within the Dong Nai basin cannot be met without further regulating the Be river and transferring water to the Saigon river to control salinity intrusion and provide water for urban, industrial, and agricultural uses. This was further supported by water balance studies undertaken during project preparation (2001). The water balance studies assessed the future situation with and without basin transfers from the Be river to the Saigon and Vam Co Dong rivers. Results further highlighted that without the basin transfer, shortages of fresh water will worsen significantly within the next 4–5 years in the face of rapidly increasing demands. These shortages will not only constrain new development, but also impinge on existing development. It will become increasingly necessary to substantially reduce cropping areas in existing irrigation areas, particularly DTIS, in favor of urban users competing for the limited water resources, thus imposing hardship on the rural community. The proposed Project will remove the above constraints by transferring excess water from the Be river⁵ to the existing Dau Tieng reservoir. It will provide reliable supplies, even in relatively dry years.

III. THE PROPOSED PROJECT

A. Objective

11. The Project is to provide additional water in the Saigon and Vam Co Dong river basins for development of irrigated agriculture and to supplement existing supplies for salinity control and domestic, municipal, and industrial (DMI) use in HCMC and the surrounding provinces. It will adopt an integrated development approach to increasing agricultural production by promoting efficient and sustainable management of the water resources.

⁵ Since commissioning the Thac Mo hydropower reservoir in the upper Be river in 1993, daily releases have considerably increased the minimum dry season flows in the Be river compared with prior natural flows.

B. Components and Outputs

12. The Project will develop water resources infrastructure comprising basin transfer and facilities, and new irrigation areas. Water from the Be river will be conveyed to the Dau Tieng reservoir on the neighboring Saigon river. From there, releases can be controlled to supply water for various purposes. These include (i) releases to the Saigon river for water supply intakes⁶ and salinity control in the lower reaches; (ii) releases to the Vam Co Dong river via the existing DTIS canals and drains for salinity control; and (iii) releases for irrigation in DTIS and the new areas to be developed under the Project. While the infrastructure provides the means for supplying additional water, it is recognized that the most challenging requirement for successful implementation of the Project and realization of the benefits is an integrated approach to develop adequate institutional capacity for sustainable management of the system at all levels. This is needed to improve the operational and financial performance of the local irrigation management institutions. There must also be adequate support for resettlement, social, and environmental issues. The project outputs can therefore be considered in two parts, one to support institutional and integrated development (Part A), and the other for the water resources infrastructure (Part B) as described below.

1. Part A—Support for Institutional and Integrated Development

a. Project and Sustainable System Management—Component A1

13. This component will facilitate overall management and coordination of activities during implementation, and provide support to develop capacity within government institutions, IMCs, and WUGs for sustainable management of the project facilities. Both these objectives will be met by involving the organizations responsible for management of the scheme in the implementation of the Project. The implementation responsibilities will be assigned in accordance with current government regulations. On this basis (i) MARD will be responsible for the Phuoc Hoa barrage, transfer canal, and main canals; (ii) provincial governments will be responsible through their departments of agriculture and rural development (DARDs) and provincial IMCs for primary and secondary canals;⁷ and (iii) for tertiary units, farmers will be responsible with technical support from the DARDs. The component will supplement government resources required for setting up and operating the proposed implementation units. Formation of irrigation WUGs will be a key project support strategy for development and management of tertiary systems and this will be supported under Component A2.

14. For ongoing management of the basin transfer system, the Project will strengthen the Dau Tieng IMC. As staff will require new and more sophisticated technical skills, a training and capacity-building program will be implemented with the assistance of the project consultants. The Project will also prepare and implement programs to develop the capacity of IMCs to undertake the institutional responsibilities they have for future management and operation of all other project facilities. In the irrigation areas, this will involve improvement of IMCs' operational and financial performance, by assisting them to redefine their overall performance objectives, develop service delivery performance indicators and a resource-based management plan, and improve management systems. Models for service delivery contracts between IMCs and between IMCs and WUGs will also be developed. Since the Project entails transfer of water through the existing DTIS to be modernized under VWRAP (para. 36), it is essential that

⁶ Ben Than is the major water supply intake which will supply DMI water for HCMC. It is to be developed in three stages to a maximum capacity of 10.5 m³ per second. Stage 1 is currently under development and expected to be commissioned in 2004. Stages 2 and 3 are expected to follow in about 2006 and 2012, respectively.

⁷ The provincial DARDs will be responsible for implementation, and will then transfer the facilities to the existing provincial IMCs for management and operation. The IMCs are within the institutional framework of the DARDs.

initiatives under this Project be closely coordinated with the approach and models developed and adopted under VWRAP to ensure consistency.

b. Support for Onfarm and Social Development—Component A2

15. Three major concerns will be addressed under this component. The first is the need for timely completion of onfarm development⁸ if the full benefits of the Project are to be realized. The second is the need for a comprehensive network of WUGs to be established from an early stage to enable beneficiaries to participate in the local-level design process and to lay the groundwork for their subsequent management of the facilities to be financed under the Project. Thirdly, there is a need to provide social support for families in the irrigated areas who are unable to benefit directly from the irrigation development or who are adversely affected by construction work.

16. The key to achieving the expected agricultural benefits of the Project is onfarm development. This will involve a substantial effort at the farm level to ensure timely construction of the tertiary units and a sustainable transformation from rain-fed to irrigated agriculture. Farmers, as the key independent decision makers, will ultimately determine project success, so their participation is imperative if the demand for irrigation services and diversified cropping is to reach the levels proposed under the Project.

17. The component will finance a community mobilization program to facilitate a participatory approach to planning, design, and installation of the irrigation systems and aim to address constraints related to onfarm development. An institutional framework for sustainable future management of the tertiary system will be developed at the same time. Qualified organizations such as social science institutes or nongovernment organizations (NGOs) will be contracted to provide the required community mobilization and social intermediation services. They will provide teams of community mobilizers working at field level. An initial pilot program will field test the process and document each phase to support subsequent widespread replication.

18. Participatory design of tertiary units will start with farmer reviews of appropriate cropping patterns, as these determine canal capacities and influence layouts.⁹ This will be followed by farmer review of tertiary unit layouts prepared by engineers to suit the topography. Pilot experience will be used to develop appropriate guidelines and criteria to ensure gravity command of tertiary units. It is envisaged that farmers will be mobilized to contribute to the construction of the tertiary units, mainly through labor for earthworks. This would represent about 70% of the cost of the tertiary unit development.¹⁰ The remaining 30% would be financed through funding to be provided through the provinces.

19. The community mobilizers will provide a key link between government agencies and the community, and therefore, for logistical efficiency, will also conduct other functions requiring community mobilization and participation. First, they will assist with detailed design of the larger canals by facilitating a participatory approach. Second, they will assist with implementation of a

⁸ Onfarm development includes tertiary structures and investment by individual farmers covering the lower order (farm) distribution systems, supplementary farm pumps where applicable, and establishment of cropping systems, especially perennial crops.

⁹ Factors that determine the design include land suitability, returns to land and labor, practical issues related to irrigating upland crops following wet season rice, tertiary rotations to facilitate intermittent irrigation of upland crops, and irrigation duration.

¹⁰ The arrangements for farmer contributions will be developed on the basis of the pilots and will be coordinated with VWRAP.

social support program (para. 20), since there will be an overlap with target groups for social support and onfarm development.

20. **Social Support Program.** This component will finance a social support program for groups with special needs. It includes provision to install small-scale water supply systems and to conduct workshops and training to improve hygiene, education, and livelihood skills, and incorporates a gender action plan.¹¹ The provinces, with assistance from consultants and community mobilizers, will implement the program through a community-based approach. The main target groups are (i) those adversely affected by resettlement; (ii) irrigation beneficiaries who need assistance to take advantage of the improved opportunities provided by the Project; and (iii) disadvantaged groups within the irrigation areas, including the poor and landless households headed by women, and vulnerable ethnic minority households and communities. An integrated participatory process to stimulate demand and meet their diverse needs will be implemented and will involve capacity building for disadvantaged people, and income restoration of households severely affected by land acquisition. The program will establish linkages with existing social organizations including NGOs, and with bilateral and government programs within the project area. There will be assistance for the poor and landless (mainly women) to develop new skills and use the microfinance services available under existing programs to create employment and income opportunities.

c. Resettlement—Component A3

21. This component will finance implementation of the resettlement plans (RPs). It will be closely linked to Component A2, which will provide social support for households severely affected by resettlement. Land will need to be acquired for the Phuoc Hoa barrage and all canals down to tertiary level. Land acquisition requirements for the barrage have been minimized through careful evaluation of alternative sites, and the canal alignments will be fine-tuned through a participatory process to minimize land acquisition and disruption to the affected people. About 2,173 households (11,138 persons) will be affected with about 3,153 hectares (ha) of land to be permanently acquired. Some land will also be required for temporary use during construction. It is estimated that 1,009 households will be severely affected by the permanent loss of agricultural land, including 453 households who will lose their houses and have to be relocated. Only 21 shops or small businesses will need to be relocated. The permanent inundation zone of the Phuoc Hoa barrage is 1,178 ha, affecting 759 households of which 109 will have to be relocated.

22. In compliance with ADB's *Policy on Involuntary Resettlement* (1995) and the *Handbook on Resettlement: A Guide to Good Practice*, a full RP has been prepared for the barrage, reservoir area, transfer canal, and main canals. It will be updated after detailed design. A separate resettlement framework has been prepared to guide the preparation of a separate RP for each of the three irrigation areas after their participatory design. The RP and framework require that severely affected farmers be offered the option of replacement and wherever possible, or cash compensation sufficient to purchase replacement land of equivalent area and productivity. Compensation for structures will be paid at full replacement cost of materials and labor with no deduction for depreciation or salvageable materials. Allowances will be paid to cover all costs incurred during the transition period. Income losses will be restored through provisions of the social support program to be implemented under Component A2, and the program will benefit disadvantaged households affected by land acquisition. All provinces will update their compensation rates prior to preparation of the final RPs. A summary of the RP and framework is presented in Appendix 4.

¹¹ The program was prepared on the basis of findings of the social surveys conducted during project preparation.

d. Environmental Management—Component A4

23. This component will implement an environmental management plan (EMP) to mitigate the adverse environmental impact effects caused by the Project. An environmental impact assessment (EIA) and a summary EIA (SEIA) have been prepared in accordance with ADB's *Guidelines for Environmental Assessment*.¹² The EIA identified a number of potentially negative impacts including: (i) involuntary resettlement, (ii) reduction of flows in the Be river as a result of the basin transfer, (iii) possible increased pressure on the recently declared Lo Go Xe Mat National Park and other forest areas adjacent to the proposed new irrigation in Tay Ninh province, (iv) potential for increased levels of acidity in rivers as a result of reclamation of acid sulfate soils in the Duc Hoa, (v) disturbances during construction, and (vi) dangers due to the presence of unexploded ordnance.

24. To mitigate the potential negative impacts due to construction and operation of the Project to acceptable levels, the EMP recommended a comprehensive range of measures. They include: release of minimum environmental flows in the Be river downstream of the Phuoc Hoa barrage; establishment of water quality monitoring stations at key locations in the lower reaches of the various basins concerned; improving local capacity to protect the national park and forest areas, and implementing a buffer zone management program in Tay Ninh; strict control on possible reclamation of the acid sulfate soils of Duc Hoa District; and provision for detecting and clearing unexploded ordnances. Surveys and studies will be undertaken to determine the optimum management of fisheries to mitigate the affects associated with construction of the Phuoc Hoa barrage. There is also provision for ongoing monitoring of impacts during and after the Project. Provision is made for the EMP to be updated during the first year of the Project, incorporating up-to-date data that are being collected under ongoing water quality monitoring programs. All measures necessary for the satisfactory mitigation of environmental impacts will be implemented in accordance with the requirements of the Government and ADB.

2. Part B—Water Resources Infrastructure

a. Basin Transfer—Component B1

25. The basin transfer facilities comprise the Phuoc Hoa barrage on the Be river and the transfer canal for gravity diversion of water to the Dau Tieng reservoir located about 40 kilometers (km) to the west in the neighboring Saigon river basin. The Phuoc Hoa barrage is located on the Be river 102 km upstream of its confluence with the Dong Nai river. The total catchment area of Be river is 8,310 km² of which 5,200 km² is upstream of the proposed barrage where two major hydropower reservoirs are located.¹³

26. **Phuoc Hoa Barrage.** The barrage site was selected after extensive comparative studies of various sites and alternate options aimed at finding the optimum balance between technical aspects, costs, and minimizing resettlement and social disruption. The barrage will raise water levels in the Be river to enable gravity diversion of basin transfers. Since its main function is to divert run-of-river flows, the barrage has only a small live storage capacity. However, live storage is sufficient to ensure maximum design discharges for downstream environmental purposes and transfer diversions can be maintained at all times despite the daily fluctuations in river flow caused by operation of the upstream hydroelectricity dam. Water levels during normal operation will vary by only about 0.4 meters (m).

¹² The SEIA was circulated to the Board on 8 May 2003.

¹³ Thac Mo reservoir commissioned in 1993, and Can Don due to be commissioned in 2003.

27. The barrage consists of an earthfill embankment with a total length of about 900 m, less than about 10 m high except for about 50 m where it increases to a maximum of 28 m as it crosses the existing river channel. Total storage (live and dead) is 18.5 million cubic meters. The barrage has a 100 m wide spillway structure with a fixed crest overflow spillway in the central section to pass normal flows up to mean annual flood, and four radial gates to pass larger floods. The design standard adopted is to avoid overtopping of the embankment during a 1 in 10,000-year flood. Sluicing arrangements are also provided for management of sediment. As upstream water levels will be about 18 m above downstream levels during normal operations, provision for a fishpass to facilitate the natural migration of fish may need to be considered.¹⁴ Physical model testing will be conducted during detailed design phase to confirm the designs.

28. Compensation and resettlement of affected people within the immediate construction zone will be completed before the construction contract is awarded. The barrage is located off-stream, so the first major phase of construction can be completed before river closure becomes necessary, thus allowing about 1 year from the start of construction to complete resettlement of people within the inundation area. Resettlement of this group of people will be required before river closure can proceed.

29. **Transfer Canal.** The canal is 38 km long and has a maximum capacity of 75 cubic meters/second (m^3/s), reducing to a minimum of 65 m^3/s after the offtakes to proposed new irrigation areas. A head regulator will control diversion flows from the barrage. Other structures include a cross regulator, an emergency outlet, cross drainage, and bridge crossings to avoid disruption to local communities. Alternative designs were considered to minimize excavation along the canal route, particularly where it crosses the catchment divide between the Be and Saigon river basins. Concrete lining of the full length of the canal is envisaged.¹⁵ In view of the substantial earthworks involved in canal construction, the designs place special emphasis on minimizing loss of productive land adjacent to the canal due to disposal of surplus spoil. As far as practical, surplus material will be hauled to reaches where filling is required, although the most economic solution in some sections is to spread spoil on each side of the cut.¹⁶

b. Irrigation Development Transfer—Component B2

30. Three new irrigation areas will be developed under the Project: Binh Long irrigation system (BLIS) in the provinces of Binh Phuoc and Binh Duong, Tan Bien irrigation system (TBIS) in Tay Ninh province, and Duc Hoa irrigation system (DHIS) in Long An province. The total net command area of the three systems is 48,130 ha. Each is described below.

31. **Binh Long Irrigation System.** BLIS has a net command area of 5,860 ha. The transfer canal divides the area into two separate blocks: 3,920 ha on the northern side mostly in Binh Phuoc province, and 1,840 ha on the southern side, all of which is located in Binh Duong province. Water for the area will be extracted from the transfer canal by pumps located 19 km downstream of the Phuoc Hoa barrage, since the service area is higher than water levels at the

¹⁴ Because the reservoirs upstream of the barrage do not have fishpasses and severely impact natural fisheries in the Be river, the requirements for a fishpass will be carefully reviewed to determine whether there are more effective alternatives to mitigate impact on the fisheries.

¹⁵ Although an unlined canal was considered for ease of construction and lower cost, a comparative analysis concluded in favor of lining because of savings in excavation. In addition, the superior hydraulic efficiency will allow higher flow velocities, which will inhibit weed growth.

¹⁶ Where this is necessary, provision is made for temporary clearance and subsequent restoration of the land. Topsoil will be removed and later replaced, and drainage will be provided so the land can be returned to full production.

barrage. A cross-regulator will be provided on the transfer canal just downstream of the pumps to maintain stable water levels.

32. **Tan Bien Irrigation System.** The net command area of TBIS is 13,400 ha. Water for this area will be conveyed from the Dau Tieng reservoir via the existing West Main Canal of DTIS, which already has adequate capacity over most of its length to accommodate the additional demands to supply to TBIS, although some upgrading will be required in some sections. This work will be done under VWRAP. The Project will construct a new main canal, about 24 km long from the tail end of the existing West Main Canal. Irrigation supply for about 40% of the area will be pumped, while the remainder will be irrigated by gravity.

33. **Duc Hoa Irrigation System.** The net command area of DHIS is 28,880 ha: 17,560 ha with a relatively high elevation, and 11,320 ha of lower elevation under influence of tidal movement in the Vam Co Dong river. Irrigation supplies for the higher area will be conveyed from the Dau Tieng reservoir via the 33 km long East Main Canal of Dau Tieng and a new 20 km long DHIS main canal. The East Main Canal will be upgraded under VWRAP to achieve the additional 25 m³/s flow capacity required for the Duc Hoa area. The low-lying area will receive irrigation supplies through Dau Tieng's West Canal and a natural drain connecting this canal and the Vam Co Dong river. The West Canal will not require additional upgrading to convey an additional 5 m³/s flow to supplement the flows in the Vam Co Dong river.

34. Much of the DHIS area is already irrigated to some extent, mostly pumped from groundwater for the higher areas, although the quality and quantity of this source is deteriorating due to overuse.¹⁷ Lack of fresh water, particularly in the dry season, is depressing yields and limiting cropping intensity. Freeing the higher areas from dependency on pumped groundwater is considered to be a major long-term benefit. The Duc Hoa area contains pockets of acid sulfate soils (about 1,250 ha) that are not included in the net command area. It is envisaged that these will be progressively remediated and reclaimed for irrigated agriculture. If so, this will be done strictly according to procedures set out in the EMP to ensure this does not result in negative environmental impacts (para. 69[v]).

C. Special Features

35. **Advance Detailed Design.** The Government approved its feasibility study for the Project in July 2002. This has allowed MARD to proceed with preparation of detailed designs under national funding to have them at an advanced stage by the time the loan is effective. This will accelerate the implementation schedule of the Project and minimize the time required for the start-up activities and award of the major civil works contracts. The specific scope of work to be covered during advanced detailed design includes detailed topographic survey and geotechnical investigations; physical hydraulic model studies of the Phuoc Hoa barrage; preparation of construction drawings for the major works (barrage, transfer canal, and main canals); and preparation of technical specifications.¹⁸ The loan consultants will review the designs, and recommend revisions as necessary.

36. **Links between Phuoc Hoa and Dau Tieng Irrigation System.** The Project is closely linked to DTIS since it will divert flows into the existing Dau Tieng reservoir, from where it will be distributed for irrigation, salinity control, and DMI uses. This means that the Project's overall success depends heavily on the safe and efficient functioning of DTIS. However, it is currently in

¹⁷ A small part of the area in the northwest (approximately 500 ha) is already irrigated from two pumping stations.

¹⁸ The hydraulic model will be retained for use of the loan consultants for further testing and confirmation of results and therefore the development costs of the model (about \$50,000) will be funded retroactively by the Project following approval of the loan.

need of upgrading and modernization which will be done under the VWRAP (para. 8). VWRAP will improve dam safety, upgrade the main and distribution canals, and introduce modern management practices to optimize water distribution.

37. The East and West Main Canals of DTIS will have to be upgraded to meet the objectives of VWRAP. Irrigation supplies for the new areas of TBIS and DHIS will be routed through these canals. In the case of the East Main Canal, some of the same sections also need enlargement to meet the requirements of this Project (see para. 33). To overcome the overlapping requirements of the two projects, it has been agreed with the Government and the World Bank that VWRAP will cover all necessary work of the East Main Canal, incorporating allowance for increased capacity to serve the new areas to be developed under this Project. VWRAP will also construct the head regulators for the main canals of TBIS and DHIS. This clearly demarcates the physical works and avoids overlap.

38. Following preappraisal for VWRAP in June–July 2003, World Bank management has endorsed further processing of an International Development Association loan for VWRAP. Approval of the World Bank board is expected in February 2004, and this is set as a condition for signing the Phuoc Hoa loan (para. 70).

D. Cost Estimates

39. The estimated cost of the Project is \$164.6 million as shown in Table 1. This includes 10% physical contingencies, price contingencies, and interest on the ADB loan during implementation. About \$60.0 million of the total is foreign exchange. Prices are in mid-2002 values, and include value added and other taxes as appropriate. Costs for Part A: Support for Institutional and Integrated Development are 25% of base costs with costs for Part B: Water Resources Infrastructure, comprising the balance. Table A5.1 of Appendix 5 shows the estimates in more detail.

Table 1: Summary of Project Cost Estimates

Item	(\$ million)		
	Foreign	Local	Total
A. Support for Institutional and Integrated Development (Part A)	8.0	25.1	33.1
B. Water Resources Infrastructure (Part B)	39.9	61.4	101.3
Total Base Costs	47.9	86.5	134.4
Physical Contingencies	4.7	8.7	13.4
Price Contingencies	4.9	8.9	13.8
Total Project Costs	57.5	104.1	161.6
Financial Charges During Implementation	2.5	0.5	3.0
Total Costs to be Financed	60.0	104.6	164.6

Source: Asian Development Bank staff estimates.

E. Financing Plan

40. It is proposed that ADB will provide a loan of \$90.0 million equivalent from its Special Funds resources to finance about 54.7% of total project costs, including \$43.6 million equivalent of local currency cost. Agence Française de Développement (AFD) has agreed in principle to provide \$34.0 million to finance about 20.7% of the total project costs through two separate loans.¹⁹ Farmers would contribute in kind by providing labor to construct tertiary canal earthworks to the value of \$5.0 million (3%). The Government will finance a total of \$35.6 million (about 21.6%), which includes about \$12 million of duties and taxes. The financing plan is summarized in Table 2, and details are provided in Appendix 5, Table A5.2.

Table 2: Financing Plan
(\$ million)

Financier	Foreign	Local	Total	%
Asian Development Bank	46.4	43.6	90.0	54.7
Agence Française de Développement	13.6	20.4	34.0	20.7
Farmers (provided in kind)	0.0	5.0	5.0	3.0
Government	0.0	35.6	35.6	21.6
Total	60.0	104.6	164.6	100.0

Source: Asian Development Bank staff estimates.

F. Implementation Arrangements

1. Project Organization and Management

41. The Executing Agency (EA) for the Project will be MARD through its Central Project Office (CPO) based in Hanoi, with the Director of CPO as the project director. The CPO will take overall responsibility for (i) managing, coordinating, and overseeing the Project, and will provide the interface with ADB and AFD; (ii) arranging procurement of consulting services, and contracts for civil works and equipment under international competitive bidding (ICB) and international shopping; (iii) managing project finances including audit of project accounts, loan disbursements, and financial statements; (iv) preparing quarterly progress reports; and (v) preparing the completion report. The CPO is experienced in the implementation of ADB- and World Bank-financed projects covering these aspects and its performance has generally been satisfactory. To ensure adequate staffing resources are allocated to the Project, it will establish a multidisciplinary subunit based in HCMC specifically dedicated to day-to-day supervision to be known as the project management unit (PMU). The PMU will be headed by a full-time manager who will be a deputy director and permanent staff of CPO experienced in the implementation of such projects. Other key staff of the PMU will include experienced permanent staff of the CPO, while others may be subcontracted locally. As the PMU will be responsible for implementing the EMP, it will subcontract this task to an appropriate local institute agreed by ADB.

42. The CPO/PMU will provide guidance and coordination for the five implementing agencies (IAs) including MARD's Project Management Board 416 (PMB416) and the four provincial project management boards (PPMBs) in the provinces of Binh Phuoc, Binh Duong,

¹⁹ The two AFD loans would include one for \$31.9 million equivalent with a maturity of 20 years (7 years' grace) at an interest of 2.5% per annum, and a second loan of \$3.1 million equivalent with a maturity of 30 years (10 years' grace) at an interest rate of 1.0% per annum. AFD financing will be on a parallel basis except for a small portion of the second loan, which will cofinance consulting services.

Tay Ninh, and Long An.²⁰ PMB416 will be strengthened in a phased manner to ensure adequate staffing levels during project implementation. It will be responsible for design, contract management, and construction supervision of the major civil works contracts including the Phuoc Hoa barrage, the transfer canal, and the main and primary canals for each of the irrigation subprojects. The four PPMBs will have responsibility for development of the irrigation areas within each of their provinces, including resettlement, social mobilization and support programs, design and supervision of civil works contracts for secondary canals, and the related onfarm development. PMB416 and the PPMBs shall be responsible for the procurement of civil works and equipment to be procured under local competitive bidding and other local procurement. In order to coordinate the activities of the IAs and facilitate an integrated approach, a project consultative committee will be set up comprising the PMU manager, senior provincial representatives, and IAs. It will meet regularly (at least quarterly) in the project area, and the consultant team leader and deputy will provide secretarial support.

43. A project steering committee will be constituted to guide the project activities. The committee will be chaired by a vice-minister of MARD, and will comprise the vice-chairpersons of Binh Duong, Binh Phuoc, Tay Ninh, Long An, and HCMC people's committees, other MARD staff including the CPO director, and representatives at director level from the ministries of Planning and Investment, Finance, and Natural Resources and Environment; the Office of Government, and the State Bank of Vietnam. Links between the project steering committee and the Dong Nai river basin organization will be established to be formalized and agreed during early stages of implementation to ensure full stakeholder participation in decision-making on issues that affect the overall management of water resources in the basin such as operating guidelines for basin transfers, water quality, and other environmental matters. The project organization chart is presented in Appendix 6.

2. Implementation Schedule

44. The Project will be implemented over a 6.5-year period beginning in early 2004. The schedule allows adequate time for a participatory approach to design and prepare the final RPs once the detailed engineering designs have been confirmed. Provision is made for approval and implementation of the RPs prior to the award of civil works contracts. For the Phuoc Hoa barrage and transfer canal, there is provision for completion of construction and a 1-year commissioning and operation phase, including training of operations staff. The schedule also allows for full development of the irrigation subprojects, including the tertiary canal and onfarm development, which will be done through an integrated and participatory approach. An implementation schedule for the Project is presented in Appendix 7.

3. Operation and Maintenance

45. Implementation arrangements for the Project follow the rationale that the agency or group that will be responsible for operation and maintenance (O&M) of the water resources infrastructure will be fully involved in its planning, design, and construction. There will be three levels of O&M responsibility: national, provincial, and farm levels. The national level covers the interprovincial facilities (barrage and transfer canal, and main canals for each of the irrigation

²⁰ The PPMBs are existing subunits within the DARDs of each of the concerned provinces. They are specifically mandated to implement water resources projects, and are adequately experienced in technical aspects of irrigation work. The PPMBs will be provided with support for a participatory integrated approach (resettlement, social, and environmental aspects) for which they generally have limited experience.

subprojects). These will be managed by MARD through the existing Dau Tieng IMC.²¹ The Project will provide the necessary training and capacity building. At the provincial level, the respective IMCs will manage the primary and secondary canals generally serving areas more than 150 ha. Canals serving less than 150 ha, generally the tertiary units and lower, will be managed by WUGs.

46. Financing the O&M costs for project facilities is based on the premise that adequate water user fees will be collected.²² The current fee structure set by government regulations is generally considered adequate to cover O&M costs; the critical issue is to ensure the fees are collected. Experience in Viet Nam shows that water user fees can be readily collected if the service delivery is satisfactory, which places the onus on the Project to ensure that the systems are able to operate properly and are well managed. The Project aims to achieve this by emphasizing establishment of institutional arrangements that promote participation of the end-users in decision making during preparation and implementation. This focuses on involvement of provincial IMCs and irrigation groups with a view to fostering high levels of ownership that promote cost recovery for sustainable O&M. The Government has provided assurances that it will develop sustainable system management and pursue a policy of cost recovery for O&M costs.

4. Procurement

47. Goods and services financed by ADB will be procured in accordance with ADB's *Guidelines for Procurement*. Civil works contracts estimated to cost more than \$2 million equivalent will be procured through ICB among prequalified firms with proven technical competence acceptable to ADB. Civil works contracts estimated to cost \$2 million or less will be procured through LCB procedures. Indicative procurement packages are presented in Appendix 8. State-owned enterprises will be eligible to bid for contracts if they are financially autonomous, independently managed, and operate on the basis of commercial practices.

48. A range of equipment will be procured under the Project including vehicles, computers, software, water quality monitoring equipment, and pumping installations.²³ ADB-financed supply contracts (for goods) costing more than \$500,000 will be procured through ICB, and supply contracts up to \$500,000 equivalent will be procured through international shopping; small or off-the-shelf items valued at less than \$100,000 may be procured under direct purchase. Items with similar specifications will be combined into one package.

5. Consulting Services and Counterpart Support

49. The Project will require approximately 961 person-months of consulting services: 214 international, and 747 domestic. Expertise will be required in the fields of integrated management, institutional development, participatory irrigation, resettlement, irrigation, social support (including gender), finance, environmental management, agriculture, monitoring and evaluation, water systems management, hydraulic structures design, irrigation and drainage system design, geotechnical and mechanical engineering, construction supervision, and contract management.²⁴ Consultants financed under the loan will be engaged in accordance

²¹ The Project has made provision to expand the Dau Tieng IMC to include an additional Phuoc Hoa subunit with specific responsibility for management of the basin transfers. The establishment of such unit and the details of its staffing will be assessed during project implementation in coordination with VWRAP.

²² Since operation of the system will commence before fee collection is fully activated, project funds have been allocated to cover O&M during implementation.

²³ It is envisaged that equipment for pumping installations will normally be included in the civil works contracts.

²⁴ The consultants will be designated the engineer for the management of ICB contracts.

with ADB's *Guidelines on the Use of Consultants* and other arrangements satisfactory to ADB for engaging domestic consultants. MARD agrees that the consultants will be recruited using ADB's quality and cost-based selection method. Most of the consulting services will be provided under a single package by an international consulting firm in association with domestic consultants. In accordance with ADB guidelines, MARD is proceeding with advance action to recruit consultants up to the point of shortlisting, prior to loan approval. The Government has been advised that this does not commit ADB to financing inputs in the event that the loan is not approved. The Project will also contract out services to prequalified local institutions or NGOs who will be recruited in accordance with ADB guidelines. Consultants, local institutions, and NGOs financed by cofinanciers will be recruited in consultation with ADB. MARD will provide office accommodation for the consultants in HCMC, and support administrative costs for counterpart staff. The terms of reference are presented in Appendix 9.

6. Disbursement Arrangements

50. Disbursements for the Project will cover a wide range of activities, from relatively small ones covered under Part A, to relatively large for progress payments for civil works contracts. To facilitate timely disbursements, a central imprest account will be established by CPO immediately after loan effectiveness, in accordance with procedures of the Ministry of Finance and the State Bank of Vietnam. Payments will be made to and from these accounts for all eligible expenditures under the Project. MARD, in consultation with ADB, will develop procedures to ensure that each of the five IAs (PMB416 and the four PPMBs) can establish second-generation imprest accounts to facilitate project implementation at the local level. The imprest accounts will be established, maintained, and audited in accordance with ADB's *Loan Disbursement Handbook*. The initial amount to be deposited in the imprest account will not exceed the estimated expenditure for the first 6 months or 10% of the loan amount, whichever is lower. MARD may use the statement of expenditures (SOE) procedure to liquidate advances, in accordance with ADB's *Loan Disbursement Handbook*. Individual payment to be reimbursed under the SOE procedure will not exceed the equivalent of \$100,000.

7. Accounting, Auditing, and Reporting

51. The CPO, assisted by the project implementation consultants, will prepare separate accounts for the Project as a whole. Accounts of each IA will be monitored and consolidated by the CPO. Within 12 months after loan effectiveness, MARD will establish a computerized management information system suited to project needs in CPO (to be managed by the PMU in HCMC) for efficient monitoring, financial management, and reporting of component progress and contracts. An auditing firm selected through LCB will audit the accounts and financial statement for the Project annually. The audit will specifically cover the imprest accounts and statements of expenditure, and a separate opinion of these will be included in the audit reports. The audit must be carried out as part of the regular annual audit of MARD's general accounts, and the report submitted to ADB annually within 9 months of the close of each fiscal year.

52. Each agency involved in the Project will prepare quarterly progress reports. The manager of the PMU will consolidate and submit the reports within 1 month to ADB and AFD through the project director. The reports will detail the achievements to date as related to the implementation schedule, targets, and plans for the next reporting period, problems requiring resolution, and steps being taken to resolve them. Reporting will make use of the computerized networking and email system to be developed. MARD will prepare and submit a project completion report to ADB/AFD within 6 months after physical completion of the Project.

8. Project Performance Management System

53. ADB's project performance management system (PPMS) will be adopted for monitoring and evaluating implementation performance and development impacts at various stages of the project cycle. The CPO/PMU, in collaboration with PMB416, PPMBs, and beneficiaries, will be responsible for its implementation. In this regard, the CPO/PMU will build on the experience and expertise gained in carrying out benefit monitoring and evaluation on other ADB-financed projects. The PPMS will include participatory baseline surveys in each of the irrigation subprojects shortly before commissioning, and follow-up surveys to evaluate changes. The monitoring and evaluation of pro-poor effects of the Project will be integrated into the system. Benefits generated during the project period will be measured against these initial data. PPMS work will be eligible for ADB financing under the loan.

9. Project Review

54. The Government, ADB, and AFD will jointly conduct a comprehensive midterm review, in consultation with the project steering committee. The review will examine (i) project progress to date, including implementation of the process of social assessment, mobilization, quality of designs and physical works, and initial benefits; (ii) future implementation plans and targets; (iii) allocation of funds for components and loan categories; (iv) effectiveness of the project management structure and implementation arrangements as well as any need for modification; (v) the status of institutional developments; and (vi) any major environmental, social, or technical, and economic aspects of the Project. Any changes in project scope, financing, or implementation arrangements deemed necessary will be effected during the period following the review. In addition to this, there will be periodic reviews to evaluate the general progress and quality of project performance and to resolve issues affecting the implementation.

IV. PROJECT BENEFITS, IMPACTS, AND RISKS

A. Social Benefits and Impacts

55. **Beneficiaries.** About 30,200 households (about 169,100 persons) in the three irrigation subproject areas will benefit directly from the Project through increased agriculture income and employment opportunities. In addition, a large number of households will benefit from improved supplies of water for domestic and industrial use and from improved salinity control in downstream reaches of rivers.

56. **Poverty Reduction and Gender.** A large proportion (about 39%) of the project beneficiaries are below Viet Nam's national poverty line of \$0.33 per person per day. This is slightly above the national average of 37%. It is estimated that improved agricultural production will increase average incomes of beneficiaries by about 40%, and that this will at least halve the number of households that are below the poverty line. The social analysis also confirmed that the burden of poverty in the project area is disproportionately borne by women. About 25% of the households are headed by women and have limited access to land and credit, and have much lower monthly incomes than male-headed households. Significantly fewer female-headed households derive their main income from agriculture and forestry activities compared to male-headed households, and a much higher proportion derive their main income from wage labor. A social support program incorporating a gender action plan will be implemented to address these issues. A summary poverty reduction and social strategy is presented in Appendix 10.

57. **Disadvantaged and Ethnic Minority Groups.** Vulnerable and disadvantaged groups (poor, landless, elderly, and illiterate) have been identified in the project area, as well as ethnic minorities. These groups are unlikely to be able to benefit either directly or indirectly from the

Project without assistance. These groups will be assisted to improve employment and income-earning opportunities, access to credit, and development of new livelihood skills through the social support program. The same program will aim to improve the health and education of these groups through the provision of reliable domestic water supplies and literacy training. The Project is not expected to trigger ADB's *Policy on Indigenous Peoples*, although any adverse effects will be addressed under the relevant RP.

B. Environmental Impacts

58. The Project will have a number of positive impacts. However, it will also cause significant adverse environmental impacts (para. 23), the most significant one being caused by permanent inundation upstream of the Phuoc Hoa barrage, and transfer of water out of the Be river basin. In accordance with ADB requirements, an EIA has been prepared which details an EMP to mitigate the impacts to acceptable levels. In line with recommendations of the World Commission on Dams,²⁵ there has been extensive public involvement and stakeholder consultations during project preparation. There has also been careful assessment of options, and the proposed development is within the framework of integrated basin management. The major potentially negative impacts and the proposed mitigation measures are set out in the following paragraphs.

59. **Resettlement.** The Project will cause significant involuntary resettlement including severance of communities and agricultural activities as set out in para. 21. Land acquisition required for the barrage was minimized through careful evaluation of alternate sites to find the optimum balance between resettlement, technical issues, and costs; resettlement for the current site is only about one third of earlier sites considered. Canal alignments determined during the feasibility study will be fine-tuned and these will be finalized during project implementation through a participatory process to minimize land acquisition and disruption to the affected people.

60. **Basin Transfers.** Reduction of flows in the Be river downstream of the Phuoc Hoa barrage as a result of the basin transfers has the potential to affect water quality, aquatic habitat and fisheries, riparian irrigators, and salinity levels in the Dong Nai river. These effects can be mitigated by (i) maintaining the recommended minimum flow of 14 m³/s,²⁶ (ii) optimizing operation to ensure there are no surplus basin transfers, (iii) comprehensive water quality monitoring, and (iv) strictly regulating polluting industries. Studies will be conducted under the Project to determine the optimum management of fisheries to mitigate the affects associated with construction of the Phuoc Hoa barrage.

61. **Forests and Acid Sulfate Soils.** Introduction of irrigation has the potential to increase pressure on the Lo Go Xe Mat National Park and other forest areas in Tay Ninh Province within or adjacent to TBIS. It may also increase the tendency for farmer to reclaim acid sulfate soils adjacent to DHIS that could lead to increased levels of acidity in surrounding waterways if it is not properly controlled. Even though the Project does not intend to develop these sensitive areas, it is recognized that introduction of irrigation and intensified farming activities is likely to increase pressure. To mitigate potential adverse effects, provision is made under the EMP to

²⁵ The World Commission on Dams. November 2000. *Dams and Development: A New Framework for Decision Making*. Earthscan Publications Ltd., London and Sterling, VA.

²⁶ This flow was determined from hydrological studies carried out as part of the feasibility study which indicate that natural dry season flow at the Phuoc Hoa barrage site would rarely fall below 8 m³/s (i.e., prior to the construction of the upstream Thac Mo hydropower reservoir, which has substantially increased flows). Based on this, the minimum base flow is set at 10 m³/s, and a further 4 m³/s is added to allow for demands of downstream riparian irrigators.

strengthen protective measures for the national park and forest areas, and the implementation of a buffer zone management program in Tan Bien District; strict controls will apply if farmers reclaim the acid sulfate soils adjacent to DHIS.

C. Financial and Economic Benefits

62. **Quantified Benefits and Costs.** The main quantified benefits of the Project are incremental outputs of agricultural products from 48,130 ha, primarily rice, maize, groundnuts, vegetables, sugarcane, and fruit. There will also be incremental production of fish from paddy fields and ponds. In addition to outputs from land-based activities, water supplied to HCMC for DMI use will provide additional benefits. These benefits are balanced by permanent loss of land to be acquired for construction of the project works representing about 7% of the proposed command area.

63. **Nonquantified Benefits.** The Project will provide a number of benefits that cannot be readily quantified. The bulk of fresh water supplies to HCMC are currently drawn from the Dong Nai river. The Project will provide a major alternative source from the Saigon river, which will improve the security of supply for the city by lessening the risk from an event such as gross contamination of the Dong Nai river. Dependence on the already overtaxed groundwater which is now being used to supply HCMC will also be reduced. In addition, the scheme will have sufficient capacity to allow the intermittent release of water for salinity control in the Saigon river while return flows from the new irrigated areas will contribute to a reduction in salinity in both the Saigon and Vam Co Dong rivers. Roads to be constructed under the Project will, in some areas, provide improved access for local people and will facilitate the movement of goods and services.

64. **Economic Evaluation.** The Project is economically viable with an economic internal rate of return (EIRR) of 14.2% for the base case. Sensitivity tests show that the EIRR is most sensitive to changes in investment costs, the timing of benefits, and price changes in agricultural outputs. If investment costs rise by 10%, the EIRR falls to 13.5%. A delay in the start of the benefits stream by a year reduces the EIRR to 12.7%. If output prices fall by 10%, the EIRR falls to 13.1%. The economic and financial analysis is presented in Appendix 11.

D. Risks

65. The main risks for the Project arise from delays in realizing the benefit stream; its economic viability is quite sensitive to this. One potential cause is project implementation being delayed. Resettlement of people affected by the construction works is on the critical path since award of the civil works contracts is conditional upon its prior completion. From past experience, it can sometimes be difficult to convince all of the affected people to quickly accept compensation and resettlement packages that are offered. Hence, substantial difficulties could delay the award of civil works contracts. To offset this, adequate provision is made to assist with resettlement so that plans can be prepared and implemented according to schedule. MARD has also developed experience and a good understanding of the Government's and ADB's requirements for resettlement over recent years. In addition, the Government has a strong commitment to the Project, which it considers particularly urgent to supplement flows in the Saigon river for extraction of freshwater supplies for HCMC, and hence there will be incentives for it to quickly resolve any difficulties that arise.

66. Slow farmer adoption of irrigated agricultural production systems also has the potential to delay the benefits. The economic analysis assumes that the whole of the target command

area is converted to irrigated production by the close of the Project or shortly after.²⁷ Any delay in the rate of adoption or the ultimate level of adoption achieved would have a significant impact on the EIRR. Three factors are expected to minimize these risks. First, past experience indicates that farmers will usually respond quickly to increase agriculture activities if they have access to water, and special attention is given to achieving this within the project time frame. Second, about half of the area is already being partially irrigated by farmers' own means, so there is already experience and knowledge of irrigated agriculture. Third, community support is to be provided under the Project to help farmers decide cropping systems and become involved in the design and implementation of tertiary-level irrigation development from an early stage (paras. 19–21). This support will increase awareness about the potential project benefits, promote beneficiary ownership, and thus encourage rapid uptake by farmers. After the design stage, the emphasis will shift to establishing and training WUGs to manage their tertiary units. Agriculture extension services will also be provided under the Project to assist beneficiaries with decisions about irrigated agriculture. With this level of support, a high level of participation should be assured.

67. Institutional capacity to achieve sustainable management of the system is also essential to ensure that project benefits are not at risk. Related institutional risks arise at both the implementation and operational stages. While the IAs are well experienced in implementation of the physical works, there is limited experience in the proposed participatory and integrated approach during implementation. This approach aims to lay the foundations for sustainable management through developing end-user ownership. At the operational stage, the responsible IMCs need to develop capacity as autonomous and accountable water service providers, with emphasis on cost recovery. This will require review and adjustment of current policies, strategies, and regulations relating to irrigation service delivery. Addressing these issues will be an important objective of the Project. The Government has committed to establishing a special task force to facilitate participatory preparation of a time-bound proposal for sustainable system management along the lines of an indicative approach agreed during project appraisal. Provision is also made for the consultants and social mobilizers to support these activities.

68. Fruit and vegetables are projected to contribute about 35% of the incremental agricultural value of the Project. Vegetable production is expected to increase by over 200%. While these are large increases, they will not be reached in full until about 12 years from the time farm development commences in the fourth year of the Project. However, there is a risk that prices will fall unless urban incomes continue to rise and export opportunities are developed. This risk will be reduced somewhat through marketing studies to be carried out by consultants to be engaged as part of project support activities.

V. ASSURANCES

A. Special Assurances

69. The Government has given the following assurances, in addition to the standard assurances, which will be incorporated into the legal documents.

- (i) **Resettlement.** The Government will prepare (or update) a resettlement plan (RP) for each subproject and submit it to ADB for approval before any land acquisition activities may begin for that subproject. The Government will ensure that the subproject RPs will be prepared in accordance with ADB's *Policy on*

²⁷ The economic analysis assumes that it will take a further 8 years after project completion to obtain full crop production targets.

Involuntary Resettlement and the approved resettlement framework. Prior to the start of any resettlement activities, the Government will sign a contract with a qualified institution acceptable to ADB to conduct independent external monitoring of resettlement.

- (ii) **Implementation of the Resettlement Plans.** The Government will implement the RPs for each subproject to the satisfaction of ADB, including provision of adequate counterpart funding to cover the actual costs. It will ensure that all people affected by the Project are compensated, resettled, and rehabilitated in accordance with the requirements of the approved RPs, government procedures, and ADB's *Policy on Involuntary Resettlement*.
- (iii) **Conditions for Award of Civil Works Contracts.** ADB will not approve of any civil works contract for any subproject unless the Government has satisfactorily completed, in accordance with the approved RP for that subproject, compensation payment and relocation to new sites, and ensured rehabilitation assistance is in place prior to obtaining possession and rights to the land. In the case of the Phuoc Hoa barrage, affected people in the construction zone will be resettled prior to award of the contract, whereas resettlement of the people affected only by the inundation zone of the barrage may be completed during the first phase of construction on the condition that this is completed before river closure commences. Furthermore, ADB will not approve of any civil works contracts for the main canals for any subproject unless the Government has confirmed to ADB that the Project provinces have undertaken to provide the necessary funding to meet their counterpart obligations for tertiary and onfarm canals.
- (iv) **Be River Water Flow and Quality.** To minimize the impact of diversions at the Phuoc Hoa barrage on the lower Be river, a minimum environmental flow of 14 m³/s will be released at all times. The Government will take action to ensure that effluent from polluting industries located along the river is treated to meet government standards prior to the start of diversions.
- (v) **Environment.** The Government will submit an updated EMP for ADB and AFD approval within 12 months from loan effectiveness and ensure that it is implemented and monitored to a satisfactory standard. Particular attention will be given to protection of the Lo Go Xe Mat National Park and forest areas in and around TBIS, and reclamation of acid sulfate soils for irrigated agriculture in DHIS. The CPO/PMU will subcontract a qualified institute acceptable to ADB, to carry out the EMP on its behalf.
- (vi) **Unexploded Ordnances.** An appropriate government agency will be engaged to clear all unexploded ordnances for the project work sites prior to the start of any construction work.
- (vii) **Future Operation.** MARD will make arrangements acceptable to ADB and AFD to manage operations of the Phuoc Hoa Barrage and transfer canal, and expand other units as required to manage the main canals of BLIS, TBIS, and DHIS.
- (viii) **System Management Task Force.** Within 6 months of loan effectiveness, MARD will establish a task force, or other similar group as agreed by ADB and AFD, to facilitate development of sustainable system management. The task force will be chaired by the vice-minister in MARD responsible for system management, and comprise representatives of the relevant departments within MARD, the provinces, and other ministries and agencies as appropriate.
- (ix) **Sustainable System Management.** Within 12 months of loan effectiveness, the task force set up to facilitate sustainable system management, with the assistance of the consultants, will prepare a comprehensive time-bound proposal for addressing the related issues as set out in the indicative approach to

sustainable system management agreed during loan appraisal,²⁸ and submit it for the approval of MARD, ADB, and AFD. In keeping with this, the Government will ensure there is adequate funding to complete the tertiary irrigation canals.

- (x) **Social Aspects.** During project implementation, the interests of poor and disadvantaged groups, especially women and ethnic groups, will be taken into account through implementation of the agreed social support program and gender action plan.

B. Conditions for Loan Signing and Effectiveness

70. It was agreed that World Bank board approval of VWRAP will be a condition for loan signing, and for loan effectiveness the following conditions will apply:

- (i) The Government will have obtained confirmation that project cofinancing from AFD has been approved.
- (ii) MONRE has approved the environmental impact assessment.
- (iii) The Government will provide confirmation that a project steering committee has been established; and that staff for the PMU (sub-office of CPO based in HCMC) have been appointed and mobilized, and confirm that a senior staff of PMB416 and each of the PPMBs have been appointed to undertake project activities as agreed with ADB.
- (iv) The Government will confirm that MARD has issued guidance to the Project provinces to apply MARD's participatory irrigation management approach under the Project.

V. RECOMMENDATION

71. I am satisfied that the proposed loan would comply with the Articles of Agreement of ADB and recommend that the Board approve the loan in various currencies equivalent to Special Drawing Rights 63,042,000 to the Socialist Republic of Viet Nam for the Phuoc Hoa Water Resources Project, from ADB's Special Funds resources with an interest charge at the rate of 1.0% per annum during the grace period and 1.5% per annum thereafter; a term of 32 years, including a grace period of 8 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft Loan Agreement presented to the Board.

Tadao Chino
President

30 October 2003

²⁸ The relevant issues agreed during loan appraisal, which incorporate a policy of cost recovery for operation and maintenance, are set out in Supplementary Appendix C.

PROJECT FRAMEWORK

Design Summary	Verifiable Indicators	Means of Verification	Assumptions/Risks
<p>Sector Goals</p> <p>Sustainable growth of the rural, urban, and industrial areas in Ho Chi Minh City (HCMC) and surrounding provinces in accordance with the regional master plan.</p> <p>Reduction of rural poverty and increased employment opportunities through the provision of reliable irrigation.</p>	<ul style="list-style-type: none"> Reliable irrigation in 75% of years for all areas developed in the Saigon and Vam Co Dong (VCD) river basins by 2009. No shortage of water for domestic, municipal, and industrial (DMI) uses and for salinity control in HCMC and surrounding provinces after 2008 until at least 2020. Incidence of poverty in the project area is not higher than 20% by 2017 through increased income from agricultural production. 	<ul style="list-style-type: none"> Infrastructure component of project completed and functioning. Progress and monitoring reports from the related agencies. Socioeconomic surveys. Agriculture monitoring surveys and reports. 	<ul style="list-style-type: none"> The Project will not be unduly delayed. Beneficiaries are able to take advantage of the project facilities.
<p>Purpose</p> <p>To provide additional water supplies in the Saigon and VCD river basins for irrigation, DMI, salinity control, and assure efficient and sustainable management of the overall water resources.</p>	<ul style="list-style-type: none"> Additional 65 cubic meters/second (m³/s) diverted from Be river to the Dau Tieng reservoir on the Saigon river by 2009. New irrigation area (48,130 hectares [ha]) in three subproject areas reliably supplied in 75% of years on average by 2011. Dry season salinity at Rach Tra on the Saigon river and Go Dau on the VCD river does not exceed 0.25 grams/liter (g/l) after 2009. 	<ul style="list-style-type: none"> Daily records of the system monitoring the basin transfers from Phuoc Hoa to Dau Tieng reservoir. Monitoring reports of the irrigation management companies (IMCs). Agricultural reports. Daily records of salinity monitoring at Rach Tra and Go Dau. 	<ul style="list-style-type: none"> Surplus supplies continue to be available in the Be river for diversion to Dau Tieng reservoir. Dau Tieng reservoir is safely and efficiently operated. Onfarm system complete and farmers adopt new cropping systems for irrigated agricultures. Dau Tieng reservoir and existing irrigation system is operated efficiently.
<p>Components/Outputs</p> <p>Part A: Support for Integrated Development</p> <p>A.1. Project Management</p> <p>Project management units established with capacity and resources to implement all components of the Project.</p>	<ul style="list-style-type: none"> Implementation proceeds according to schedule. Satisfactory quality of work. 	<ul style="list-style-type: none"> Project progress reports and review missions. 	<ul style="list-style-type: none"> Implementing agencies have sufficient qualified staff.

Design Summary	Verifiable Indicators	Means of Verification	Assumptions/Risks
<p>IMCs develop capacity to operate and maintain the system.</p> <p>The Ministry of Agriculture and Rural Development formulates and implements reforms aimed at IMCs becoming financially autonomous and accountable to ensure sustainable system management.</p>	<ul style="list-style-type: none"> Dau Tieng IMC able to operate the basin transfer facilities and main canals efficiently and sustainably by 2009. Provincial IMCs are able to operate the primary and secondary canals efficiently and provide reliable service delivery to farmers. Related task force is established by end-2004. Related time-bound proposal defining performance objectives, and service standards and indicators, is approved by end-2004. Management plan prepared by end-2004. Subsidies to IMC are according to clearly defined criteria. 	<ul style="list-style-type: none"> Records of flows diverted from Be river to Dau Tieng reservoir. Maintenance plan and financial records of Dau Tieng IMC. Records of irrigation fee collection. IMC maintenance plan. Financial records of provincial IMCs. Progress reports and review missions. Service contracts between IMCs and between IMCs and water user groups (WUGs). Accounting records of IMCs. Records of subsidy payments to IMCs. 	<p>Dau Tieng IMC will adopt modern techniques for operation of Dau Tieng irrigation system (DTIS) and the basin transfer facilities.</p> <ul style="list-style-type: none"> Provincial IMCs will adopt modern operating techniques. IMCs will adopt reform packages proposed by the task force. Service delivery and fee collection is adequate.
<p>A2. Support for Onfarm and Social Development</p> <p>Onfarm systems are transformed from rain-fed to diversified irrigated agriculture.</p> <p>Social support program for people adversely affected by resettlement and other disadvantaged groups is successfully implemented.</p>	<ul style="list-style-type: none"> Community mobilizers fielded within 4 months of project commencement. Tertiary system completed and operating and WUGs formed and functioning by the end of the project (2011). Farm production is increased according to project targets by 2011. All resettled groups have their incomes restored by 2010. Poor farmers are able to utilize the irrigation system by 2010. Workshops and training programs are completed by 2008. 	<ul style="list-style-type: none"> Progress report and review missions. Farming systems surveys. Records of irrigation service fee collection from tertiary units. Participatory irrigation management surveys to assess the efficiency of WUGs. Social surveys. 	<ul style="list-style-type: none"> Farmers will participate in design and construction of tertiary units. Farmers will adopt new and diversified agricultural production systems. Markets and prices of farm outputs provide adequate incentives for farmer. Microcredit is available and accessible to the poor.
<p>A3. Resettlement</p> <p>Households affected by the infrastructure development fully resettled and compensated</p>	<ul style="list-style-type: none"> 2,173 affected households resettled and compensated without loss of livelihoods by 2008. 	<ul style="list-style-type: none"> Independent monitoring. Project progress reports and review missions. 	<ul style="list-style-type: none"> Affected persons (APs) will accept the compensation packages offered.

Design Summary	Verifiable Indicators	Means of Verification	Assumptions/Risks
<p>according to the resettlement plan.</p> <p>A4. Environmental Management</p> <p>Environmental management plan (EMP) is successfully implemented.</p> <p>Part B. Water Resources Infrastructure</p> <p>B1. Basin Transfer</p> <p>Phuoc Hoa barrage on the Be river and transfer canal from the barrage to Dau Tieng reservoir constructed and operating.</p> <p>B2. Irrigation Development</p> <p>Three irrigation systems of Binh Long, Tan Bien, and Duc Hoa are constructed and operating.</p>	<ul style="list-style-type: none"> Water quality monitoring system is established by end-2004. Acid sulfate soils are reclaimed without reducing water quality. Areas of natural forest in Tan Bien are not reduced and the Lo Go Xe Mat National Park is protected. Transfer facilities able to divert up to 65 m³/s from the Be river to Dau Tieng reservoir by 2009. An additional 48,130 ha of agricultural land areas receiving reliable irrigation supplies by 2011. 	<ul style="list-style-type: none"> Surveys of APs. Water quality records. Fisheries surveys. Forestry surveys. Register of public complaints. Daily records of the system monitoring the basin transfers. Project progress reports and review missions. Project progress reports and review missions. 	<ul style="list-style-type: none"> There are sufficient government funds to cover compensation costs. Government will support the plan and provide adequate staff. Government will support the plan and provide qualified staff. Government will enforce environmental regulations to control polluting industries. Implementation capacity exists within appropriate implementing agencies. The existing DTIS is operating efficiently. The East Main canal in DTIS is upgraded under the World Bank-supported Viet Nam Water Resources Assistance Project (VWRAP).
Project Inputs	Input Resources	Monitoring System	Assumptions/Risks
<p>Inputs</p> <ul style="list-style-type: none"> Support for project management, including consultants. Community mobilizers and logistics. Social support program. Land acquisition and compensation packages. 	<ul style="list-style-type: none"> \$6.6 million (consultants) \$3.5 million (other support) \$2.7 million \$0.3 million \$18.1 million 	<ul style="list-style-type: none"> Project implementation progress reports. Project reviews. Project accounts. 	<ul style="list-style-type: none"> Competent consultants are recruited and their advice followed. Counterpart staff are available. Community mobilizers are experienced in the fields required.

Design Summary	Verifiable Indicators	Means of Verification	Assumptions/Risks
<ul style="list-style-type: none"> • Equipment, reforestation, studies, and monitoring for the environment. • Civil works. <p style="text-align: center;">Total</p>	<ul style="list-style-type: none"> • \$1.9 million • \$101.3 million <p>\$134.4 million (base costs)</p>		<ul style="list-style-type: none"> • Counterpart funding is available when required. • Contractors are competent.

WATER SECTOR ANALYSIS

A. Introduction

1. About one third of the Vietnamese population live below the poverty line, of whom 85% live in rural areas, and 70% of the labor force depends on agriculture. To help reduce income disparities between the rural and urban populations, the Government is placing increased emphasis on rural development to improve incomes. As part of this strategy, high priority is being placed on investments in water resource infrastructure to increase agricultural productivity and reduce rural poverty. Since 1996, the Government has spent about \$120 million annually on upgrading the country's irrigation and drainage systems and on constructing new schemes.

2. Viet Nam has a long history of water management that has developed in response to water shortages during the dry season, a monsoon climate that regularly causes extensive flood damage, and a need to intensify agricultural production. Irrigation, drainage, and flood control have traditionally been the main focus of water sector development with less than 1% of total water resources used to meet municipal and industrial demands. The Government strategies for the water sector have evolved significantly in recent years. Past sector plans were largely supply-driven and mainly focused on investment targets that were determined at the central level. The Government's current approach is more demand-based and a start has been made on adopting integrated water resources planning in river basins.

B. Integrated Water Resources Management

3. To address the sector constraints, the Government has introduced reforms and is developing new policies to improve the efficiency of management and use of water. Most significant in this process was the adoption of the Water Resources Law (WRL) in 1998. Under the WRL, the National Water Resources Council was established in 2000 to advise on water resource management issues for the country as a whole. River basin organizations are being established for water resource planning for large rivers such as the Red, Mekong, and Dong Nai, together with a system of water abstraction rights and wastewater discharge permits, public information, and supporting measures to improve water resources management. In November 2002, the Government took another important step by separating the functions of water resource management from water service delivery. The water resource management functions are now being carried out by the newly established Ministry of Natural Resources and Environment (MONRE) while the Ministry of Agriculture and Rural Development (MARD) has retained the service delivery functions.

4. The institutional, organizational, and regulatory aspects of the WRL will involve significant changes in interagency and basin coordination at the national, provincial, and local levels, and in stakeholder participation. Further, the river basin organizations and irrigation management companies (IMCs) will have increased responsibilities for management, and for technical and financial operation of the systems. This is in line with the Asian Development Bank (ADB) water policy which focuses on establishing an effective policy, legal and regulatory, and institutional environment to implement efficient water resource investments in river basins and for water service delivery investments using accountable and autonomous service providers. In Viet Nam, the ADB country strategy in the sector supports implementation of the new government policy.

C. Irrigation Service Delivery

5. At present, more than 2.6 million ha of agricultural land are irrigated through 75 large and medium-scales schemes and thousands of small-scale systems. These systems are managed by 173 state-owned IMCs and by thousands of agricultural cooperatives and water user groups (WUGs). The IMCs serve about 63% of the country's irrigated area. Irrigation service fees are high in Viet Nam compared with the other countries in the region. On average, the fees are about 220 kg of paddy/ha/crop, representing 8-10% of the crop yield. This is equivalent to about \$46/ha for systems with double cropping. Such high fees are even applied for small run-of-river gravity schemes. Besides the fees, IMCs received subsidies from the central and provincial governments for operation and maintenance (O&M). In 1995-1996, irrigation fees covered 56-60% of the total O&M cost. The present fee structure and the subsidies do not provide an incentive for the IMCs to improve their performance, nor for farmers to use irrigation supplies efficiently.

6. The Government estimates that the country's irrigation systems realize only about 50-60% of the design targets as a result of a number of constraints that limit performance. These include (i) degraded or inadequate irrigation infrastructure (especially at farm level), (ii) weak institutional capacity to manage the systems, and (iii) inadequate integration of agricultural extension to development cropping systems. This low performance contributes to rural poverty, with the effect most severely felt by poor households at the tail end of irrigation systems.

7. The effects of inadequate farm level development are a significant contributor to low performance of systems. An example is the situation in the Dau Tieng irrigation system where a significant portion of the target area is not properly serviced by gravity supplies, even after almost 20 years of operation, because the lower-level canals were never constructed. This is caused by an implementation approach that does not emphasize onfarm development during project implementation, and does not formally allocate funding for this work. Project funding from central level usually only covers the major works. This is on the understanding that provincial governments will fund the onfarm work, although in practice, it is not usually executed during project implementation because provinces rarely have funds at the time. Provinces make efforts to gradually execute the work, although funding tends to be on a limited and ad hoc basis, and even if the work is eventually executed, it becomes a long and inefficient process. Lessons learned from this highlight the need to complete the total irrigation system down to farm level during initial implementation to ensure that benefits are realized.

8. A new strategy is needed to improve system performance in Viet Nam. Hence, policies on water service delivery have shifted to a more decentralized and participatory approach, particularly for irrigation and drainage services. The Government policy now is to promote autonomy for the IMCs and to strengthen the WUGs at the local level. Some provinces have started to transfer O&M of smaller systems to local authorities and WUGs. This will require a move away from the present strategy to implement or improve irrigation with a heavily subsidized engineering approach. This does not encourage the adoption of a more holistic approach whereby IMCs have an incentive to pursue nonphysical interventions to improve system management nor to introduce O&M approaches that minimize the need for rehabilitation. Such improvements require that a set of monitorable performance targets related to better service delivery and increased agriculture production be developed. Outright subsidies should be minimized in favor of a system of matching funds so that interventions proposed will benefit the majority of the end-users. Farmers and their WUGs should be able to borrow money for financing their share of the cost for the improvement works.

EXTERNALLY ASSISTED MAJOR PROJECTS IN THE WATER RESOURCES SECTOR

Programs/Projects ^a	Amount (\$'000)	Type	Source
Second Red River Sector Project, Loan 1855	100,000 10,600	Loans Grant	ADB, AFD NET
Capacity Building for Water Resources Management Project, TA 3528	3,800	TA	ADB, NET
North Vam Nao Flood Control Project	12,900	Grant	AusAID
Viet Nam Water Resources Management Assistance Project	5,400	Grant	AusAID
Water Sector Support Program	13,270 ^b	Grant	Danida
Phan Ri - Phan Tiet Irrigation Project	56,300	Loan	JBIC
Groundwater Development in Northern Provinces	7,225	Grant	JICA
Lower Ayun Irrigation Project	16,500	Loan	Kuwait
Mekong Delta Water Resources Development Project	101,800	Loan	World Bank
Irrigation Rehabilitation Project	100,000	Loan	World Bank

ADB = Asian Development Bank, AFD = Agence Française de Développement, AusAID = Australian Agency for International Development, Danida = Danish International Development Agency, JBIC = Japan Bank for International Cooperation, JICA = Japan International Cooperation Agency, NET = The Netherlands, TA = technical assistance.

^a Includes projects ongoing as of 30 June 2003.

^b This amount does not include the water supply subcomponents.

Source: Asian Development Bank staff estimates.

SUMMARY RESETTLEMENT PLAN

1. **Scope of Land Acquisition and Resettlement.** The Project will require land acquisition for the reservoir and access roads, the transfer canal, the main canals, the primary and secondary canals (from the main canals to the irrigated areas), and for onfarm canals (from secondary canals to farmers' plots). Land acquisition requirements for the reservoir have been minimized through careful selection of project alternatives. Land acquisition will be further minimized through participatory design of canal alignments. Table A4.1 presents the breakdown of land acquisition impacts estimated for each subproject. A total of 2,173 households (11,138 persons) will be affected by land acquisition. The total land to be permanently acquired will be 3,153 hectares (ha). Some land will be required also for temporary use during the construction period. It is estimated that 1,009 households will be severely affected by the permanent loss of agricultural land, and 453 households will lose their houses and will need to be relocated. Only 21 shops or small businesses attached to houses will need to be relocated.

2. **Scope of the Resettlement Plan and Framework.** As part of project preparation, a social analysis was carried out in the project areas. A census and inventory of lost assets was carried out for the barrage, reservoir, and transfer and main canals, and estimates were made of land acquisition impacts of the primary and secondary canals of the three irrigation subprojects. A household socioeconomic survey was conducted on a sample of 25% of the reservoir-affected persons and group interviews were conducted in eight out of the total of 34 project communes. Based on the information collected, a resettlement plan has been prepared for the Project in compliance with ADB's *Policy on Involuntary Resettlement* (1995) and the *Handbook on Resettlement: A Guide to Good Practice*. The resettlement plan will be updated following detailed design during project implementation.

3. A census and inventory of losses for the primary and secondary canals of the subproject irrigation systems will be dependent upon community participation to select the alignment and, as such, can only be done during project implementation. To guide preparation of subproject resettlement plans for the Binh Long, Tan Bien, and Duc Hoa primary and secondary canals, therefore, a resettlement framework has been prepared, also in compliance with ADB's *Policy on Involuntary Resettlement*. For the development of tertiary and onfarm systems, the Project will facilitate a system of equitable contribution of land and labor by farmers within water user groups. The farmers will be responsible for contributing land and labor to build small canals over their land, for which a resettlement plan is not required.

4. **Policy Framework and Entitlements.** The policy framework and entitlements for the Project have built upon Vietnamese laws, principally the 1993 Land Law, amended in 2001, Decree 22/CP (1998), Decree 87/CP (1994), and ADB's *Policy on Involuntary Resettlement* (1995). With the promulgation of Decree 22/CP (24 April 1998), the Government issued legislation regarding resettlement, which approaches the principles of ADB's policy. However, provisions and principles adopted in the resettlement plan for the Project supersede the provisions of the relevant decrees currently in force in Viet Nam wherever a gap exists.

5. **Project Principles.** The following basic principles have been adopted for the Project:

- (i) The principal objective of ADB's policy and the resettlement plan (RP) and resettlement framework is to ensure that populations affected by the Project should be at least as well off, if not better off, than they would have been without the Project. Affected populations should be able to maintain and preferably improve their standard of living and quality of life.

- (ii) The populations affected by the Project are defined as those who may stand to lose, as a consequence of the Project, all or part of physical and nonphysical assets, including homes, homesteads, productive lands, commercial properties, tenancy, income-earning opportunities, social and cultural activities and relationships, as well as other losses that may be identified during the process of resettlement planning.
- (iii) Involuntary resettlement will be minimized by identifying possible alternative project designs, and appropriate social, economic, operational, and engineering solutions that have the least impact on populations in the project area.
- (iv) A census and detailed measurement survey and baseline socioeconomic survey will be carried out for all irrigation subprojects after detailed design of each subproject and in preparation of an RP for each subproject.
- (v) The cut-off date for compensation eligibility for physical assets affected by the barrage, reservoir, and transfer and main canals will be the date of the completion of the census and the detailed measurement survey after detailed design has been completed for these components. Affected people and local communities will be informed of the cut-off date for each Project component. People moving into the area impacted upon the project component after the cut-off date will not be entitled to compensation and assistance under the Project.
- (vi) All project-affected people will be entitled to be compensated for their lost assets, incomes, and businesses at full replacement cost and provided with rehabilitation measures sufficient to assist them to improve or at least restore their pre-project living standards, income levels, and productive capacity.
- (vii) All affected populations will be equally eligible for compensation and rehabilitation assistance, irrespective of tenure status, social or economic standing, and any such factors that may discriminate against achieving the objectives outlined above.
- (viii) In the case of population relocation, efforts shall be made for the existing social and cultural institutions of the people being resettled and host community to be maintained to the extent possible.
- (ix) Preparation of RPs (as part of subproject preparation) and their implementation are to be carried out with the full participation of affected people.
- (x) Adequate budgetary support will be fully committed and be made available to cover the costs of land acquisition and resettlement and rehabilitation within the agreed implementation period.
- (xi) ADB shall not approve any civil works contract for any subproject to be financed from the loan proceeds unless the Government has completed satisfactorily and in accordance with the approved RP for that subproject compensation payment and relocation to new sites, and ensured rehabilitation assistance is in place prior to obtaining possession and rights to the land. The exception is the Phuoc Hoa barrage where construction of the barrage may commence (in an off-river location) before clearing the upstream inundation. This area will be cleared before permitting the contractor to close the natural flow of the river.
- (xii) Detailed RPs for implementation will be translated into the local language and placed in project and commune offices for the reference of affected people as well as any interested groups.
- (xiii) Appropriate reporting, monitoring, and evaluation mechanisms will be identified and set in place as part of the resettlement management system. Monitoring and evaluation of the land acquisition process and the final outcome will be conducted independently of the Executing Agency.

6. **Entitlement Matrix.** The project entitlements were designed to cover compensation, resettlement, and rehabilitation for lost assets and restore or enhance the livelihoods of all categories (directly and indirectly affected, titleholders and non-titleholders) of affected people. The entitlement matrix for the Project summarizes the main types of losses and the support entitled for each type of loss.

7. **Ethnic Minorities and Disadvantaged Groups.** The social analysis shows that 2% of the population in the project area are ethnic minorities, and although there are some pockets of concentration, they are generally integrated into the larger population. Special attention will be given to identifying and addressing the special needs of this group plus other disadvantaged groups such as the landless, poor, women-headed households, the disabled, and war veterans. They will be assisted through the project's Social Support Program under Component A2.

8. **Resettlement Strategy.** Households that have to relocate will participate in identifying and selecting options for government assistance to move to either group or individual relocation sites or to receive cash compensation and make their own arrangements for relocation.

9. **Income Restoration.** Agricultural households who are severely affected through loss of more than 20% of productive assets will be assisted to purchase replacement land or increase productivity on remaining land, or learn new income-generating skills through the Social Support Program. Businesses will be assisted to relocate to viable new sites.

10. **Participatory Process of Resettlement Planning and Implementation, and Grievance Mechanism.** There was an extensive consultative process during the social analysis and resettlement planning period of the feasibility study. Resettlement planning and RP preparation and implementation during project implementation will follow the Project's participatory approach using facilitators to mobilize the affected and beneficiary communities to participate in alignment selection and design, inventory of losses and socioeconomic survey, validation of compensation rates and entitlements, delivery of entitlements, design and delivery of the Social Support Program to disadvantaged and severely affected households, monitoring of impacts and benefits, and design and participation in a grievance mechanism.

11. **Institutional Arrangements.** Affected people will be organized by the implementing agencies (departments of agriculture and rural development [DARDs]), under guidance of the consultants, to participate in alignment selection and design, inventory of losses, and resettlement planning, implementation, and monitoring. The intention is to make resettlement part of the participatory approach that is integral to the success of the Project. This will be closely linked to the social mobilization activities under Component A2.

12. **Monitoring of Resettlement Planning Implementation and Impacts.** The implementing agencies will be responsible for internal monitoring of the RPs and the impacts. A qualified independent agency such as a nongovernment organization (NGO) or social science institute will be contracted for external monitoring and evaluation of the resettlement process and impacts. Findings will be regularly fed back into management decisions.

13. **Cost Estimates.** The estimated base cost for resettlement planning, RP preparation, implementation, management and monitoring for the RP of the barrage, reservoir area, and main and transfer canals is \$10.7 million. The estimated base cost of the three irrigation subprojects is \$7.5 million. Hence, the total estimated resettlement base cost is \$18.2 million (see Table A5.1).

14. **Implementation Schedule.** All resettlement activities will be coordinated with the civil works schedule. ADB will not approve any civil works contract for any subproject to be financed from the loan proceeds unless the Government has completed satisfactorily and in accordance with the approved RP for that subproject compensation payment and relocation to new sites, and ensured that rehabilitation assistance is in place prior to obtaining possession and rights to the land.

Table A4.1: Summary of Impacts on Land and Structures for the Project

Physical Component	Impact on Household Structures					
	Severe Impact on Households			Marginal Impact	Total Impact	
	Shops/ Houses ^b			HH	HH	Persons
	Residential ^a	Agricultural				
Phuoc Hoa Barrage and Reservoir	109	9	435	215	759	4,083
Access Road	25	0	31	0	56	275
Transfer Canal	131	12	114	40	285	1,349
Binh Long Irrigation System	0	0	73	109	182	892
Tan Bien Irrigation System	110	0	173	150	433	2,296
Duc Hoa Irrigation System	78	0	183	197	458	2,243
Total	453	21	1,009	711	2,173	11,138
Loss of Land (ha)						
	Residential	Agricultural	Ponds	Forest	Unused	Total
Phuoc Hoa Barrage and Reservoir	2	863	12	8	293	1,178
Access Road	0	37	0	0	0	37
Transfer Canal	8	392	1	0	3	404
Binh Long Irrigation System	4	256	0	0	0	260
Tan Bien Irrigation System	4	616	0	0	0	620
Duc Hoa Irrigation System	11	643	0	0	0	654
Total	29	2,807	13	8	296	3,153

HH = household, ha = hectare.

^a Includes shops and houses.

^b Combined shops and houses are also included in the column for Residential.

Source: Asian Development Bank staff estimates .

Table A4.2: Entitlement Matrix

Item	Type of Loss	Application	Definition of Entitled Person	Compensation Policy
1	Temporary loss of arable land	Loss of use of the land for a period less than 1 year	User with permanent right (legal and legalizable)	<ul style="list-style-type: none"> (i) No compensation for land if returned to original user; (ii) Cash compensation for loss of crops and trees at market prices; (iii) Compensation for loss of net income from subsequent crops that cannot be planted for the duration of the lease; and (iv) Restoration of land to its previous or better quality.
	Permanent loss of arable land	Less than 20% of total affected assets lost due to acquisition of arable land	Legal user with permanent rights to use the affected land, and temporary user who will be legalized before compensation as a permanent user	Affected persons (APs) will be entitled to: <ul style="list-style-type: none"> (i) cash compensation for acquired land at 100% of replacement cost, and (ii) cash compensation for crops and trees at market price.
		Marginal impact on household income and living standards		
		More than 20% of total affected assets lost due to acquisition of arable land for the inundated area and the right-of-way (ROW) of the canal network	Legal user with permanent rights to use the affected land	APs will be entitled to cash compensation for crops and trees at market price, in addition to one of the following options: <ul style="list-style-type: none"> (i) full title to land of equal area and productivity acceptable to APs, in the same or surrounding communes; or (ii) cash compensation for lost land at 100% replacement cost, at the informed request of APs and a rehabilitation package of allowances and income restoration under the Social Support Program.
2	Loss of residential land (no structures affected)	The approach taken is restoration of income loss.		
		Severe impact on household income and living standards		
		Illegal user	Illegal user of land without registration	<ul style="list-style-type: none"> (i) Assistance for acquired land corresponding to the investment in the land, and (ii) cash compensation for crops and trees at market price
		Land acquired without structures built therein	Legal user of the affected land with permanent rights to use land	APs will be entitled to cash compensation for land at 100% of replacement cost of the land acquired.

Item	Type of Loss	Application	Definition of Entitled Person	Compensation Policy
3	Loss of residential land (with structures affected)	AP has remaining legal residential land beyond the inundated area or beyond the ROW of the canal network of at least equal to 100 m ²	Legal user of the affected land with permanent use rights	APs will be entitled to the following: (i) cash compensation for land acquired at 100% of replacement cost, and (ii) reorganization on remaining legal land behind the inundated area or beyond the ROW of the canal network and issued with Land Use Right Certificate in due time.
	Loss of residential land (with structures affected)	AP has remaining permanently legal or legalizable residential land less than 100 m ² in rural area.	Legal user of the affected land with permanent use rights	APs will be entitled to one of the following options: (i) Group Relocation: If there are sufficient numbers of APs warranting development of a group relocation site, full title to a plot on a fully serviced resettlement site (access and internal roads, water, electricity, drainage, access to services such as school and health center); or (ii) Individual Relocation: Full title to a site equivalent to their area of legal land lost, and sufficient cash at replacement cost to develop their own infrastructure and services (access road, water, electricity if available, landfill); or (iii) Self-Relocation: Cash in lieu of land at replacement cost, and APs will make their own arrangements for relocation. Relocating APs will be entitled to a rehabilitation package (subsistence and transport allowances to assist during the transition period). APs will be entitled to compensation or assistance for their structures according to the legal status of the structures.
	Structures	Structures located in the inundated area or within the ROW of the canal network or other project components	Legal owner of the affected structure	APs with legal right to build the affected structure will be entitled to compensation at 100% of replacement cost of the affected structure in material, cash, or a combination of the two. No deduction will be made for depreciation or salvageable materials.
	Secondary APs	APs affected by land acquisition for borrow areas or individual relocation	Legal user with permanent or temporary use rights who are legalizable	Because all secondary APs are affected through loss of arable land, the provision of Section 1 (Loss of arable land) will apply to these secondary APs.

Item	Type of Loss	Application	Definition of Entitled Person	Compensation Policy
5	Loss of business income for relocated shopkeepers	Loss of business income for relocated shopkeepers	Relocating owner of the affected shop	Relocating APs will be entitled to: (i) compensation for structure at full replacement cost in material, cash or a combination of the two; no deduction will be made for depreciation or salvageable materials; (ii) a special income transition allowance of D1.4 million to facilitate restoration of income; (iii) transport allowance; and (iv) priority to relocate to a place with equal or better commercial potential.
6	Allowances	Materials transport allowance	Relocating APs	All relocating APs are entitled to assistance from district resettlement committees (DRCs) to transport household effects and salvaged and new building materials to relocation sites. If requested by APs, this assistance will be provided in the form of cash (D420,000).
		Transition subsistence allowance	Relocating APs and severely affected farmer APs	All relocating APs and severely affected farmers are entitled to between D3 million and D5 million subsistence allowance during transition period.
		Income transition allowance for shopkeepers relocating	APs who have businesses and are to be relocated	APs are entitled to D1.4 million cash payment of an income transition allowance to provide for loss of income during the transition period.
		Incentive allowance for households that move on time	Relocating AP	Households that move according to the planned schedule are entitled to a special allowance D2 million–D3 million.
		Allowance for persons who receive social allowance from the state	Beneficiary of social allowance who relocate	Beneficiaries of social allowance who are relocated are entitled to a special allowance of D5 million.
7	Loss of standing crops	Crops located in the less than 20-year flood level of the reservoir area or within the ROW of the canal network or affected by other project component	Households that cultivate the land	APs are entitled to compensation in cash at market value.
8	Loss of trees	Trees located in the 20-year flood level of the reservoir area, within the ROW of the canal network or affected by other project component	Households that occupy the land where trees are located irrespective of land tenure status	APs are entitled to compensation in cash at market value on the basis of type, age, and productive value.
9	Loss of graves	Graves located in the affected areas	Households that own the graves	APs are entitled to cash compensation for all costs of excavation, movement, and reburial.

Item	Type of Loss	Application	Definition of Entitled Person	Compensation Policy
10	Loss of community assets	Community buildings , structures, community forest/grazing land/ irrigation systems affected by temporary or permanent land acquisition or spoil disposal	Village, ward, government unit	(i) Restoration of affected community buildings and structures to at least previous condition, or (ii) replacement in areas identified in consultation with affected communities and relevant authorities Note: If income loss is expected (e.g., irrigation, community forest, community grazing land), the village is entitled to compensation for the total production loss (over 3 years); this compensation should be used collectively for income restoration measures and/or new infrastructure.
11	Loss of income of employees or hired laborers	Employees of enterprises affected or farm laborers affected	Temporarily affected (while business is reorganizing) within remaining land Permanent job loss due to relocation of business or loss of agricultural land	(i) Cash compensation for lost salary/wages for each month they cannot work, or (ii) assistance in securing new employment, including relevant skills training expenses if required (iii) Cash compensation for 6 months salary/wages; or (iv) cash compensation for remaining contract period, whichever is higher; (v) severance pay for employees; and (vi) rehabilitation under the Social Support Program.
12	Loss of income from upstream fishing	Income from fisherfolk upstream of the barrage may be affected by reduced fish in the river after barrage construction and river diversion	Households that fish in the Song Be upstream from the barrage and whose fishing supply and, therefore, household income is potentially severely reduced (i.e., more than 20% of household income lost)	APs will be assisted to benefit from aquaculture in the reservoir. Any necessary training will be provided under the Project. During the transition period until the reservoir aquaculture can be developed, income rehabilitation assistance will be provided.
13	Temporary impact during construction	Damage by contractors to private or public structures or land	Owner or pers on with use rights	(i) The contractor will be required to pay compensation immediately to affected families, groups, communities, or government agencies. (ii) Damaged property will be restored immediately to its former condition.
14	Income restoration/ Social Support Program for severely affected and vulnerable groups	APs lose more than 10% of their productive assets (agricultural or forestry land or business) due to land acquisition for the reservoir or feeder canal and vulnerable APs.	(i) APs losing more than 20% of agricultural or forestry land, or (ii) other vulnerable APs (poor, landless, and/or female-headed households, etc.).	APs entitled to income restoration assistance from the Social Support Program: agricultural/aquacultural extension assistance to intensify use of existing land, skills training for a new skill (and subsistence allowance for the trainee during the duration of the training program), access to existing credit programs and credit management, literacy training.

COST ESTIMATES AND FINANCING PLAN

Table A5.1: Summary of Project Cost Estimates
(\$ million)

Component	(\$ million)			Foreign Exchange as % of Total	Total as % of Total Base Costs
	Foreign	Local	Total		
A. Part A: Support for Institutional and Integrated Development					
1. Project and Sustainable Management					
a. Management Services	0.79	2.73	3.52	22	3
b. Consultants	6.57	0	6.57	100	5
Subtotal	7.36	2.73	10.09	73	8
2. Support for Onfarm and Social Development	0.27	2.72	2.99	9	2
3. Resettlement	0.12	18.02	18.14	1	13
4. Environmental Management	0.27	1.59	1.87	15	1
Subtotal Part A	8.01	25.06	33.08	24	25
B. Part B: Water Resources Infrastructure					
1. Phuoc Hoa Basin Transfer					
Barrage	13.29	14.20	27.50	48	20
Transfer Canal	10.88	12.91	23.79	46	18
Subtotal	24.17	27.12	51.29	47	38
2. Binh Long Irrigation System					
Main Canals	0.44	0.24	0.68	64	1
Primary/Secondary Canals	1.63	1.23	2.86	57	2
Tertiary and Lower Canals	0.46	0.48	0.94	49	1
Subtotal	2.53	1.95	4.48	56	3
3. Tan Bien Irrigation System					
Main Canals	1.01	4.06	5.07	20	4
Primary/Secondary Canals	4.70	8.25	12.96	36	10
Tertiary and Lower Canals	0.28	1.85	2.14	13	2
Subtotal	6.00	14.16	20.16	30	15
4. Duc Hoa Irrigation System					
Main Canals	1.81	7.24	9.06	20	7
Primary/Secondary Canals	4.97	8.50	13.48	37	10
Tertiary and Lower Canals	0.38	2.49	2.87	13	2
Subtotal	7.17	18.24	25.41	28	19
Subtotal Part B	39.87	61.47	101.34	39	75
Total Base Costs	47.89	86.54	134.42	36	100
Physical Contingencies ^a	4.79	8.65	13.44	36	10
Price Contingencies ^b	4.88	8.92	13.81	35	10
Total Project Costs	57.56	104.11	161.67	36	120
Financial Charges During Implementation	2.51	0.45	2.95	85	2
Total Costs to be Financed	60.06	104.56	164.62	36	122

Note: Figures do not always add up due to rounding.

^a Physical contingencies are estimated at 10% for all items^b Price contingencies are estimated using constant purchasing parity exchange rate with foreign inflation of 2.5% (year 1), 2.6% (years 2-4), and 2.3% (years 5-7)

Source: Asian Development Bank staff estimates.

Table A5.2: Components by Financiers
(\$ million)

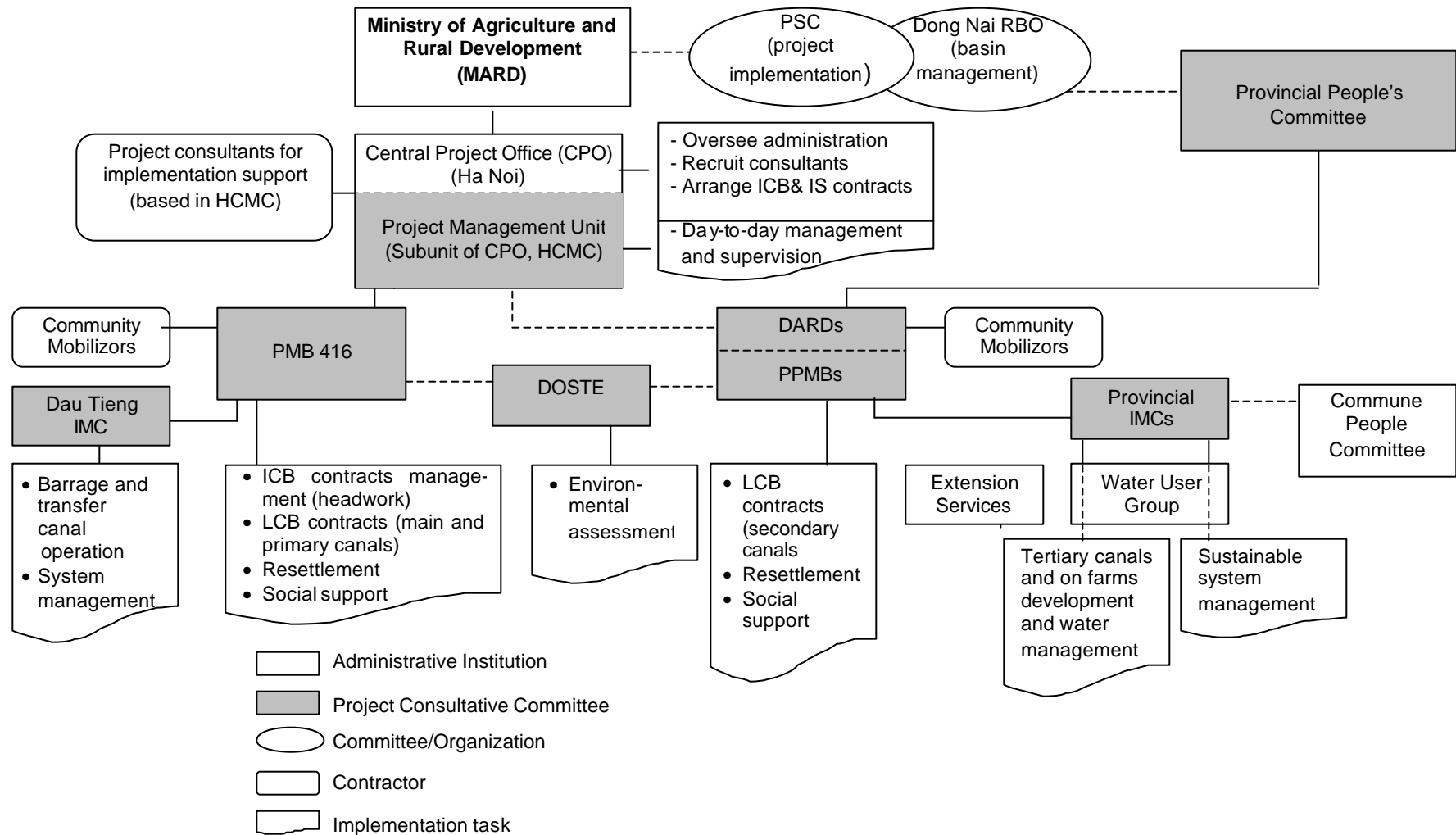
Item	ADB		AFD		Farmers	Govt		Total		
	Amount	%	Amount	%		Amount	%	Amount	%	
A. Part A: Support for Institutional and Integrated Development										
1. Project and Sustainable Management										
a. Management Services	3.65	88.8	0	0	0	0	0.46	11.2	4.11	2.5
b. Consultants	6.89	90.0	0.77	10.0	0	0	0.00	0.0	7.65	4.6
Subtotal	10.54	89.6	0.77	6.5	0	0	0.46	3.9	11.77	7.1
2. Support for Onfarm and Social Development	0.93	26.3	2.31	64.8	0	0	0.31	8.9	3.56	2.2
3. Resettlement	1.89	8.9	0	0	0	0	19.37	91.1	21.25	12.9
4. Environmental Management	1.98	91.5	0	0	0	0	0.18	8.5	2.16	1.3
Subtotal Part A	15.34	39.6	3.07	7.9	0	0	20.32	52.5	38.73	23.5
B. Part B: Water Resources Infrastructure										
1. Phuoc Hoa Basin Transfer										
Barrage	28.29	86.2	0	0	0	0	4.54	13.8	32.83	19.9
Transfer Canal	24.67	86.2	0	0	0	0	3.94	13.8	28.61	17.4
Subtotal	52.96	86.2	0	0	0	0	8.48	13.8	61.44	37.3
2. Binh Long Irrigation System										
Main Canals	0.72	86.2	0	0	0	0	0.11	13.8	0.84	0.5
Primary/Secondary Canals	3.01	86.1	0	0	0	0	0.49	13.9	3.49	2.1
Tertiary & Lower Canals	0.58	49.3	0	0	0.48	41.0	0.11	9.7	1.17	0.7
Subtotal	4.31	78.3	0	0	0.48	8.7	0.71	13.0	5.50	3.3
3. Tan Bien Irrigation System										
Main Canals	5.26	85.0	0	0	0	0	0.93	15.0	6.19	3.8
Primary/Secondary Canals	0	0	14.46	91.0	0	0	1.42	9.0	15.88	9.6
Tertiary & Lower Canals	0	0	0.61	23.0	1.93	72.4	0.12	4.7	2.66	1.6
Subtotal	5.26	21.3	15.07	60.9	1.93	7.8	2.47	10.0	24.73	15.0
4. Duc Hoa Irrigation System										
Main Canals	9.63	86.3	0	0	0	0	1.54	13.7	11.16	6.8
Primary/Secondary Canals	0	0	15.03	91.0	0	0	1.49	9.0	16.52	10.0
Tertiary & Lower Canals	0	0	0.82	23.0	2.59	72.4	0.17	4.7	3.58	2.2
Subtotal	9.63	30.8	15.86	50.7	2.59	8.3	3.19	10.2	31.26	19.0
Subtotal Part B	72.15	58.7	30.93	25.2	5.00	4.1	14.86	12.1	122.94	74.7
Total Project Costs	87.49	54.1	34.00	21.1	5.00	3.1	35.18	21.8	161.67	98.2
Financial Charges During Implementation	2.51	84.8	0	0	0	0	0.45	15.2	2.95	1.8
Total Disbursement	90.00	54.7	34.03	20.7	5.00	3.0	35.63	21.6	164.62	100.0

ADB = Asian Development Bank, AFD = Agence Française de Développement, Govt = government.

Note: Figures do not always add up due to rounding.

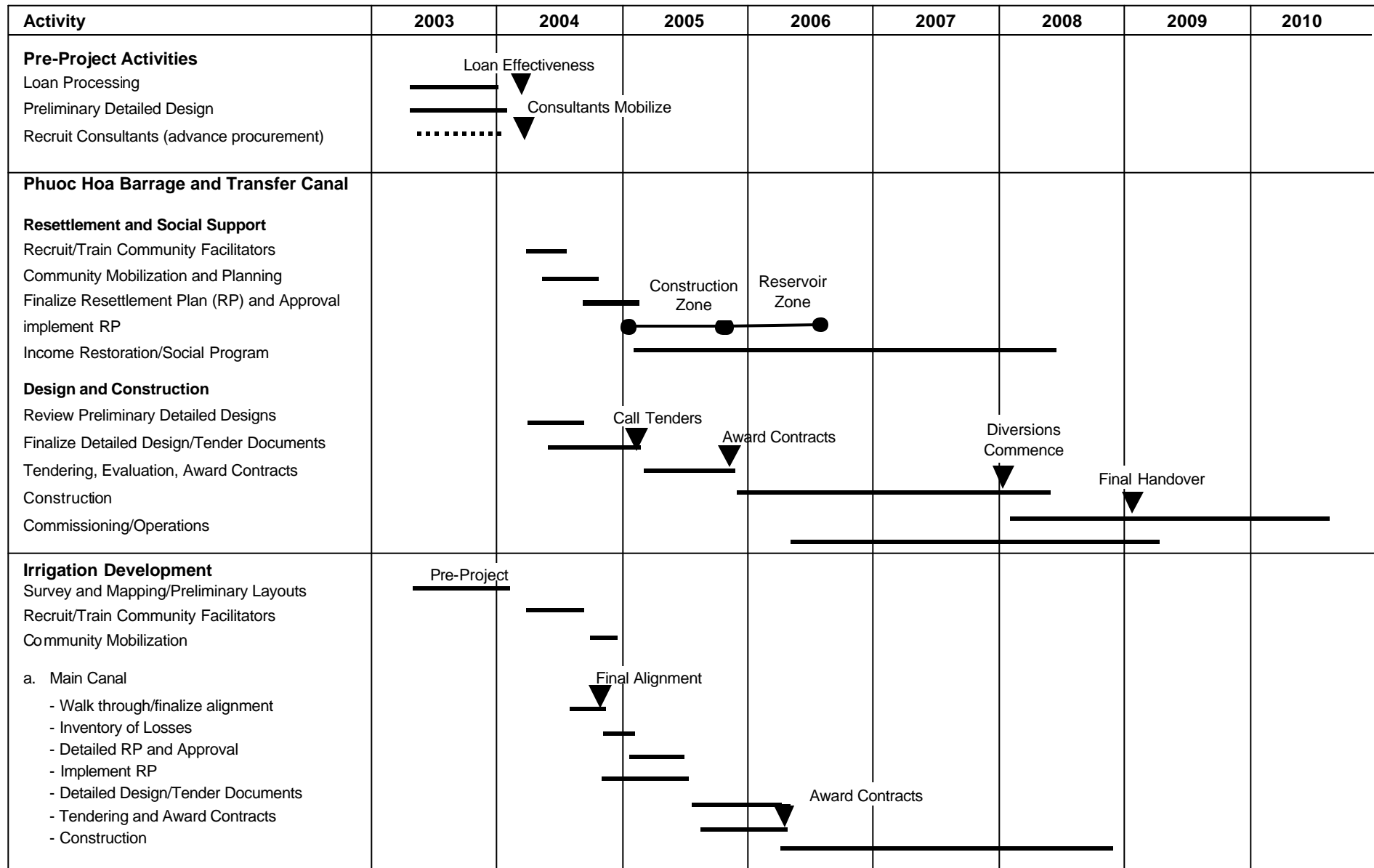
Source: Asian Development Bank staff estimates.

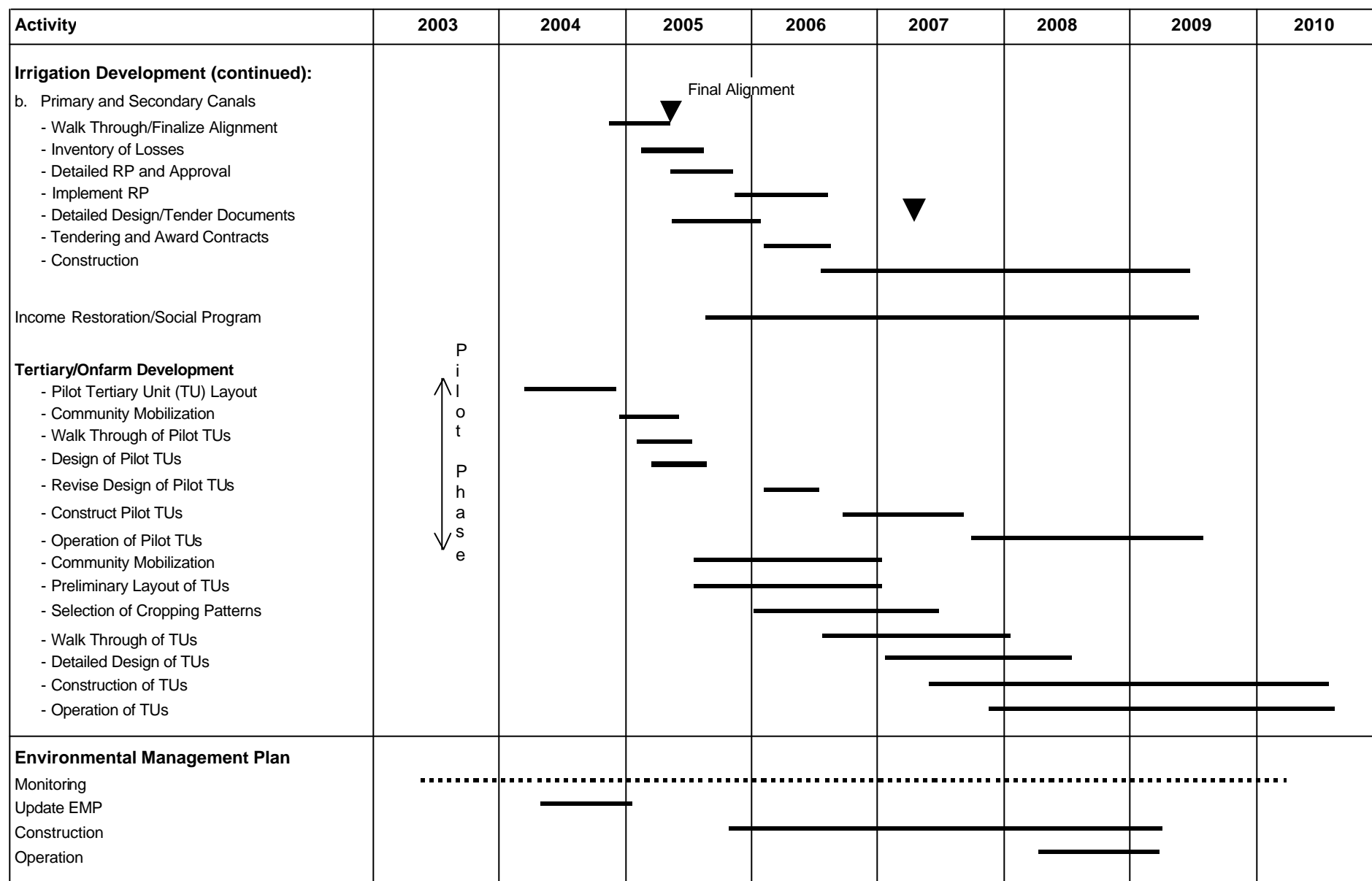
PROJECT ORGANIZATION CHART



DARD = department of agriculture and rural development; DOSTE = departments of science, technology, and environment; HCMC = Ho Chi Minh City; ICB = international competitive bidding; IMC = irrigation management company; LCB = local competitive bidding; NGO = nongovernment organization; PMB = project management board; PMU = project management unit; PPMB = provincial project management board; PSC = Project Steering Committee.

IMPLEMENTATION SCHEDULE





INDICATIVE LIST OF PROCUREMENT PACKAGES

Package	Implementing Agency	Indicative Cost (\$ million)	Number of Packages	Procurement Method
Phuoc Hoa Barrage and Transfer Canal	PMB416	51.3	1	ICB
Binh Long Main Canal	PMB416	0.7	1	LCB
Tan Bien Main Canal	PMB416	5.1	1	ICB
Duc Hoa Main Canal	PMB416	9.1	1	ICB
Binh Long Primary and Secondary Canals (separate package for each primary canal unit)	PMB416 and PPMBs - Binh Phuoc - Binh Duong	2.9	4	LCB ^a
Tan Bien Primary and Secondary Canals (separate package for each primary canal unit)	PMB416 and PPMB Tay Ninh	13.0	9	LCB ^a
Duc Hoa Primary and Secondary Canals (separate package for each primary canal unit)	PMB416 and PPMB Long An	13.5	16	LCB ^a
Consulting Services	MARD	6.8	1	Service Contract
Community Mobilizers (separate packages for PMB416 and each PPMB)	MARD and PPMBs	2.0	5	Service Contract
Total (excluding contingencies and taxes)		104.4		

ICB = international competitive bidding, LCB = local competitive bidding, MARD = Ministry of Agriculture and Rural Development, PMB416 = Project Management Board 416, PPMB = provincial project management board.

^a LCB will be adopted provided the contract value of a complete primary canal unit is \$2 million or less, otherwise ICB will be adopted.

Source: Asian Development Bank staff estimates.

TERMS OF REFERENCE FOR CONSULTING SERVICES

1. The consultants will assist with overall coordination of the Project through relevant agencies at national, provincial, district, commune and tertiary level. They will also coordinate with the agencies involved in the modernization of the Dau Tieng irrigation system (DTIS) under the Viet Nam Water Resources Assistance Project (VWRAP). The tasks covered in the terms of reference (TOR) require integrated management through the deployment of a team of specialists covering a wide range of disciplines, as summarized in Table A9 below.

Table A9: Summary of Consulting Services^a

Expertise	Person-Months	
	International	Domestic
Part A: Support for Institutional and Integrated Development		
Team Leader/Integrated Management Specialist	46	0
Deputy Team Leader/Irrigation System Management	0	66
Resettlement	14	80
Participatory Irrigation Management	10	56
Social Support	3	12
Irrigation Engineers (tertiary design and construction)	0	108
Irrigation Agronomy/Extension	0	48
Agricultural Extension	6	0
Training Coordinator	0	24
Irrigation System Institutions	10	56
Environment	10	30
Environmental Technical Specialist	8	22
Unallocated	12	30
Subtotal Part A	119	532
Part B: Water Resources Infrastructure		
Senior Hydraulic Structures Design Engineer	10	17
Geotechnical	2	3
Mechanical Design Engineer	3	6
Irrigation Design Engineer	3	15
Contracts Engineer	12	36
Chief Resident Engineer	36	0
Resident Engineers (1 international, 4 domestic)	16	94
Systems Operations Specialists	7	32
Unallocated Specialists	6	12
Subtotal Part B	95	215
Total (A+B)	214	747

^a The expertise areas and inputs are indicative and are to be firmed up between Ministry of Agriculture and Rural Development and the selected consultants based on an agreed methodology and work program.
Source: Asian Development Bank staff estimates.

A. Project Management

2. The consultants will assist with overall management of project implementation, assisting to plan and implement an integrated approach. This will require:

- (i) Working with Ministry of Agriculture and Rural Development (MARD, the Executing Agency), its Central Project Office (CPO) in Hanoi and the Project Management Unit (PMU) in Ho Chi Minh City (HCMC); and implementing agencies (IAs) (Project Management Board [PMB] 416), departments of agriculture and rural development (DARDs), their provincial project management boards [PPMBs], and irrigation management companies [IMCs]) to itemize the key tasks and identify the resources and schedules required.
- (ii) Supporting the project steering committee, the project consultative committee and the task force for sustainable system management.
- (iii) Detailing the Project's strategy for supporting the agriculture transformation in the project area and supporting its implementation.
- (iv) Ensuring that implementation schedules reflect the envisaged integrated approach, with phasing of all the interrelated activities.
- (v) Identifying tasks on the critical path, and ensure these are given particular attention. Assisting with all aspects of project administration, performance and monitoring, and preparation of project reports.¹
- (vi) Provide on-the-job training and capacity building for counterparts.

3. The consultants will assist with implementation of the Project's strategy to support the transformation of the present predominantly rain-fed agriculture to high-value irrigated agriculture production systems. This will be the main task of the consultants' core management team (team leader and deputy team leader). It will require establishing efficient working relationship with the central and provincial agencies directly and indirectly involved in implementation of the Project under the guidance of the project consultative committee and the project steering committee. The team will also need to seek synergies between the project activities and programs being undertaken by nonproject agencies (government and nongovernment) that would support the implementation of the Project's agriculture transformation strategy. Furthermore, the core management team will assist in introducing mechanisms for sustainable management of the Dau Tieng-Phuoc Hoa system (paras. 17 and 18).

4. **Monitoring Project Performance.** As part of the project management role, the consultants will assist to establish the project performance management system (PPMS). This will include assisting IMCs and WUGs to monitor and evaluate implementation of their agreed operation plans, identify performance constraints, and formulate and implement practical remedial measures. Annual performance evaluations will be conducted as a basis for refined operation planning, and assessments of the project impacts on poverty.

B. Preparatory Activities

5. The consultants will undertake a comprehensive review of the Project's feasibility study report and other relevant background documents including those pertaining to the Irrigation Modernization Component of VWRAP. The following aspects require attention, particularly at the farm and tertiary levels: water balance estimates, land capability, farming and irrigation systems, target groups, existing institutional arrangements, and proposed improvements for efficient water management along hydraulic boundaries. In particular, the feasibility study advocates the ADB-financed technical assistance pilot work in Nghe An and Thanh Hoa provinces as a successful institutional and participatory model for emulation under the Project.

¹ These reports will include, among others, quarterly progress reports and the project completion report.

6. The consultants will review water balance projections from the perspective of future cropping and irrigation systems, and prepare tentative operation plans for dissemination to farmers as a basis for their informed collective decision making. Indicative considerations include water requirements for different crops under different conditions and soil types.² The supply of irrigation for fruit trees and vegetables by repumping canal seepage losses, and practical alternatives for irrigating extensive areas of grain legumes at night will also be considered.

7. Based on the above considerations, the consultants will prepare a technical design brief prior to commencement of detailed design for irrigation development in the three irrigation subprojects of Binh Long, Tan Bien, and Duc Hoa. The design and specifications for irrigation development of these three areas will be in accordance with international practice and based on the criteria used in the Project's feasibility study where appropriate. The design brief will describe proposed criteria and technical specifications and highlight any areas where these may deviate from current Vietnamese standards. The criteria should include revised canal capacities, particularly of tertiary and secondary canals. On this basis, an implementation manual setting out integrated technical procedures for a participatory design process should be prepared (para. 9).

C. Support for Integrated Development and Management

1. Onfarm and Social Development³

8. The consultants will assist the DARDs to implement an integrated program for community mobilization, agricultural and social support, and organizing farmers in water user groups (WUGs)—the onfarm and social development program (OSDP). The OSDP will be implemented by the PPMBs in association with other DARD organizations and the provincial IMCs through local organizations (such as social science institutes or NGOs)⁴ and local consultants. The consultants will arrange and provide training, technical assistance, and monitoring.

9. To develop the OSDP in each of the three irrigation subprojects, the consultants will undertake a participatory diagnosis of farmer's production constraints and cultural practices that influence farmer decisions about cropping patterns and calendars, and their ability to cooperate in onfarm water management through WUGs. The diagnosis will also identify poor and vulnerable groups and their specific needs. Based on the diagnosis, the consultants will develop:

- (i) Packages for agriculture and social support, and identify agencies that can be associated with the implementation of these packages.
- (ii) A process to establish WUGs and model regulations to clarify the role of the WUG in the design of the tertiary canal system and its operation and maintenance.

² This will include water requirements for rice percolation losses versus realistic operational losses and efficiencies to accommodate tertiary rotations for intermittent irrigation of crops other than rice.

³ Onfarm development includes the construction of tertiary canal infrastructure and the lower order (farm) distribution system, and investments by individual farmers (e.g. tubewells, perennial crops, etc).

⁴ The organizations will have a proven track record in large-scale social mobilization and community development. Selection will take into consideration attitudes and values of the candidate organizations, as well as formal qualifications and experience.

- (iii) A model contract between the WUG and the IMC for the delivery of irrigation supplies.
- (iv) Procedures for field-testing methodologies and processes for the implementation of the OSDP during a pilot phase after which an implementation manual will be prepared. The implementation manual will be revised regularly during project implementation to incorporate the experiences and lessons learned.

10. The consultants will prepare TOR and output-based service contracts for the local organizations that will assist the PPMBs to implement the OSDP, and assist in their recruitment. Upon deployment of the organizations, the consultants will arrange training of the PPMBs and the organizations' field staff, and provide technical assistance and on-the-job training during implementation of the program. The consultants will also assist the PPMBs to monitor the performance of the local institutions.

11. The consultants will assist the PPMBs and their locally subcontracted consultants to adopt a fully participatory approach for the design and construction of the tertiary canals. Specific tasks will be to:

- (i) Develop a process to design and construct the tertiary system with the full participation of the WUGs. It is proposed that this will involve the tertiary systems being constructed by the WUGs with materials for the structures supplied by the Project, and the PPMBs (and their consultants) providing technical assistance.
- (ii) Review the available topographic, cadastral, soils, and land capability information and recommend mapping standards to facilitate the participatory layout and design of the irrigation system. This will allow identification of suitable small-scale reservoir sites for night storage (if needed), and preparation of preliminary canal system layouts (including tertiary units), for refinement and agreement during farmer walk-throughs and subsequent participatory design.
- (iii) Develop arrangements for the participation of the WUGs in the design of the primary and secondary canal systems. This will be confined to adjusting preliminary canal and drain routes selected by the PPMB engineers to minimize compensation and resettlement requirements and disruption to existing landholdings. The WUGs will decide the optimum location of the tertiary turnouts as an integral part of the secondary canal design.

12. For design and construction of the tertiary, secondary, and primary canal systems (including drainage systems if required), the consultants will assist the PMB416 and PPMBs to:

- (i) develop design criteria, standards, and specifications;
- (ii) develop procurement documents, TOR, and a model contracts for the selection and recruitment of local consultants for design and construction supervision based on ADB guidelines;
- (iii) develop procurement documents for the civil works contracts for the canal systems on the basis of ADB standard bidding documents for local competitive bidding;
- (iv) assist the PPMBs to supervise and monitor the consultants and the contractors; and
- (v) ensure adoption of the participatory process in the design and construction of the canal systems.

13. The consultants will assist the PPMBs and the IMCs to select and develop representative pilot tertiary units for field demonstrations. These will be the center of appropriate field trials and demonstrations to support farmer field days. They will also develop and demonstrate suitable management practices. These will include, among other things, tertiary rotations to facilitate intermittent irrigation of extensive grain legumes and efficient land soaking for the first wet season rice crops.

14. For each of the three irrigation subareas, the consultants will assist provincial IMCs and WUGs to:

- (i) develop performance objectives at the tertiary as well as at the higher-order canals under the management of the IMC;
- (ii) based on the performance objectives, jointly develop an operation plan for coordinated water delivery schedules to optimize utilization of the available water resources and the farmers' land, labor and management resources;
- (iii) monitor and evaluate implementation of their operation plans, identify performance constraints, and formulate and implement practical remedial measures; and
- (iv) conduct annual performance evaluations with the participation of the WUGs as a basis for refined operation planning.

15. **Baseline and Follow-Up Surveys.** The consultants will assist the IMCs to design and facilitate participatory baseline surveys in tertiary units during the year prior to their commissioning.⁵ The surveys are intended to further stimulate demand, accelerate adoption of agricultural transformation, and provide a platform for subsequent WUG participation in operation planning and system management. Upon commissioning of the systems, follow-up surveys will be conducted to monitor project benefits and evaluate impacts. Special attention will be given during the design of the surveys to ensure that project impacts on the poor are captured, including quantitative and qualitative assessments of the levels and nature of poverty and vulnerability.

16. **Social Support.** The consultants and community mobilizers will assist the IAs to develop a participatory social support program for disadvantaged and vulnerable groups, building on the program outlined in the feasibility study. Appropriate activities will depend on the specific needs of each group identified. Indicative activities include:

- (i) conduct preliminary screening of basic characteristics and issues in each commune including rapid social assessments to identify and locate the main target groups;
- (ii) conduct social and cultural assessments in each irrigation service area including focus group meetings to ascertain target group needs, aspirations, and preferences;
- (iii) conduct baseline surveys and follow-up surveys, which should include monitoring and evaluation of the effects on poverty;
- (iv) facilitate participation of target groups in program development/implementation; and

⁵ The indicative program is for completion of 10% of tertiary units in 2007, 30% in 2008, and the remaining 60% in 2009.

- (v) coordinate the program with activities of Government, NGOs, bilateral agencies, and international funding agencies working on poverty reduction in the project area.

2. Sustainable System Management

17. Upon the completion of the Project and VWRAP, the combined Dau Tieng–Phuoc Hoa system (the System) will become one of the largest and most complex systems in Viet Nam with multisector water demands. Sustainable management of this system is a prerequisite for realizing and sustaining the projected increase in agriculture production and a reliable supply of water to nonagricultural users.⁶ To achieve this, the consultants will assist MARD and the IMCs to:

- (i) develop and operationalize sustainable management of the entire System by defining its overall multisector management objectives and develop performance standards (and associated indicators) to achieve these objectives;
- (ii) optimize the use of the available water resources against changing water demands during the next 7–10 years;⁷
- (iii) develop a resource-based management plan for each of the IMCs based on the System's overall objectives;
- (iv) implement the management plan through development of management systems so that it can be readily put into operation within the IMCs; and
- (v) draw up new service delivery contracts between IMCs within the System and between IMCs and nonagricultural bulk water users.

18. The consultants will support the task force to be set up to guide the process of developing the System's overall management objectives and the management plans for the Dau Tieng IMC and the provincial IMCs. Discussion papers on issues will be prepared for consideration and further guidance by the concerned departments within MARD, the provincial people's committees, and when needed also from other government agencies.

3. Resettlement

19. The consultant will assist the PMU, PMB416, and the PPMBs to provide overall planning, coordination, and supervision of the resettlement program, and establish project-wide consistent procedures for planning, implementing, and monitoring resettlement activities. These should be integrated into the holistic participatory agricultural transformation process to be implemented within the three irrigation service areas. There are two distinct target groups: (i) those adversely affected by construction of the barrage, transfer and main canals, and impoundment of the reservoir, and (ii) irrigation beneficiaries along the main, primary, and secondary canal routes. Both target groups will require compensation, relocation, and income restoration. However, relocation of irrigation beneficiaries will be minimized as there is some flexibility in locating the final alignment of canals, which is to be done in a participatory way to minimize disruption to landholdings and property and minimize resettlement requirements. The

⁶ Sustainable management within the project context is defined as local irrigation institutions (IMCs and WUGs) being able to provide water delivery services against agreed performance indicators to all users without having to resort to major rehabilitation interventions.

⁷ The rehabilitation and modernization of DTIS under VWRAP will result in the service area being extended, and thus increase water demands from the IMCs. Water demands from domestic, industrial, and urban water users are also expected to increase. It is also expected that adjustments will be needed in reservoir releases for salinity control and environmental management purposes.

consultant shall also provide formal and on-the-job training and capacity building in resettlement and social assessment for the PMU, IAs, resettlement committees, community-based organizations, and the external monitoring organization.

20. The consultant shall guide and assist the IAs, resettlement committees, and community-based organizations to update the resettlement plan (RP) for the main components after detailed design, and to implement the approved RP. The consultant shall also guide and assist to prepare and implement a resettlement plan for each of the three irrigation subprojects after detailed design. Activities include, but are not limited to, participatory preparation, implementation, and monitoring of:

- (i) subproject RPs and information campaigns;
- (ii) procedures to minimize adverse social impacts from land acquisition and loss of other assets throughout the planning, design, and implementation phases;
- (iii) procedures for undertaking and completing census and asset verification exercises;
- (iv) accurate recording of affected persons by asset and resource surveys and census;
- (v) procedures for coordination of subproject resettlement and compensation activities;
- (vi) income restoration programs for persons losing more than 20% of income;
- (vii) prompt implementation of corrective actions and the resolution of grievances;
- (viii) facilitate disclosure of RPs to affected communities and general public;
- (ix) liaison mechanisms to ensure proper technical and logistical support; and
- (x) management information system (MIS) procedures and monitoring activities to track compliance with project policies.

4. Environmental Management

21. The consultants will assist the PMU, and in particular the unit that is expected to be subcontracted to undertake responsibility for environmental issues, to:

- (i) review the environmental management plan (EMP), which is included in the environmental impact assessment (EIA) approved by ADB and the Ministry of Natural Resources and Environment (MONRE) and determine whether any changes are needed. If changes are required, the revised EMP should be submitted to ADB, MONRE, and MARD for review and approval;
- (ii) design and implement technical studies to monitor key environmental issues that will fall within the responsibility of the PMU including: (a) monitoring of the environmental impact of the TBIS on the Lo Go Xe Mat National Park; (b) establishing a water quality monitoring network as recommended in the EMP; (c) monitoring local land-use patterns of the potential acid soils in and around the DHIS; and (d) monitor the social and environmental benefits of the proposed fish pass at the Phuoc Hoa barrage;
- (iii) prepare proposals for inclusion in construction contracts to mitigate adverse impacts on forest areas, road networks, and community severance;
- (iv) assist with coordination of the EMP including monthly reporting and bimonthly coordination meetings with provincial departments of science, technology, and environments and other interested parties;

- (v) oversee preparation and approval of the construction contractor's site EMPs by reviewing and commenting on the draft versions to ensure they are to an adequate standard;
- (vi) monitor implementation of the site EMPs through site visits, data review, and meetings, and ensure that implementation is to government and ADB standards; and
- (vii) take corrective management actions with construction contractors if monitoring of site EMPs reveals any deficiencies in the contractor's performance.

D. Main Water Resources Infrastructure

1. Detailed Design and Procurement

22. The consultants will review the advance detailed design and tender documents, which are being prepared by local consultants. It will include studies, designs, preliminary drawings, and tender documents for the Phuoc Hoa barrage, and transfer and main canals. The specific aspects covered under the advance detailed design that require review are:

- (i) benchmark controls and detailed topographic surveys of the three irrigation systems with spot levels taken on a 50 m grid and data digitized to facilitate subsequent contour mapping including provincial cadastral and soil data wherever available;
- (ii) hydraulic modeling of the Phuoc Hoa barrage with the model maintained in full working order to facilitate further testing following loan approval;
- (iii) contour plans of the reservoir site at a scale of 1:1,000;
- (iv) transfer and main canal strip surveys, cadastral mapping, plotting of cross sections (1:200 scale) and long sections (1:2,000 vertically and 1:200 horizontally);
- (v) geotechnical investigations of the barrage site and canal alignments; and
- (vi) preparation of preliminary construction drawings, with sufficient detail for bidding, and preliminary technical specifications in both Vietnamese and English.

23. On the basis of the review, the consultants will finalize the detailed engineering designs, cost estimates, and tender documents for bidding and construction purposes.⁸ The design of the headworks will incorporate the results of the hydraulic modeling of the Phuoc Hoa barrage undertaken during advanced detailed design, with further tests undertaken as deemed necessary by the consultants. The specifications will be based on international standards for all items of work. A design report shall be prepared in adequate detail to explain the design rationale and methodology. These will follow standard quality assurance procedures. Quantities shall be calculated for all items and included in the bill of quantities. Specific items include:

- (i) individual designs of major hydraulic structures shown on separate drawings, with typical drawings prepared for smaller structures such as bridges;
- (ii) separate reinforcement drawings in sufficient detail to indicate bar locations; and
- (iii) mechanical and electrical drawings indicating the general arrangement (detailed shop drawings to be prepared by the mechanical/ electrical subcontractors).

⁸ As it is not possible to estimate the resources needed to finalize the designs and tender documents, the consulting contract will include a provision for unallocated specialists.

24. The consultants will assist in the preparation of prequalification documents together with evaluation criteria. All procurement documents will be prepared on the basis of ADB guidelines and sample documents for ICB procurement. The consultants will assist the PMB416 in the prequalification of contractors and the bid evaluation following ADB guidelines.

2. Construction

25. The consultants will assist PMB416 to manage and supervise the contractors. As the engineer, the consultants will ensure timely progress of the works, enforce specified materials and workmanship requirements, and control the quality of construction. This includes assessment of programs, materials, labor, construction methods, and monitoring compliance with specified construction methods, installation, and commissioning. It also includes supervision of contractor's programs, rates of progress, performance testing, compliance with specifications and drawings, health, safety, and environmental requirements. Specific tasks will include, but not limited to:

- (i) undertake day-to-day construction supervision and monitoring of quality control, application of quality assurance procedures, adequacy of contractors' designs and drawings, and preparation of progress and other reports;
- (ii) issue interim payment certificates for consideration to PMB416;
- (iii) examine contractors' claims, decide on claims that fall within the authority of the Engineer, and make recommendations for claims to be considered by PMB416/MARD;
- (iv) examine the need for contract variations, decide on contract variations within the delegated authority of the engineer, and recommend contract variations to be approved by PMB416/MARD;
- (v) monitor compliance of environmental mitigation and management plans by contractors;
- (vi) monitor preparation of as-built drawings by contractors; and
- (vii) prepare partial, substantial and final completion certificates for consideration by PMB416 /MARD.

3. Commissioning and Operation

26. The consultants will assist PMB416 and the IMCs with the commissioning and operation phases. It will involve building capacity within the IMCs to manage the project facilities. Commissioning covers initial operation to identify and rectify any construction faults prior to official contractors handover of completed systems to IMCs. Commissioning will be progressive over the final three years of project implementation. Partial operations will commence in the final 2 years but the irrigation systems will not be fully operational until project completion. Particular attention will be given to establishment of a Phuoc Hoa subunit of the Dau Tieng IMC. The consultants will identify specific facilities needed, expertise, and staffing requirements, and prepare detailed operating and management procedures, including those relating to minimizing the social and environmental impacts of the barrage (according to World Commission on Dams guidelines) which will be supported by a full operation manual. The operating and management procedures should be developed in consultation with stakeholders, including the Dong Nai river basin organization.

Summary Poverty Reduction and Social Strategy

A. Linkage to the Country Poverty Analysis

Sector identified as a national priority in Country Poverty Analysis?	Yes	Sector identified as National Priority in Country Poverty Partnership Agreement?	Yes
Contribution of the sector/subsector to reduce poverty in Viet Nam: Poverty in Viet Nam is concentrated in the rural areas, where around 85% of the poor live. Nearly 80% of poor household are engaged in agriculture as their primary occupation. The water resources sector is therefore important for development of irrigated agriculture to improve food security, income generation, and job creation, and general quality of life in rural areas. The water resources sector provides important support to the agriculture sector, which accounts for 25% of gross domestic product (GDP), 60% of the labor force, and 30% of the country's exports.			

B. Poverty Analysis Proposed Classification: Poverty Intervention

<p>A social analysis was carried out during the feasibility study in compliance with ADB's <i>Guidelines on Incorporation of Social Dimensions in Bank Operations</i>. It included an assessment of the incidence of poverty which revealed that the main nature and perceptions of its causes are: (i) lack of access to functioning irrigation and drainage; (ii) low level of education; (iii) landlessness; (iv) poor access to market centers and social services; (v) lack of access to low interest credit; (vi) surplus labor within the households and chronic unemployment or underemployment especially among the young; (vii) gender-related factors; and (viii) poor health, especially due to waterborne diseases and malaria.</p> <p>The social analysis identified specific groups within the population who are particularly vulnerable and disadvantaged and unable to benefit directly from project interventions without some social preparation. There are significant numbers of poor landless households, many of them headed by women, and a high percentage of children living in poor households, many of whom are affected by Agent Orange-related health problems. It also identified pockets of large numbers of pensioners and disability support recipients, as well as some ethnic minorities.</p> <p>Income data collected during the social survey showed that poverty is widespread in the project area (Tables A10.1 and A10.2). About 39% of households in the three irrigation subproject areas have incomes below the national poverty line of D149,000/person/month (\$0.33/person/day). Using the international poverty line of \$1/person/day, 88% are below the poverty line. It is estimated that improved agricultural production provided by the Project will increase the average income by about D86,000/person/month, equating to about a 40% increase. It is estimated that this will least halve the incidence of poverty (estimated by simple linear interpolation). This may underestimate the impact, given that it represents an 81% increase in income from agriculture, and recent the Viet Nam Living Standards Survey shows that more households own less agriculture land than the poor and generate much higher proportions of their income from off-farm activities.</p>
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C. Participation Process

Stakeholder analysis prepared	Yes	Participation Strategy	Yes
<p>A participatory and consultative methodology was adopted to undertake the social analysis during the feasibility study. It involved (i) initial field reconnaissance discussions with project stakeholders; (ii) group interviews in about 15% of communes; (iii) detailed survey questionnaires of 605 households (about 2.2%); (iv) a series of stakeholders workshops in the four concerned provinces of Binh Duong, Binh Phuoc, Tay Ninh, and Long An; (v) interviews with key government staff, nongovernment organizations (NGOs), and other funding agencies; and (vi) group interviews with ethnic minorities.</p> <p>During project implementation there will be extensive participation of stakeholders. A team of community facilitators will be deployed to implement a social support program. This will ensure close linkages are established between the implementation team and the community. It will facilitate a participatory approach to detailed design of the irrigation works through formation of water user groups and arranging farmer walk-throughs to finalize alignments in accordance with the groups' preferences. The institutional capacity of the groups will subsequently be developed to facilitate sustainable management of the system. The community facilitators will also be responsible for identifying and assisting disadvantaged and vulnerable groups.</p>			

D. Potential Issues

Issue	Assessment	Strategy to Address Issues	Output Prepared
Resettlement	Significant	A resettlement plan (RP) was prepared for the main component and a resettlement framework (RF) to be applied to the preparation of an RP for each subproject during project implementation. The RP for each subproject will be implemented and monitored. A social support program will facilitate community participation in selecting the final canal alignments and locating structures that will service the local communities such as roads and canal bridges, aimed at minimizing disruption and land acquisition. Steps will be taken to ensure adequate livelihood restoration for affected people, particularly disadvantaged and vulnerable households.	Full RP and RF
Gender	Significant	The social analysis confirmed that the burden of poverty in the project area is disproportionately borne by women; about 25% of the households are headed by women. Compared to male-headed households, these women-headed households have a lower level of education, limited access to land and credit, and much lower monthly incomes. Only 53% of female-headed households derive their main income from agriculture and forestry activities compared to 80% for male-headed households. Similarly 41% of female-headed households derive their main income from wage labor as opposed to only 17% for male-headed households. These women are either widowed or abandoned. In addition, there are a number of single elderly women living alone on their farms. A social support program will be implemented to address these issues.	Yes
Affordability	Significant	The social analysis identified poor and disadvantaged groups who will need assistance to ensure they are able to avail of the project benefits. The social support program will assist these groups, including establishing the necessary linkages so they are able to arrange microcredit under existing programs.	Yes
Labor	Positive	The Project will not have any adverse effect on labor; it is expected to have positive impacts through job creation related to increased agricultural production.	No
Indigenous Peoples	Non-significant	The social analysis identified that ethnic minorities make up approximately 1.3% of households in the project area, and the majority of these are Khmer. They are generally well integrated in the communes where they live. Group interviews with ethnic minority people highlighted the need in some communes for documentation and training courses to be delivered in Khmer and possibly other minority languages to facilitate their full participation in the Project. The greatest concentration of ethnic minorities is in the inundation area of proposed Phuoc Hoa barrage, and especially in Nha Bich Commune where Khmer account for up to 23% of the entire population. Although they are fully integrated into the commune, special attention will be paid to this group during relocation.	Yes
Other Risks/ Vulnerabilities	Significant	Environmental management plan and social support program.	Yes

Table A10.1: Social Profile of Households in Project Area

Social Indicator		Unit	Irrigation System			Project
			Binh Long	Tan Bien	Duc Hoa	
A. Existing Situation						
Income <D180,000/person/month ^a		% of hh	28	49	49	47
Income D180,000-250,000/person/month		% of hh	24	21	26	25
Income D250,000-500,000/person/month		% of hh	35	22	19	21
Income > D500,000/person/month		% of hh	13	8	6	7
Average Income	Total	D/person /month	283,885	219,745	210,035	218,940
	From Agriculture only	D/person /month	75,100	116,200	106,400	106,600
Average Agriculture Landholding		ha/hh	1.9	3.7	1.2	1.6
Poverty Incidence – Viet Nam standard ^b		% of hh	24	40	40	39
Poverty Incidence– International standard ^c		% of hh	80	88	90	88
B. Estimated With Project Situation						
Net Benefit Area		ha	5,860	13,390	28,880	48,130
Number of Beneficiary households		hh	3,120	3,620	23,480	30,220
Income from Agriculture	Without Project	\$/ha/year	156	124	350	263
	With Project	\$/ha/year	351	400	535	475
	Increase	\$/ha/year	195	276	186	212
Estimated Increase in Agricultural Income		D/ha/month	247,000	349,600	235,600	268,700
		D/person /month	93,900	258,700	58,000	86,000
Average Income	Total	D/person /month	377,785	478,445	268,035	304,940
	From Agriculture only	D/person /month	169,000	374,900	164,400	192,600

D = dong; hh = household; ha = hectare.

^a D180,000/person/month (\$0.39/person/day) is the poverty line adopted by the provinces in the project area.

^b These estimates are based on the generally adopted national poverty line of D149,000/person/month (\$0.33/person/day) and are derived using linear interpolation of incomes show at the top of this table.

^c Based on the international World Bank standard of \$1/person/day.

Source: Asian Development Bank staff estimates .

Table 10.2: Levels of Monthly Income

Project Components	Category I	Category II	Category III	Category IV
	< D180,000 /month	D190,000 to D250,000/month	D260,000 to D500,000/month	> D500,000 /month
Reservoir Area	10.0%	40.0%	45.0%	5.0%
Transfer Canal	5.5%	19.2%	50.0%	25.3%
Binh Long Subproject	28.5%	23.9%	35.0%	12.6%
Tan Bien Subproject	48.8%	21.5%	21.5%	8.0%
Duc Hoa Subproject	48.9%	25.6%	18.9%	6.7%
Average Percentage	28.3%	26.4%	34.1%	11.52%

D = dong.

Sources: Socioeconomic surveys 1999 and 2000.

FINANCIAL AND ECONOMIC EVALUATION

A. Benefits and Costs

1. Quantified

1. About 30,200 households (about 169,100 persons) in the project area will benefit directly from the Project. In addition, a large number of households will benefit from improved supplies of water for domestic and industrial use and from improved salinity control in downstream reaches of rivers. The main quantified benefits of the Project are incremental outputs of agricultural products (primarily rice, maize, groundnuts, vegetables, sugarcane, and fruit) from 48,130 hectares (ha) in three new irrigation areas. After allowing for increased consumption by producer households the residual incremental output will largely be marketed domestically. There will also be incremental production of fish from paddy fields and ponds. In addition to outputs from land-based activities, water will be supplied to Ho Chi Minh City (HCMC) and other municipalities for domestic, municipal, and industrial use.

2. As a result of the Project's new infrastructure, about 2,807 ha of existing agricultural land will be lost. It is estimated that land losses will represent about 7% of the potential command area. About 454 households, who will lose their houses and farm structures, will need to be relocated, retrained, and assisted with the establishment of new businesses.

2. Nonquantified

3. Provision of an alternative water source for HCMC will improve the security of supply for the city by lessening the risk from an event such as gross contamination of the Dong Nai river from which the bulk of existing needs are drawn. Dependence on groundwater supplies will also be reduced. In addition, the scheme will have sufficient capacity to allow the intermittent release of water for salinity control in the Saigon river while by-flow from the new irrigated areas will contribute to a reduction in salinity in both the Saigon and Vam Co Dong rivers. It has not been possible to value any of these benefits. On the other hand, possible economic and environmental disbenefits as a result of reduced flows downstream of the Phuoc Hoa barrage after diversions begin to operate were also considered. In the lower Be river, the required minimum environmental flow is set so as to avoid any potential impacts becoming significant. In the low Dong Nai river downstream of its confluence with the Be river, the Phuoc Hoa diversions represent only a small portion of the average dry season flows (about 6%), so impacts will be minimal. Hence it was concluded that negative impacts will be small, and therefore they have not been quantified in the feasibility study.

4. During project implementation, access roads will be constructed along major canals. Although the standard of the existing road network in the proposed irrigation areas is, in general, quite good, roads to be constructed under the Project will, in some areas, provide improved access for local people and will facilitate the movement of goods and services. Supplies of crop by-products, which can be used as animal feed, will improve throughout the irrigated areas as cropping intensity increases. A small, but unquantified, increase in animal production is likely to result. Finally, social support activities to be initiated under the Project are expected to improve income-earning opportunities for the landless and female-headed households.

B. Financial Evaluation

1. Households

5. Changes in household income have been estimated for six representative farm models (Table A11.1) covering the main cropping patterns that are expected to develop in response to changes in the availability of irrigation water. Over half of the Duc Hoa area is currently irrigated from small diversion or pumped schemes, with water shortages a common feature. Scheme water will replace local supplies in this area. Changes in cropping patterns will include an increase in dry-season cropping of groundnuts, maize, and vegetables as well as expanded plantings of fruit trees, especially longan. With the exception of local varieties of rice grown in the monsoon season, the highest returns for annual crops are obtained in the dry season when the climatic conditions are most suitable, provided that irrigation water is available. Fruit production is by far the most profitable enterprise. Between 1,000 and 1,500 households will be able to supplement their agricultural earnings from pond paddy field fish production.

Table A11.1: Summary of Farm Model Analysis—All Areas

Area/ Farm Model	Farm Size (ha)	Cropping Intensity (%)			Farm Surplus After Financing (\$)			Return to Family Labor Day (\$/day)			Incremental Return Per Day Incl. Family Labor (\$)
		Present	F W/O	F W	Present	F W/O	F W	Present	F W/O	F W	
Binh Long											
Small	1	200	200	300	156	183	351	3.18	3.74	3.38	4.80
Large	3	115	115	160	1,018	1,184	1,469	15.56	17.99	17.40	15.32
Tan Bien											
Small	1	150	150	300	124	179	400	1.95	2.80	4.65	10.01
Large	6	110	100	260	1,806	2,817	8,141	22.18	34.61	81.74	298.39
Duc Hoa											
Small	0.2	300	300	300	70	4	107	1.59	2.20	2.43	10.91
Large	2	175	175	250	(55)	64	3,448	0	0.75	37.08	433.90

F W/O = Future without Project, FW = Future with Project.

Source: Asian Development Bank staff estimates.

6. In all cases, household incomes are projected to increase by a minimum of 40% over the future without project situation. For 1 ha farms, incomes rise to between \$350 and \$400 per annum compared to about half that amount at present. For farms in the 2 ha to 3 ha range, incomes rise by between \$1,400 to \$3,500 per annum, from less than \$1,000 at present. While the income from a 0.2 ha farm is expected to double, it will still only be a little over \$100 per annum, well below the poverty line. Assurances have been obtained from Viet Nam Bank for Agriculture and Rural Development that credit to finance onfarm investments such as orchards will be available, subject to the Bank's usual lending criteria.

7. For all representative farms, both returns to family labor and financial internal rates of return after meeting irrigation service charges are attractive and should provide a strong incentive for participation in the Project. Furthermore, agricultural systems in the project area

are dynamic with farmers prepared to change to quite different cropping patterns and crop mixes in response to market signals and the expectation of better returns. Much of the area has been settled relatively recently with farmers appearing to be very responsive to change. Family labor is adequate to meet most of the labor demands of more intensive production systems on farms of about 1 hectare or less, and survey data show there is unused family labor. On larger farms, hired labor will be required, especially at peak demand times. Potential for labor conflicts is not considered to be significant. It will be highest for the annual cropping systems, although the proposed cropping intensities (250%) are unlikely to cause overlap between harvest of one crop and planting of another. Careful farm-level planning through agricultural extension can minimize risks. Existing contract-harvesting systems for fruit and sugarcane are expected to continue. In the longer term, mechanization is expected to increase as labor is attracted from rural areas to the light industrial and service sectors in HCMC and its environs.

2. Water Management Institutions

8. Water management institutions will incur costs to maintain the scheme and to manage the distribution of water. In addition, pumping costs will be incurred in two areas where gravity distribution is not feasible. In nonpumped areas, irrigation service fees of about \$54 per hectare will need to be levied to cover costs, while in pumped areas, fees of about \$87 per ha will be required. Operating costs may to some extent be offset through sales of water for domestic, municipal, and industrial (DMI) use, which would allow a reduction in service fees.

C. Economic Evaluation

1. General

9. The economic analysis draws together the investment costs of the Project during a 7-year implementation period, plus the recurrent costs needed to ensure sustainable benefits, and compares them with the quantified incremental benefits, over a 35-year period. Incremental benefits have been estimated by comparing with project outputs with the expected future position without project. In this latter case, some increase in output from existing farming systems is assumed reflecting improvements in dryland production systems that would have occurred in the absence of the Project. Rice, maize, groundnuts, sugar, diesel, and all fertilizers are assumed to be tradables and have been valued at their border equivalents. All other inputs and outputs, with the exception of DMI water for HCMC, and electricity, have been valued at competitive market prices, after adjusting for taxes, duties, and an implicit overvaluation of the exchange rate. Avoided pumping and distribution costs have been used as the basis for valuing DMI water. Electricity used in pumping has been valued at its long-run marginal cost of supply. All investments are assumed to have a zero residual value at the end of the analysis period. The economic cost of lost land was taken into account in the analysis by excluding production in the with project situation. Cost of acquiring the land is not taken as an economic cost.

2. Price Numeraire and Conversion Factors

10. A world price numeraire has been used. Base costs and benefits are in mid-2002 terms. A conversion factor of 0.9 has been used to express most civil works prices in efficiency terms. In the case of unskilled labor, a shadow wage rate factor of 0.8 has been used to express wages in terms of opportunity costs. For civil works with a significant component of unskilled labor, a conversion factor of 0.85 has been used. For diesel, no price adjustment has been made, as the current domestic price is very close to the equivalent untaxed world price.

Domestic prices of nontraded goods and services have been converted to their economic equivalent by multiplying their financial prices by a standard conversion factor of 0.91.

3. Incremental Outputs

11. **Agriculture.** Significant changes in land use and cropping intensities are expected to occur, as scheme water becomes available. These changes and all the related investments are assumed to be substantially complete by the end of the Project in the seventh year. All current areas of cashew and cassava will be replaced, partly with vegetables (a 231% increase in area) and with fruit (a 20% increase in area). Other land use changes will include a 9% decline in the area of sugar cane and an increase in the dry season cropping of rice, with the area of rice remaining about the same. The area of maize will increase from about 240 ha at present to over 13,000 ha with project, largely replacing rice on currently rain-fed upland areas, while the area of groundnuts will increase from about 4,890 ha to about 17,920 ha, an 84% increase over future without project areas. Over the whole net command area (see Table A11.1 for individual farms), annual cropping intensities are expected to rise to about 245% from the present 142%.

12. Incremental benefits are assumed to commence in year 5 and progressively increase to the assumed maximum yields in year 17. Increments (future without project compared with future with project) include rice (28,668 t), groundnuts (16,107 t), maize (56,032 t), vegetables (14,459 t), sugarcane (59,716 t), and fruit (28,221 t).

13. **Aquaculture.** It is envisaged that a combination of gravity irrigation and suitable soils for aquaculture will be found in up to 3% of the command area, producing a return (in economic prices) of between \$1,000 to \$2,000 per ha per year. It is assumed that the benefits will commence in year 5 and stabilize in year 11. An amount of \$979,814 per annum at full development has been included in the economic analysis for fisheries benefits.

14. **DMI Water.** At full development, the scheme will have the capacity to supply up to 10 m³/s to the greater HCMC area for DMI use. On the assumption that water would need to be lifted from the Dong Nai river then distributed by pipeline to the western areas of HCMC in the absence of the Project, this water is valued in economic prices (net of incremental Phuoc Hoa scheme costs) at D478/m³ (\$0.03/m³) for a total annual value of supply of \$10.33 m.

4. Economic Internal Rate of Return and Sensitivity

15. The economic internal rate of return (EIRR) of the Project, in the base case, is 14.2%. Sensitivity tests show that the EIRR is most sensitive to changes in investment costs, the timing of benefits, and a combination of price changes in tradable outputs and fruit. If irrigation system investment costs rise by 10%, the EIRR falls to 13.5%. A delay in the start of the benefits stream by a year reduces the EIRR to 12.7%. If agricultural output prices fall by 10%, the EIRR falls to 13.1%. Base-case resource flows are summarized in Table A11.2. Switching values have been estimated for fruit and vegetables, which are expected to contribute about 35% of the incremental value of project output. The analysis shows that the price of fruit would need to fall to about half of the base case price assumption, and vegetable prices can fall to zero, before the EIRR falls to around 12%. Agricultural output prices would together need to fall by nearly 20% before the EIRR fell below 12%. Overall, the economic viability is quite robust, mainly because the benefits are derived from a wide mix of crops as well as from supplying domestic and urban water.

Table A11.2: Project Resource Flows (\$ million in mid-2002 prices)

	Year of Project										
	1	2	3	4	5	6	7	8	15	35	
Outflows											
Irrigation Infrastructure											
Dam & Transfer Canal	0.02	0.00	25.72	20.62	4.35	0.26					
Other	—	—	—	18.82	20.05	9.16	0.61				
Subtotal	0.02	0.00	25.72	39.44	24.40	9.41	0.61				
Operation & Management	0.00	0.07	0.52	1.37	2.18	2.70	2.78	2.78	2.78	2.78	
Project Support	4.37	7.69	8.39	6.74	2.86	0.88	0.37	0.25	0.13	0.13	
Total Outflows	4.40	7.76	34.63	47.56	29.44	12.99	3.77	3.03	2.91	2.91	
Inflows											
Net Agricultural Benefits											
Binh Long					0.17	0.36	0.93	1.31	3.66	3.78	
Tan Binh					0.63	1.35	3.17	4.13	9.23	9.24	
Duc Hoa					0.90	1.92	4.37	5.44	11.05	11.17	
Subtotal					1.69	3.63	8.46	10.88	23.94	24.19	
Saved Pumping Costs				0.04	0.06	0.08	0.11	0.17	0.17	0.17	
Aquaculture Benefits					0.14	0.28	0.42	0.56	0.98	0.98	
DMI Water Value					1.72	3.44	6.89	6.89	10.33	10.33	
Total Inflows				0.04	3.61	7.43	15.88	18.50	35.42	36.35	
Net Resource Flows	(4.40)	(7.76)	(34.63)	(47.52)	(25.83)	(5.56)	12.12	15.46	32.51	35.66	
Economic Internal Rate of Return		14.2%									
Net Present Value (\$ million) @ 12%		21.33									

DMI = domestic, municipal, and industrial.

Source: Asian Development Bank staff estimates.

D. Recurrent Budget Implications of the Project

16. Under the Project, it is proposed that the full cost of operating the scheme (including maintenance of O&M roads constructed under the Project) will be recovered from beneficiaries through irrigation service fees and pumping charges. If collection is poorly administered, however, or if beneficiaries become reluctant to pay because of poor service delivery, then water management groups will run at a deficit. It is exactly this situation that currently exists in the Dau Tieng irrigation system. In 2000, for example, budgeted collection of irrigation service fees was about \$0.29 million, only about a third of the fee that could have been justified had the scheme been adequately maintained. If such a situation were allowed to continue with the Phuoc Hoa Project, annual operating deficits could be as high as D30.0 million (\$1.97 million), assuming incremental operating costs of D45.45 million (\$2.99 million).

17. Continuing environmental monitoring will be required beyond the 6.5-year life of the Project. The incremental recurrent cost is estimated at about D2.13 million (\$0.14 million) per annum. In addition, it is expected that social services support will be required for displaced persons for 3 years beyond the life of the Project at a cost of about D1.98 million (\$0.13 million) per annum. All other incremental support services are expected to terminate at the close of the Project.

E. Risks

1. Adoption of Irrigated Agricultural Production Systems

18. The economic analysis assumes that the whole of the net command area is converted to irrigated production by the close of the Project or shortly beyond. Any delay in the rate of adoption or the ultimate level of adoption achieved would have a significant impact on the EIRR. Two factors are expected to minimize these risks. First, about half of the command area is already being irrigated using a variety of systems—flood diversion, pumping from groundwater, group schemes pumping from streams, and local storage-based systems. Farmers with access to these water sources are already engaged in irrigated production, although in most cases not to the extent envisaged with project. They are expected to substitute project-supplied water for local supplies and to intensify production at a rapid rate thereafter. They also have the advantage that tertiary distribution structures are already in place in much of the currently irrigated area.

19. Second, community development support is to be provided under the Project to help beneficiaries become involved in the design and implementation of tertiary-level irrigation development from an early stage. This support will increase awareness about the potential benefits of the Project and a sense of scheme ownership by beneficiaries is expected to result. After the design stage, the emphasis will shift to the establishment of water user groups with training being provided in the management of such groups. Extension services will also be provided under the Project to assist beneficiaries with decisions about irrigated agriculture. With this level of support, a high level of participation should be assured.

2. Fruit and Vegetable Production

20. Fruit and vegetables are projected to contribute about 35% of the incremental agricultural value of the Project. Vegetable production is expected to increase by over 200% compared with the future without project situation with fruit production growing by over 35%. While these are large increases, they will not be reached in full until about 12 years from the time farm development commences in the fourth year of the Project. During this time, market trends can be reviewed, and development activities amended if necessary. Furthermore, the incremental fruit and vegetable areas are only about 1% and 1.5% respectively of the total existing areas of those crops in the country and the incremental output would not normally be expected to have a significant impact on prices. However, there is a risk that prices will fall unless urban incomes continue to rise and local and export marketing opportunities are developed. This risk will be reduced somewhat through marketing studies to be carried out by consultants to be engaged as part of project support activities. In addition, the Government is supporting the establishment of agroprocessing facilities and is committed to furthering the development of export markets for fruit and vegetables.