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Report No: PAD1250

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF SDR 297.1 MILLION

(US$415 MILLION EQUIVALENT)

TO THE

SOCIALIST REPUBLIC OF VIETNAM

FOR A

DAM REHABILITATION AND SAFETY IMPROVEMENT PROJECT

November 20, 2015

Water Global Practice
EAST ASIA AND PACIFIC REGION

CURRENCY EQUIVALENTS
(Exchange Rate Effective October 31, 2015)

Currency Unit	=	VND
VND 22,315	=	US$1
US$ 1.39687	=	SDR 1

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank	IWRM	Integrated Water Resources Management
CEOHSP	Contractor Environment and Occupational Health and Safety Plan	MARD	Ministry of Agriculture and Rural Development
		M&E	Monitoring and Evaluation
CPMU	Central Project Management Unit	MoIT	Ministry of Industry and Trade
CPO	Central Project Office	MoNRE	Ministry of Natural Resources and Environment
CPS	Country Partnership Strategy	NGO	Non-Governmental Organization
DA	Designated Account	NDRMP	Natural Disaster Risk Management Project
DARD	Department of Agriculture and Rural Development	NDSRP	National Dam Safety Review Panel
DoIT	Department of Industry and Trade	NHMS	National Hydro-Met Services
DoNRE	Department of Natural Resources and Environment	O&M	Operation and Management
DRaSIP	Dam Rehabilitation and Safety Improvement Project	ODA	Official Development Assistance
DSF	Dam Safety Framework	PAD	Project Appraisal Document
DSU	Dam Safety Unit	PCRA	Procurement Capacity and Risk Assessment
E&S	Environment and Social	PDO	Program/Project Development Objective
EFA	Economic and Financial Analysis	PER	Public Expenditure Review
EMDP	Ethnic Minority Development Plan	PforR	Program for Results
EMP	Environmental Management Plan	PHRD	Policy and Human Resources Development
EMPF	Ethnic Minority Policy Framework	PIC	Project Implementation Consultant
EPP	Emergency Preparedness Plans	PMU	Project Management Unit
ESIA	Environment and Social Impact Assessment	PoE	Panel of Expert
ESMF	Environmental and Social Management Framework	POF	Probability of Failure
ESMP	Environmental Social Management Plan	POM	Project Operations Manual
EVN	Electricity of Vietnam	PPMU	Provincial Project Management Unit
FM	Financial Management	PPC	Provincial People's Committees
FMS	Financial Management Specialist	P-RAMS	Procurement Risk Assessment and Management System
FS	Feasibility Study		
GDP	Gross Domestic Product	PSC	Project Steering Committee
HLWG	High Level Working Group	PSD	Procurement Strategy for Development
IA	Implementing Agency	RAP	Resettlement Action Plan
IBRD	International Bank for Reconstruction and Development	RPF	Resettlement Policy Framework
		SA	Social Assessment
ICOLD	International Commission on Large Dams	SEDS	Socio-Economic Development Strategy
IDA	International Development Agency	SORT	Systematic Operations Risk Rating Tool
IFR	Interim Financial Reporting	VN-Haz	Vietnam Managing Natural Hazards
IMC	Irrigation Management Company	VWRAP	Vietnam Water Resources Assistance Project
IME	Irrigation Management Enterprise	WBG	World Bank Group
IPF	Investment Project Financing	WOP	Without project
ISC	Independent Supervision Consultant	WP	With project

Regional Vice President:	Axel van Trotsenburg
Country Director:	Victoria Kwakwa
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Task Team Leaders:	Cuong Hung Pham and Marcus Wishart

VIETNAM
Dam Rehabilitation and Safety Improvement Project

TABLE OF CONTENTS

PAD DATA SHEET

Vietnam

Vietnam Dam Rehabilitation and Safety Improvement Project (P152309)

PROJECT APPRAISAL DOCUMENT

EAST ASIA AND PACIFIC

Water Global Practice

Report No.: PAD1250

Basic Information		
Project ID P152309	EA Category A - Full Assessment	Team Leader Cuong Hung Pham Marcus Wishart
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints [ ] Financial Intermediaries [ ] Series of Projects [ ]	
Project Implementation Start Date December 15, 2015	Project Implementation End Date December 30, 2021	
Expected Effectiveness Date April 29, 2016	Expected Closing Date June 30, 2022	
Joint IFC No		

Practice Manager/Manager	Senior Global Practice Director	Country Director	Regional Vice President
Ousmane Dione	Junaid Kamal Ahmad	Victoria Kwakwa	Axel van Trotsenburg

Borrower: SOCIALIST REPUBLIC OF VIETNAM			
Responsible Agency: Ministry of Agriculture and Rural Development			
Contact:	Tran Kim Long	Title:	Gen. Director of ICD
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Project Financing Data(in USD Million)					
[ ]	Loan	[ ]	IDA Grant	[ ]	Guarantee
[X]	Credit	[ ]	Grant	[ ]	Other

Total Project Cost:	443.00	Total Bank Financing:	415.00
Financing Gap:	0.00		

Financing Source	**Amount**

BORROWER/RECIPIENT	28.00
International Development Association (IDA)	415.00
Total	443.00

Expected Disbursements (in USD Million)

Fiscal Year	2016	2017	2018	2019	2020	2021	2022	0000	0000	0000
Annual	6	50	90	100	100	55	14			
Cumulative	6	56	146	246	346	401	415			

Institutional Data

Practice Area / Cross Cutting Solution Area

Water

Cross Cutting Areas

[X] Climate Change
[ ] Fragile, Conflict & Violence
[ ] Gender
[ ] Jobs
[ ] Public Private Partnership

Sectors / Climate Change

Sector (Maximum 5 and total % must equal 100)

Major Sector	Sector	%	Adaptation Co-benefits %	Mitigation Co-benefits %
Agriculture, fishing, and forestry	Irrigation and drainage	35	100	
Energy and mining	Energy efficiency in Heat and Power	30		
Water, sanitation and flood protection	Water supply	30	100	
Public Administration, Law, and Justice	Public administration-Water, sanitation and flood protection	5		
Total		100		

☐ I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this project.

Themes

Theme (Maximum 5 and total % must equal 100)

Major theme	Theme	%
Social protection and risk management	Natural disaster management	35
Environment and natural resources management	Water resource management	30
Rural development	Rural services and infrastructure	25

Financial and private sector development	Infrastructure services for private sector development	10
Total		100

Proposed Development Objective(s)

The Project Development Objective is to improve the safety of targeted dams under the Government's Dam Safety Program to protect downstream communities and economic activities through priority investments and capacity enhancement.

Components

Component Name	Cost (USD Millions)
1. Dam Safety Rehabilitation	412.00
2. Dam Safety Management and Planning	20.00
3. Project Management Support	11.00
	443.00

Systematic Operations Risk- Rating Tool (SORT)

Risk Category	Rating
1. Political and Governance	Substantial
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Substantial
4. Technical Design of Project or Program	Substantial
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	High
7. Environment and Social	Substantial
8. Stakeholders	High
9. Other	
OVERALL	High

Compliance

Policy

Does the project depart from the CAS in content or in other significant respects?	Yes [ ]	No [X]
Does the project require any waivers of Bank policies?	Yes [ ]	No [X]
Have these been approved by Bank management?	Yes [ ]	No [ ]
Is approval for any policy waiver sought from the Board?	Yes [ ]	No [X]
Does the project meet the Regional criteria for readiness for implementation?	Yes [X]	No [ ]

Safeguard Policies Triggered by the Project	Yes	No

Environmental Assessment OP/BP 4.01	X	
Natural Habitats OP/BP 4.04	X	
Forests OP/BP 4.36		X
Pest Management OP 4.09	X	
Physical Cultural Resources OP/BP 4.11	X	
Indigenous Peoples OP/BP 4.10	X	
Involuntary Resettlement OP/BP 4.12	X	
Safety of Dams OP/BP 4.37	X	
Projects on International Waterways OP/BP 7.50	X	
Projects in Disputed Areas OP/BP 7.60		X

Legal Covenants

Name	Recurrent	Due Date	Frequency
Schedule 2, Section I.A.1 Establish and thereafter maintain throughout the implementation of the Project, a High Level Working Group (HLWG)		Three months after effectiveness	

Description of Covenant:
The HLWG will include core representatives from MARD, MoIT, and MoNRE, as well as other relevant line ministries and will be chaired by the MARD Minister or an authorized representative. It will be responsible for coordinating national policy positions and strategic issues relating to dam safety, providing overall guidance to implementation of the National Dam Safety Program, reviewing implementation progress and providing necessary guidance to accelerate the implementation of the program.

Name	Recurrent	Due Date	Frequency
Schedule 2, Section I.A.2 MARD and the provinces to maintain throughout the implementation of the Project, a Central Project Management Unit (CPMU) at MARD and PPMUs at provinces.			Ongoing

Description of Covenant:
A Central Project Management Unit (CPMU) will be formed by MARD with responsibility for overall project implementation. The CPMU will coordinate the three ministries and oversee the procurement, financial management, safeguards management, project monitoring and overall administration of the project.
The PPMU, to be established or appointed by the Provinces, will be in charge of day-to-day implementation activities of provincial subproject(s) .

Name	Recurrent	Due Date	Frequency
Schedule 2, Section I.A.3 Establish and maintain an International Dam Safety Panel and a National Dam		Three months after effectiveness	

Safety Review Panel with composition and under terms of reference satisfactory to the Association.			

Description of Covenant

An International Panel of Experts (PoE) and a National Dam Safety Review Panel will be established within three months of project effectiveness. The panels will comprise several individual consultants with considerable experience in dam rehabilitation programs.

Conditions

Source Of Fund	Name	Type
IDA	Article IV 4.01	Effectiveness

Description of Condition

The Project Operational Manual (POM) is adopted by MARD.

Team Composition

Bank Staff

Name	Title	Specialization	Unit
Cuong Hung Pham	Task Team Leader	Sr. Water Resources Spec.	GWADR
Marcus Wishart	Co- Task Team Leader	Sr. Water Resources Spec.	GWADR
Nina Masako Eejima	Senior Counsel	Country Lawyer	LEGES
Victor Bundi Mosoti	Senior Counsel	Country Lawyer	LEGEN
Anjali Acharya	Environmental Cluster Coordinator	Environment	GENDR
Shakil Ahmed Ferdausi	Sr. Environmental Specialist	Environment	GENDR
Roxanne Hakim	Social Cluster Coordinator	Social	GSURR
Tuan Anh Le	Social Development Specialist	Social	GSURR
Mai Thi Phuong Tran	Sr. Financial Management Spec.	Financial Management	GGODR
Yuling Zhou	Procurement Hub Leader	Procurement	GGODR
Hoang Xuan Nguyen	Sr. Procurement Specialist	Procurement	GGODR
Adu-Gyamfi Abunyewa	Sr. Procurement Specialist	Procurement	GGODR
Satoru Ueda	Lead Dam Specialist	Dam management	GWADR
Ximing Zhang	Sr. Water Resources Specialist	Water Resources	GWADR
Thi Ba Chu	Sr. Energy Specialist	Hydropower	GEEDR
Victoria Gyllerup	Sr. Operations Officer	Quality Control	GWADR
Junxue Chu	Senior Finance Officer	Finance Officer	WFALN
Chau-Ching Shen	Senior Finance Officer	Finance Officer	WFALN
Tuyet Thi Phung	Program Assistant	Program Assistant	EACVF
Demilour Reyes Ignacio	Program Assistant	Program Assistant	GWADR

Non Bank Staff

Name	Title	City
Thomas Muenzel	Sr. Economist; FAO CP	Rome
Trithep Lohavisavapanich	Sr. Financial Analyst; FAO CP	Rome
Van Thanh Thi Ngo	Lead Economist	Hanoi
Frederick Brusberg	Safeguards Specialist	Ontario
Jonas Baptista	Environmental Specialist	Manila
Ly Thi Dieu Vu	Environmental Specialist	Brisbane

Locations

Country	First Administrative Division	Location	Planned	Actual	Comments
Vietnam	Bắc Giang		X		
Vietnam	Bắc Kạn		X		
Vietnam	Bình Định		X		
Vietnam	Bình Thuận		X		
Vietnam	Đắk Lắk		X		
Vietnam	Đắk Nông		X		
Vietnam	Gia Lai		X		
Vietnam	Hà Giang		X		
Vietnam	Hà Tĩnh		X		
Vietnam	Hải Dương		X		
Vietnam	Hòa Bình		X		
Vietnam	Khánh Hòa		X		
Vietnam	Kon Tum		X		
Vietnam	Lâm Đồng		X		
Vietnam	Lạng Sơn		X		
Vietnam	Lào Cai		X		
Vietnam	Nghệ An		X		
Vietnam	Ninh Bình		X		
Vietnam	Ninh Thuận		X		
Vietnam	Phú Thọ		X		
Vietnam	Phú Yên		X		
Vietnam	Quảng Bình		X		
Vietnam	Quảng Nam		X		
Vietnam	Quảng Ngãi		X		

Vietnam	Quảng Ninh		X		
Vietnam	Quảng Trị		X		
Vietnam	Sơn La		X		
Vietnam	Tây Ninh		X		
Vietnam	Thái Nguyên		X		
Vietnam	Thanh Hóa		X		
Vietnam	Thừa Thiên Huế		X		
Vietnam	Tuyên Quang		X		
Vietnam	Vĩnh Phúc		X		
Vietnam	Yên Bái		X		

I. STRATEGIC CONTEXT

A. Country Context

1. **Vietnam has experienced rapid economic growth over the past two decades.** Political and economic reforms launched in 1986 have transformed Vietnam from one of the poorest countries in the world, with per capita income below US$100, to a lower-middle income country within a quarter of a century, per capita income reaching US$1,790 by the end of 2014. The poverty headcount ratio has fallen from 58 percent in 1993 to 17.2 percent in 2013, and most indicators of welfare have improved. Vietnam has been applauded for the equity of its development, which ranks better compared with other countries in similar context. Five of the ten original Millennium Development Goal targets have already been attained.

2. **Vietnam is highly exposed to the negative impacts of natural hazards, given the geography, topography, economic structure and population distribution and the agricultural sector is particularly vulnerable.** Agriculture contributes an estimated 18 to 19 percent of GDP, but with an estimated 70 percent of the population living in the rural areas and reliant on mainly agricultural activities, these risks pose a challenge for Vietnam's quest for continued growth. While floods and typhoons are the dominant hazards, the country is also susceptible to droughts, landslides and seawater intrusion, particularly during the monsoon rainy season combined with river plain flooding and flash floods, as well as associated land-slides. The risks associated with these hazards are being further exacerbated due to the impacts of climate change. Recent experience has illustrated the increasing financial vulnerability from extreme weather events, accentuated by the density of physical and commercial activities in vulnerable areas. The agricultural sector is particularly vulnerable to climate risk and is heavily dependent on irrigation, drainage and flood control with a high density infrastructure network distributed across 14 major river basins throughout the country.

3. **Significant resources have been invested in ensuring water security.** Water-related expenditures accounted for an estimated 22.9 percent (US$1,140.57 million) of total Government expenditure during the period of 2001 to 2011. Over half of the Government expenditures were channeled into hydroelectric power plants (50.6 percent), followed by water supply and sanitation (27.8 percent) and agricultural water resources (17.3 percent). During this same period, official development assistance (ODA) gross disbursements in the sector on average amounted to US$240.52 million per year, with close to half of ODA disbursements going to water supply and sanitation (46.8 percent). As a result of these investments, Vietnam has one of the world's most extensive network of dams and hydraulic infrastructure with a combined storage capacity of about 50 billion cubic meters, similar to that of France, Germany and Australia. While the primary development has been for irrigation and hydropower, many of these dams are multi-purpose, supporting flood regulation, aquaculture and bulk water supply. While these investments have provided an effective infrastructure platform to ensure water security and meet historical demands, increasing impacts associated with a changing climate, the frequency of natural disasters and increased demand resulting from rapid economic development are undermining the existing dams and hydraulic infrastructure and accentuating uncoordinated operational procedures.

4. **With over 7,000 dams of different types and sizes Vietnam has a complex and evolving institutional framework for dam safety.** There are more than 750 large dams[1],

[1] Over 15m in height or between 5 and 15m with reservoir storage in excess of 3 MCM

with the number of small dams[2] estimated to be in excess of 6,000. These are largely earth embankment dams supporting irrigation of more than three million of the total four million hectares of agricultural land. These irrigation dams fall under the Ministry of Agriculture and Rural Development (MARD) and are managed through the Provincial structures, with the exception of one inter-provincial dam managed at the central level. At the provincial level all large and medium-size dams are managed by provincial Irrigation Management Companies (IMCs) while small dams are entrusted by IMC to local communities for operations and maintenance. In addition, there are more than 1,100 hydropower dams either under operation, construction, investigation or planned that fall under the Ministry of Industry and Trade (MoIT). The existing 268 hydropower dams have a total installed capacity of 13,066 MW. Of these, 86 are defined as large hydropower dams, with an installed capacity greater than 30 MW, managed through Electricity of Vietnam (EVN), the state owned power utility, or other state-owned hydropower companies. In contrast, most of the small hydropower facilities (<30MW) are developed, owned and operated by the private sector.

Table 1: Summary of the Dam Network in Vietnam

Definition	***Irrigation***	***Hydropower***
Dams > 50m	3	32
Dams 15m – 50m or >=3 MCM	661	54
Dams <15m & < 3 MCM	6,648	201

Source: Department of Dam Safety Management, MARD.

5. **The development of this extensive network of hydraulic infrastructure has resulted in a number of inherent challenges.** Many of the medium and small-size reservoirs were built in the 1960s-1980s with limited technical investigations, inadequate design, and poor construction quality. These issues have been compounded by limited investments in operations and deferred maintenance, as the public sector irrigation dams are financed through Government transfers which are often insufficient and untimely.[3] As a result, many dams have deteriorated, posing a substantial risk to human safety and economic security, with structural and non-structural safety often falling below acceptable international standards. The deterioration of these dams, coupled with increased risk and uncertainty resulting from hydrological variability due to climate change and rapid upstream development, has placed many reservoirs at risk.[4]

6. **Failure to secure the operational safety of the existing hydraulic networks and strengthening the capacity for further development has the potential to undermine Vietnam's economic gains.** The cost of damages associated with water-related disasters have been estimated at VDN 18,700 billion (US$1.25 billion) between 1995 and 2002. In the past five years, there have been an estimated 30 dam failures. These have resulted in devastating regional flooding, significant loss of human life, and substantial economic losses. The impacts associated with natural flooding have been further exacerbated by the uncoordinated operation along cascades of dams within individual river basins and the limited capacity for timely monitoring and forecasting of high flows, particularly in the narrow and steep topography of the Central Highlands. The public outcry resulting from recurrent flooding and dam failure has been echoed by the media and has led to civil society campaigns which have raised the awareness of this problem in all spheres of Government.

[2] Less than 15m in height and 3 MCM

[3] Maintenance of hydropower dams is financed through electricity tariffs which provide more secure and predictable revenue streams.

[4] The risks are widespread, resulting from inadequate cross section e.g. too thin to be stable, through subsidence of the main structure, seepage through main and/or auxiliary dam and around the intake structure, deformation of up/downstream slope, spillway malfunction, and inadequate and ineffective use of safety monitoring devices.

7. **The Government has established a sectoral program for dam safety in recognition of the importance of securing the foundations for sustained and secure economic growth.** The program was first launched in 2003, revised again in 2009 and has been revisited in 2015 as part of the effort to revitalize the program activities and targets. Based on information available from MARD, there are about 1,150 irrigation dams in need of urgent rehabilitation or upgrading until 2022. By contrast, the physical conditions of the large hydropower dams under the operation of the national utility are reported as safe. The program recognizes the need to improve not only the physical stability of dam facilities, but also the safety management system including the legal and regulatory framework, technical standards, norms, guidelines, manuals as well as building capacity. The program is currently being led by MARD in collaboration with the MoIT, the Ministry of Natural Resources and Environment (MoNRE) and Provincial authorities with budget support from the national Government. The total cost of the program is estimated to be over VND21.3 trillion (approx. US$1.0 billion). In support of this renewed effort, the Government has allocated an amount of VND900 billion (approximately US$38 million) since 2013 to rehabilitate about 90 dams. The number of dams rehabilitated annually is about 50, with an average cost of US$400,000. While sufficient technical capacity exists to rehabilitate a large number of dams, the current program is constrained by resource availability.

B. Sectoral and Institutional Context

8. **Vietnam's legislation governing the water sector consists of a complex system of legal instruments issued by different state agencies.** The institutional responsibilities are divided between MARD, which is responsible for publicly financed irrigation dams while MoIT oversees the hydropower facilities. The Law on Water Resources approved in 2012 and effective since January 2013 assigns MoNRE within the evolving institutional framework with responsibility for inter-reservoir operations in those basins with cascades of dams. The Law is aligned with principles of Integrated Water Resources Management (IWRM), with an emphasis on the introduction of river basin approaches, including provisions for improving dam safety and reservoirs, as well as introducing provision for the introduction of environmental flows. The national legal framework for dam safety is prescribed through Decree No. 72, issued in May 2007 and revised to define a set of dam safety related issues.[5] However, oversight of dam operations and performance by central ministries and provincial authorities is constrained by lack of capacity, both in terms of number and skilled qualifications, further undermined by the lack of technical standards, norms, safety inspection guidelines and procedures. The roles and responsibilities of the various Government agencies are outlined in a series of Government Circulars.[6] These were formulated and came into effect to direct dam safety and reservoir management and include provisions for inter-reservoir water regulation plans covering serious drought, water contamination, environmental incidents, or disasters. The decrees and circulars also define the roles and responsibilities of provincial and district level organizations and other relevant entities.

[5] Including classification of individual dams, procedures for safety reviews and quality assurance for dam designs, acceptance of completed dams, operational procedures for reservoirs, dam safety and hydro-meteorological monitoring, periodic safety inspection and reporting requirements, rehabilitation and protection measures, along with flood storm prevention and the protection of downstream communities.

[6] Circular No. 33 (February 2008) details the role of MARD for irrigation dams and Circular No 34 (October 2010) details the role of MoIT in relation to hydropower dams. The MoNRE is responsible for developing inter-reservoir water regulation plans and operating rules in eleven river basins where there is a cascade of dams and reservoirs (Decree 21/2013/ND-CP dated March 4, 2013). The roles and responsibilities of MoNRE, MARD, and MoIT relating to integrated management of hydropower and irrigation reservoirs are detailed in Decree No. 112.

9. **The rapid development of hydraulic infrastructure is increasing the institutional complexity within various river basins.** This evolving context requires similar changes in the regulatory regime to clearly delineate responsibilities and provide the mechanisms to balance the competing demands of the different state agencies. The operation and maintenance (O&M) of medium and large-size irrigation dams is the responsibility of the provincial irrigation management companies (IMCs), which are state-owned entities, with branch offices at district level called Irrigation Management Enterprises (IMEs). The O&M of small dams is typically the responsibility of the local authorities acting through its Agricultural Cooperatives or irrigation brigades. While the technical capacity of the IMCs is generally good and sufficient to meet the minimum management responsibilities, the capacity of the local authorities is limited, necessitating significant support and guidance from technical agencies at the provincial and district level. In contrast, the responsibility for the O&M of hydropower dams rests with its owners, although often without regular monitoring by administrative agencies. The state-owned corporations responsible for O&M of the large and medium-size hydropower dams have sufficient technical expertise to perform their tasks. However, the private-sector investors developing the smaller hydropower dams often lack the technical expertise to manage these facilities. This poses a number of safety risks, especially during the flood season. Strengthening the institutional arrangement to ensure more effective dam safety and reservoir management is a core Government objective that will be supported by the project.

10. **There are estimated to be at least 104 different entities responsible for managing irrigation and drainage systems across Vietnam.** These include 90 Provincial IMCs under the Provincial People's Committees (PPCs) in 49 of the country's 63 provinces employing over 24,000 staff. In addition, there are three MARD IMCs in charge of large inter-provincial irrigation schemes that operate across 11 provinces. In the remaining 14 provinces where there are no IMCs, irrigation and drainage systems are managed by a range of different institutions, including Irrigation Management Centers, Irrigation Management Boards, Water Resources Division of the Provincial Departments of Agriculture and Rural Development (DARDs). These 14 provinces are mainly in the Mekong Delta where irrigation schemes do not rely on reservoir storage. Typically, responsibility for reservoirs less than 1MCM in the lowland areas and 500,000m^3 in the highlands are delegated to the District or Commune level. The DARDs are responsible for overseeing the O&M, monitoring performance and regulation of irrigation at the provincial level under the guidance of the PPCs.

11. **The PPCs are responsible for guiding and monitoring the operation of dams and reservoirs, and the execution of safety plans during disaster events.** The O&M of the dams, along with emergency preparedness procedures and overall dam safety measures are prescribed in the Provincial Flood Prevention and Protection Plans. These are the responsibility of the PPC in accordance with the provisions of Decree No. 72. These plans are compiled and carried out in coordination with MARD, MoNRE, and MoIT, along with the Steering Committees for Natural Disaster Prevention and Control, which is led by the Minister MARD. Insufficient funds and delays in the release of the annual budgets for O&M implies that such plans are not fully implemented, resulting in the deterioration of many dams. This is particularly problematic for small dams managed by the local communities. Lack of safety monitoring devices, unclear reporting procedures and the absence of a robust institutional framework for coordination further undermine dam safety operations and expose many downstream communities and economic activities to significant risks.

C. Higher Level Objectives to which the Project Contributes

12. **The project directly contributes to the Government's Socio-Economic Development**

Strategy (SEDS) and the World Bank Group's (WBG's) Country Partnership Strategy (CPS) for Vietnam FY12-16. The financing of activities aimed at improving the safety of dams along with the downstream populations and infrastructure directly contributes to the following:

(a) SEDS Goal 11: Protect and Improve Quality of the Environment, Proactively and Effectively Respond to Climate Change, as well as Prevent and Fend off Natural Disasters

(b) CPS Outcome 2.1: Improved Natural Resources Management

(c) CPS Outcome 2.3: Enhanced Preparedness for Natural Hazards and Climate Change:

13. **The project is contributing to the WBG Strategic Twin Goals of ending extreme poverty and boosting shared prosperity.** The project is targeted toward 34 of 63 Provinces (51%), accounting for roughly 42 percent of the total population constituting 54 percent of the total poverty headcount. This is equal to an estimated nine million of the poorest people in Vietnam. All but five of the provinces included have levels of poverty above the national average headcount of 17.6 percent. The provinces included under the project also account for 50 percent of the total population in the bottom 40 percent, with all but three provinces above the national average of 39 percent of the population in bottom 40 percent. Additionally, the provinces included under the project account for nearly 60 percent (58.71 percent) of the national population living in extreme poverty. All but nine provinces are equal to or above the national average headcount of six percent of the population living in extreme poverty.

14. **Improved dam safety will disproportionately benefit the poor, and in particular women, who are the most vulnerable to downstream flooding and dam failure.** These risks, compounded by the prospects of adverse impacts associated with climate change, pose a greater challenge for sustained economic growth and efforts to combat poverty. Improved physical safety of irrigation dams will secure food production systems, improve the climate resilience of the hydraulic infrastructure network including dams and reduce the risk of inundation downstream due to dam failure. Improved institutional mechanisms, stronger planning and enhanced coordination are expected to reduce the risks on vulnerable populations downstream. More transparent objective mechanisms for identifying risks, prioritizing interventions and integrating asset management will further improve the long term risk profile, reduce the vulnerability of the poor and safeguard economic gains in which women who are the most vulnerable to water threat due to either water shortage or excessive releases caused from dam failure.

15. **The package of support to be provided by the Bank includes its international experiences in dam safety aspects including international engineering and social and environmental best practices, as well asfunding resources.** This builds on an extensive portfolio of dam safety projects globally that has enabled the Bank to respond to the Government's request for a combination of structural and non-structural measures to assist in the formulation and execution of a comprehensive program to address systemic issues associated with dam safety. Combining the financial investments for structural rehabilitation of dams with the World Bank's global expertise will further enhance the project development impact and address underlying systemic issues in ways that go beyond what can be realized by exclusive reliance on the Government's own human and financial resources. The framework approach adopted provides an objective, risk based portfolio management tool to help prioritize investment decisions, address the most urgent risks and ensure economic efficiency. Coupled with the introduction of internationally benchmarked safeguards, regular implementation support and technical assistance that draws on the Bank's global experience,

the framework approach also helps to consolidate the internal arrangements to address underlying institutional issues required to ensure long-term sustainability and safety. The project supports implementation of the National Dam Safety Program by providing incremental resources that complement the Government initiatives and scale up the program.

16. **The project also provides a framework for improved partnerships to leverage support for the Government.** Given the importance of dam safety within the national context, there are a number of active programs being proposed and supported by a range of development partners. During the project preparation process, the Bank has established mechanisms to enhance coordination among active development partners and stakeholders. It is expected that these will be further strengthened during implementation. The project specifically draws on the experience of the first phase of the "Dam and Downstream Community Safety Initiative" supported by the Government of New Zealand and is designed to align with the second phase which is under preparation and planned to start in 2016. The program also supports a more structured dialogue to complement ongoing activities financed by the Asian Development Bank (ADB) in the Central Highlands, the on-going Japanese operation supported by JICA in four provinces in the Central region and the Bank's own portfolio of disaster reduction initiatives, including agriculture, water and irrigation projects. It is envisaged that the project would help formalize a framework for implementation which could then easily be scaled up in a coordinated manner to build on the interest expressed by other development partners, such as South Korea.

II. PROJECT DEVELOPMENT OBJECTIVES

A. Project Development Objectives (PDO)

17. The PDO is to improve the safety of targeted dams under the Government's Dam Safety Program to protect downstream communities and economic activities through priority investments and capacity enhancement.

B. Project Beneficiaries

18. Direct project beneficiaries are estimated to be 6.8 million people, including: i) more than 540,000 households (>2.7 million people, of which 1.35 million are estimated to be female) relying on dams and associated appurtenant structures for irrigated agricultural and aquaculture production, water supply and hydropower generation; and ii) more than 820,000 households (>4.1 million people, of which 2.1 million are estimated to be female) in downstream communities where economic assets are at risk in the event of dam failure.

19. On farm-benefits will accrue through: (i) avoidance of potential losses of agricultural production and farm income resulting from dam failure/breaks; (ii) potential increases in the agricultural area under production facilitated through improved reliability of water for irrigation; and (iii) a potential increase in agricultural productivity and cropping intensity facilitated by the increased availability of water for irrigation. Downstream benefits will accrue through avoidance of potential flood damage to houses, farm areas and infrastructure (roads, bridges, agricultural facilities and other public or private infrastructure), and industrial/commercial facilities.

20. The project will also have national and provincial benefits derived from the establishment of a comprehensive national framework for dam safety that incorporates a national register, a standardized process for identification, screening and prioritization for those dams requiring safety improvements. This will safeguard economic gains and promote macro-economic benefits through: (i) improved dam safety and reduced downstream risks; (ii) enhanced

Government coordination and improved regulatory frameworks; and (iii) efficiency in operations and management through better monitoring and technical standardization, improved coordination, data collection and early warning systems.

PDO Level Results Indicators

21. PDO indicators for the proposed project include:

(a) Direct Project Beneficiaries (number), of which female (number)

(b) Portfolio risk reduced in all risk categories under the project (%)

(c) Irrigated area protected from the risk of dam failure as a result of structural and non-structural interventions (Ha.)

(d) Adoption of Emergency Preparedness Plans for large dams by MARD and Provinces (number)

(e) Integrated Dam Database Operational

III. PROJECT DESCRIPTION

A. Project Components

22. **The project is designed based on a framework process approach that is intended to help strengthen the Government system for dam safety with a flexible, transparent and responsive mechanism.** The number of dams to be financed under the project is not fixed, but an initial list of 450 dams has been prioritized based on assessed risk using the modified index developed during preparation and the estimated cumulative costs within the resources available. The project will allow the Government additional financial resources to scale up the current program that rehabilitates an estimated 50 dams per year. While not evenly distributed among the 34 Provinces, the rehabilitation of 450 dams over a six-year implementation period would mean an average of 75 dams per year, or about two dams per province per year during implementation.

23. **The initial number of dams to be financed under the project will be reviewed, revised and updated annually within the context of the framework during implementation.** The process and detailed criteria defining the framework are explained in Annex 2. This includes criteria for determining eligibility, the process for prioritization and the assessment of individual sub-project readiness. The specific costs for each of the proposed dams to be rehabilitated will be available after the completion of the feasibility studies and detailed designs that will be confirmed following the bidding process. The annual review will therefore be informed by resource availability taking into account the contract price for each of the sub-projects the year before and an update of prioritized dams identified through the screening process to manage resource availability. This is intended to be an iterative process that will contribute to the institutional enhancements, as well as the physical rehabilitation envisaged under the Government's dam safety program, and is aligned directly with the provisions of Decree 72 governing the management of dam safety in Vietnam.

24. **The project provides an optimal mix of structural and non-structural measures designed to improve dam safety.** The structural measures include physical rehabilitation and upgrading safety work of existing dams and appurtenant structures, including instrumentation and associated dam safety planning instruments. Such physical works represent the large part of the IDA financing (>80%). Non-structural interventions have been proposed to support a range of institutional and regulatory measures, as well as pilot specific basin level measures.

These basin level measures are aimed at improving data collection platforms, inter-institutional information management and coordinating dam and reservoir operations in basin management. The project will also help improve institutional coordination mechanisms as an integral part of those measures aimed at improving operational dam safety and supporting the regulatory environment and instruments to guide future development and management of hydraulic infrastructure.

25. **The majority of the 450 irrigation dams are small, earth-filled embankment dams, with embedded intake structures**. The preliminary list of 450 irrigation dams from 34 Provinces have been identified through an iterative, consultative prioritization process with the national and provincial authorities. Of the initial 450 dams prioritized for IDA financing, 334 (74%) are less than 15m in height, while 116 (26%) are higher than 15m and defined as large dams. Of these large dams, more than half are located in ten provinces, with these ten provinces accounting for roughly 37% of the preliminary cost estimate. In terms of forecasting capacity, 431 (96%) of the 450 prioritized dams report having no upstream forecasting capacity or observation and monitoring at the dam, while 85% report having less than 30% trained staff for operations and maintenance. Through the annual review process those investments that have the necessary risk assessments, engineering design and tender documents ready will move to implementation subject to satisfactory review. The readiness filter will help ensure that those prioritized on technical grounds are fast tracked through the preparation process.

26. **Component 1: Dam Safety Rehabilitation (US$412 million of which IDA US$388.5 million).** This component will be implemented through MARD and the Provinces with the aim of improving the safety of irrigation dams through physical rehabilitation of existing infrastructure. The implementation includes two different approaches required for the rehabilitation of small community-managed and large dams. The difference between the two approaches relates not only to the types of works and the regulatory framework involved, but also the institutional and implementation arrangements required to undertake such works and ensure their sustainable operations and maintenance. The activities would include: (i) detailed engineering design, safeguards policies documents, supervision and quality control of rehabilitation works and associated safeguards compliance for prioritized dams and associated infrastructure; (ii) rehabilitation works, including civil works, hydro-mechanical works and installation of hydrological and safety monitoring equipment and devices; (iii) preparation of Operation and Maintenance Plans, Instrumentation Plans and Emergency Preparedness Plans; (iv) flood discharge assessments for large dams to confirm the adequacy of spillway discharge capacity; and (v) monitoring and evaluation. Financing under this component would be used for consulting services, works, goods and non-consulting services. Implementation of a three steps process framework applicable to this important component is presented in Annex 2.

27. **Component 2: Dam Safety Management and Planning (US$20 million of which IDA US$17 million).** This component will be implemented through MARD, MOIT and MONRE with the aim of improving the planning and operational framework for dam management to safeguard the downstream communities and socio-economic infrastructure. Three common and mutually reinforcing sub-components are envisaged, involving all three participating Ministries including: (i) technical services and strategic studies; (ii) institutional, legal and regulatory improvements; and (iii) capacity enhancement and professional development. Financing under this component will support consultant services, works and goods, equipment and non-consulting services. Detailed activities with indicative budget allocation for each participating ministry are presented in Annex 2.

28. For MOIT this includes: (i) hydropower dam and reservoir database for safety operations; (ii) the development and piloting of hydropower dam safety methodology with internationally-accepted safety indicators; (iii) the development of legal and institutional standards norms and regulations for hydropower dams; (iv) the provision of technical assistance to support the Project activities carried out by MOIT; and, (v) improvement of the monitoring capacity of MOIT's safety management department.

29. For MONRE this includes: (i) the installation and rehabilitation of hydromet stations the Vu Gia-Thu Bon river and Ca river basins; (ii) the provision of equipment for the operation of cascade dams in, and disaster forecasting and early warning for, the Vu Gia-Thu Bon and Ca river basins; (iii) the development of an information database for monitoring dam operations; and, (iv) the provision of technical assistance to support the Project activities carried out by MONRE; and, (v) improvement of MONREs capacity to monitor implementation of the joint operating rules for cascade dams.

30. For MARD this includes: (i) the provision of monitoring and support equipment for disaster risk management by the Department of Water Resources Directorate; (ii) the development of a dam/reservoir database; (iii) the preparation of provincial disaster risk management plans for selected provinces; (iv) the development of legal, institutional and financial models for sustainable dam safety management; (v) the adoption of a standardized operational procedures for small community-managed dams; (vi) the provision of technical assistance to support the Project activities carried out by MARD; (vii) training, capacity

building and information dissemination and awareness activities on dam safety; (viii) the study of new dam rehabilitation and safety management technologies; and, (ix) improvement of the monitoring capacity within MARD; and, monitoring and evaluation.

31. **Component 3: Project Management Support (US$11 million of which IDA US$9.5 million**). This component will provide the necessary enabling environment to support project implementation. This will include support for the following: (i) High Level Working Group (HLWG) composed of MARD, MoIT and MoNRE, along with other relevant Government agencies, to coordinate and oversee all project interventions; (ii) Project Management Units (PMU) within MARD and the Provinces to provide the necessary supporting services for timely and effective project implementation, including monitoring and evaluation, procurement, financial management, safeguard monitoring, etc.; (iii) a Project Implementation Consultant to provide Technical Assistance for Engineering and Quality Assurance; (iv) a Project Implementation Consultant to provide Environmental and Social support; (v) an independent international Panel of Experts (POE); (vi) establishment and operations of a National Dam Safety Review Panel; (vii) Technical Assistance for beneficiary departments within MARD, MoIT and MoNRE to provide supporting services for timely and effective project implementation; and (viii) an Independent Supervision Consultant, or Third Party Monitor, for monitoring and quality control. Financing under this component will be used for consulting services, goods, equipment, non-consulting services, and incremental operating costs associated with project implementation, management and monitoring.

B. Project Financing

32. **Lending Instrument**. The total cost estimate for the project is US$443 million, of which IDA would finance up to US$415 million. Provision of IDA financing is proposed via the Investment Project Financing (IPF) instrument. A range of potential financing instruments were considered during project preparation. The project is aimed at strengthening Government systems in order to boost the organizational capacity, regulatory authority and process framework for dam rehabilitation and safety management. As such, the Program-for-Results (PforR) instrument was explicitly considered. However, the PforR excludes programs or activities that are considered Category A-type investments under the environmental safeguards classification. The processes and procedures for assessing, securing and implementing approvals for individual investments was also deemed to be inefficient in the Government's current administrative system given the large portfolio of dams identified for inclusion under the project. The risks associated with the rehabilitation of a large number of dams across many provinces, in the absence of an approved Government program with a well-defined expenditure framework and clear disbursement-linked indicators, carried a substantial potential risk. Thus, the use of the conventional IPF has been assessed and determined as appropriate to provide the necessary support to the Government's dam rehabilitation program. It also provides the necessary due diligence in the investment preparation process and consolidates the various steps in the different systems by sequencing the rehabilitation needs to allow appropriate adjustments during implementation to respond to emerging challenges and incorporate lessons learnt. Using IPF also allows the introduction and application of international best practices on dam safety from similar Bank supported programs that sought to strengthen Government systems for long-term sustainable development in the sector.

Table 2: Summary of Project Costs (US$ million)

Project Components	Project Cost	IDA Financing	% IDA Financing
1. Dam Safety Rehabilitation	412	388.5	94

2. Dam Safety Management and Planning	20	17	85
3. Project Management Support	11	9.5	86
Total Costs	443		
Total Project Costs	443	415	94
Front-End Fees	0	0	
Total Financing Required	443	415	

C. Lessons Learned and Reflected in the Project Design

33. **The WBG has extensive experience in supporting dam safety and rehabilitation projects**, specifically combining prioritized investment programs with long-term institutional development and financing mechanisms. The project formulation draws on lessons learned from a number of related World Bank projects, including similar dam safety programs in Armenia, China, India, Indonesia and Sri Lanka as well as through reimbursable technical assistance in countries like Brazil. The Bank is also financing rehabilitation of major hydropower dams, such as Kariba (Zambia and Zimbabwe), seven cascade dams in Dnipro and Dnister Rivers in Ukraine, and three cascade dams in Drin River in Albania. This is coupled with Advisory Services and Analytics to leverage the global experience with leading knowledge services. A global comparative assessment of regulatory frameworks for dam safety, published in 2002 reviewed the experience of 22 countries through a series of case studies looking at the institutional aspects of dam safety. This is being updated, with an expanded set of case studies to inform project design.

34. **Lessons point to the need for an integrated, holistic approach within the context of the river basin management and adequate institutional and operational support for enhanced dam safety and reservoir operation.** Common to all approaches is the need to invest in long-term institutional support to provide a sustainable operating environment and a strong, national cadre of professionals and training institutions. This was demonstrated in Brazil where a strong focus on institutionalized training enhanced national capacity and established international professional networks through dedicated training exchange programs. Experiences from similar project support in India highlights the need for strong implementing agencies to ensure effective implementation. These arrangements are better served when embedded within centralized national apex institutions that can provide the necessary environment on regulatory, technical assistance support as well as overseeing implementation. Performance in all instances was facilitated by ensuring a sound, transparent and objective framework for the identification, screening and prioritization of dams within a national framework. The long World Bank engagement on dam safety projects in Indonesia further highlights the importance of a *priori* agreement on these mechanisms and the use of internationally benchmarked assessment tools to set verifiable targets.

Box 1. Good Practice Examples from the World Bank Group Experience with Dam Safety Operations

- A screening template that describes the history of a dam (current status, rehabilitation and modernization requirements, costs, and safeguard requirements) is required as it helps decision makers to provide in principle approval to proceed with rehabilitation under the project.
- Updated hydrological assessments are critical to ensure the design of adequate spillway capacity. Older dams designed on limited hydrological records, coupled with the implications of changing climatic conditions, mean that many dams have insufficient discharge capacity and are not compliant with contemporary safety standards.
- Operational measures, such as revised rule curves and good emergency preparedness and management plans, can help mitigate under-designed spillways but should not be seen as a replacement for structural measures.
- Cost overruns are difficult to avoid as many of the rehabilitation requirements and modernization measures cannot be fully designed and defined at the planning stage. It is important to carry out all the required works, rather than taking work items out in order to stay within the original cost estimate.
- There are a lot of challenges associated with small dams, thus a strong need for proper design and supervision. Many of the incentives are often aligned to larger infrastructure and clear implementation procedures and arrangements should be established upfront for the small dams.
- International technical assistance is recommended to support implementation of interventions on larger dams. This helps to bring international experience, ensure dam safety issues are properly addressed and serve as examples to local designers for future applications.
- Basic dam safety equipment for monitoring dam safety, supporting early warning and flood forecasting, etc. are better procured in large batches and flexibility is often required in procurement to ensure a standard, integrated national platform with appropriate service contract

35. **The WBG has been a long standing partner in Vietnam and the project draws on the lessons from more than two decades of support to the Government.** Specifically, the project draws on the experience of previous support to MARD, MoIT and MoNRE through a series of Bank financed projects aimed at improving integrated development and management of water resources, including in areas of dam safety. These consist of the Irrigation Rehabilitation Project (1995-2003); Vietnam Water Resources Assistance Project (VWRAP 2003-2010); Vietnam Natural Disaster Risk Management Project (NDRMP 2007-2011) and the on-going Vietnam Managing Natural Hazards Project (VN-Haz 2012-2019). The dam safety component under VWRAP supported the formation of MARD's Dam Safety Unit and the development of Decree 72, along with similar rehabilitation works for six of the largest irrigation dams and designs for another ten large dams. The institutional developments supported under VWRAP triggered follow-up actions such as the development of several regulations for dam safety and Emergency Preparedness Plans (EPP) for the rehabilitated dams. The VN-Haz project is continuing this support through development of hazard protection plans and early warning systems.

36. **Global experience highlights the need for an appropriate balance of structural and non-structural interventions within an objective prioritization framework to ensure sound institutions, secure infrastructure and sustainable revenues.** The lessons from Vietnam and the global experience show that while non-structural measures are not a substitute for structural rehabilitation they play a fundamental role in assuring sustainability of the works and in ensuring long-term operational safety. The project has been structured to reflect these aspects, with a combination of international experience coupled with local expertise to develop a local cadre of professionals and a sound framework. Linking the data

collection to information products that can inform the planning and decision making process for the individual schemes as well as the basin level also draws on the international experience that advocates an integrated approach to governance and optimized operations within the river basin context. Another lesson learnt from similar operations supported by the Bank in India and Sri Lanka underscores the risk of underestimating rehabilitation cost during project preparation which often lead to cost-overruns and reduce the number of dams rehabilitated. The project includes an annual review that will be prepared and monitored during implementation to ensure timely adjustment of costs and targets.

37. **The safe operation of dams have a proven environmental, social and economic relevance.** Based on the experience of similar operations in other countries, projects implemented by MARD and findings of the environmental and social assessment of the first year 12 sub-projects, the project has adopted a sound environmental and social management approach to identify, avoid, or minimize and mitigate potentially adverse environmental and social impacts. Four framework documents have been adopted to ensure compliance with the operational policies and help Government strengthen the national system. In particular, the Dam Safety Policy (OP4.37) helps ensure that the design and construction supervision of rehabilitation and safety improvement works are undertaken in a qualitative manner and that the institutional and operational aspects are enhanced with improved instrumentation, reservoir operation, maintenance and emergency preparedness procedures. These have been subject to implementation through development and application of the four frameworks to the 12 first phase sub-projects and shown to provide a robust mechanism, directing the preparation of 54 different safeguard instruments. During implementation the risks will be further mitigated through international technical assistance to support environmental and social management and the appointment of an independent Supervision Consultant, or Third Party Monitor. This combination of the framework documents coupled with the Government oversight and support from the technical assistance and oversight by the third party monitor will help ensure that the project is implemented in accordance with international best practices.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

38. **The implementation arrangements mirror the Government's institutional mandates, taking into account the complexities of applying a framework approach.** Within this complex dynamic, a range of options were considered during project preparation. These entailed looking at efficiency in processes such as procurement and financial management, with the objective of consolidating and reinforcing the Government system for ensuring dam safety under the broader program. The agreed approach follows high level discussions with Government and duly recognizes the current institutional arrangements along with the respective responsibilities of the line Ministries and the Provincial authorities. Given the project complexities, specific measures have been introduced to help reinforce capacity during implementation building on international experiences and best practices. The implementation arrangements therefore reinforce the existing institutions and build on four themes to ensure efficiency and quality control, including: (i) oversight and coordination; (ii) implementation; (iii) technical assistance; and, (iv) audit, monitoring and evaluation. These functions are distributed within the structures, roles and responsibilities below.

39. **The Ministry of Agriculture and Rural Development (MARD) will be responsible for overall implementation and management of the project.** The Provinces will be in charge of implementing the physical rehabilitation of individual dams under Component 1 and MARD will coordinate activities with MOIT and MONRE under Component 2. The

project will support interventions aimed at improving vertical integration among the various tiers of Government, as well as horizontal integration within the administrative system, including Provincial authorities and future river basin organizations. Based on this arrangement, MARD is tasked with the management of dam safety at the state level. It has established a Dam Safety Unit (DSU) that merged with the Directorate of Water Resources in 2009. MARD has experience implementing various Bank financed projects, including projects with dam safety components, such as the VWRAP and NDRMP, and demonstrated a reasonable implementation capacity.

40. **A High Level Working Group (HLWG) will be established to coordinate policy and strategic issues and provide overall guidance.** The HLWG will include core representatives from MARD, MoIT, and MoNRE, as well as other relevant line ministries and will be chaired by the MARD Minister or an authorized representative. The three core ministries reflect the assigned responsibility for dam safety management under Decree 72 and coordination will be facilitated through support to all three entities under Component 2. Such implementation arrangements are intended to be integrated within the national systems and lay the foundations for application of a framework approach that will extend beyond the project implementation period. These mechanisms are further expected to help enhance coordination between the various Government agencies.

41. **MARD will be the main executing agency of the project responsible for the overall implementation through its existing Central Project Office (CPO).** A Central Project Management Unit (CPMU) will be formed by MARD within the CPO with responsibility for overall project implementation. The CPMU will coordinate the three ministries and oversee the procurement, financial management, safeguards management, project monitoring and overall administration of the project. An international firm at the central level will support the CPMU in implementation of the framework and overall implementation oversight. This firm will further contribute to the consolidation and integration of the framework approach into the Government systems in order to help improve the performance of dam safety. This firm is expected to be on board within six months following project effectiveness.

42. **Implementation of the physical rehabilitation of irrigation dams under Component 1, representing roughly 90 percent of the financial resources, will be the responsibility of Provincial Project Management Units (PPMUs) established under the Provincial Peoples Committee (PPCs).** The rehabilitation works and preparation of dam safety plans will rest within the provincial level authorities under the PPCs with participation of provincial agencies including DARD, Irrigation Management Company (IMC), with DoNREs and DoITs involved in non-structural activities at the Provincial level. All provinces participating in the project have experienced PPMUs implementing World Bank and Asian Development Bank-financed projects in various sectors. As such, they are familiar with Bank requirements and procedures on fiduciary and safeguards policies. They will be responsible for the preparation of engineering design, safeguards mitigation plans, procurement, financial management, contract administration, payment to contractors and handing-over. They will be supported and supervised by MARD through the CPMU with the screening process in line with the agreed framework.

43. **Implementation of non-structural activities under Component 2, representing less than 10 percent of the financial resources, will be the responsibility of the MARD CPMU in collaboration with MOIT and MONRE as project beneficiaries.** While the MARD CPMU will be responsible for overall management, MOIT, acting through its Department for Environment and Industrial Safety, and MONRE, acting through its Department of Water Resources, will assign staff to carry out specific project financed

activities. These two departments will be responsible for implementation of the planned activities without formally establishing or appointing dedicated PMUs. This includes preparation of the identified activities, terms of reference, budgets, facilitating the procurement process, and will sign the contracts, while the MARD CPMU will provide any overall support as required. The MARD CPMU will designate focal points to ensure a working interface between the departments, facilitate timely implementation, monitor progress and provide support as required. Progress review meetings of the three participating Ministries will be convened on a quarterly basis to strengthen the coordination amongst responsible ministries to ensure the dam safety program is being effectively implemented.

44. **An International Panel of Experts (PoE) and a National Dam Safety Review Panel will be established within three months of project effectiveness.** The panels will comprise several individual consultants with considerable experience in dam rehabilitation programs. The independent PoE would be expected to visit twice a year for a period of at least two weeks. The NDSRP will work closely with the international PoE to strengthen the institutional capacity to support the Government in independent oversight of dam safety measures.

45. **An Independent Third Party Monitor, or Supervision Consultant, will be appointed within six months of effectiveness to carry out regular evaluations.** This will include engineering verification and technical audits, supported through the development and application of innovative, state-of-the art technologies to enhance citizen and stakeholder engagement during project implementation, such as geotagging. The evaluations will be carried out against approved plans and framework documents for the technical and safeguard aspects. The Third Party Monitor, or Independent Supervision Consultant, will also evaluate compliance with the applicable safeguard policies and implementation of the various safeguard instruments.

B. Results Monitoring and Evaluation

46. **The MARD CPMU will work with MoIT, MoNRE and participating Provinces to collect data and report the indicators in the results framework.** The MARD CPMU will compile information from the participating ministries and provinces to monitor progress on regulation and policy changes, emergency preparedness and basin-wide operation plans. During the first six months of implementation, the CPMU will develop a simple database for monitoring indicators under each component. The project will introduce an innovative technology, such as geotagging of project sites, in the national dam database. The inclusion of geotagging metadata will help enhance project supervision and monitoring of results by various stakeholders. The CPMU will assess the compiled data, including the risk indices before and after rehabilitation, and report to the HLWG.

47. **The Provinces will submit information on project progress to the CPMU on a quarterly basis.** This will include: (a) progress of dams rehabilitation works; (b) introduction and use of operational rules, safety plans, and communication procedures for individual and cascades of dams; and (c) consultation with beneficiaries, dissemination of information and level of public awareness. In order to estimate the total number of beneficiaries the CPMU with input provided by PPMUs will provide information on the dam break analysis, the provincial administrative authorities will collect data on households and infrastructure within the area of influence. The current capacity is adequate to carry out these monitoring and evaluation roles.

C. Sustainability

48. **The project is aimed at supporting the Government's efforts to implement a**

sustainable framework for ensuring dam safety. Critical factors have been examined during project preparation to identify aspects affecting the sustainability of project interventions. In order to address the specific risks associated with the issue of sustainable operation and maintenance, the project undertook a public expenditure review during preparation. The review acknowledged the difference in financing mechanisms, with irrigation dams in the agricultural sector dependent on public sector financing while hydropower dams rely on energy user fees to facilitate investments through state owned entities or private sector developers and operators.

49. **Operation and maintenance of irrigation dams, along with new investments in the agricultural sector, rely mainly on Government budget transfers**. The initial findings of the review noted that the Government abolished irrigation service fees in 2008 and established a framework for national subsidies through Decree 115. As a result, the operation and maintenance of irrigation dams, along with new investments in the agricultural sector, rely mainly on Government budget transfers. The waiver of the irrigation service fees is viewed as the first phase of a long-term Government plan to renovate irrigation management. The Government subsidy stabilized the state owned IMCs and the operation and maintenance of irrigation systems, including dams, and improved the livelihoods of farmers. As the first phase of Government's efforts to revitalize the irrigation sector, consideration is now being given to a budgeting system in which the Government will focus primarily on capital investment while operation and maintenance continues to rely on annual budget transfers.

50. **Further development of sustainable revenue mechanisms to be supported under the project will contribute to institutional strengthening and long term sustainability.** The findings and recommendations of the public expenditure review provide a guide for the format to report on budget allocations and expenditures. These are intended to be integrated into the framework approach and applied by the Government. This will help inform budget allocation decisions in a more systematic and transparent manner. The project will also help develop and pilot asset management systems to assess the specific operation and maintenance needs for specific dams and guide budgeting decisions calculated on an as need-basis for operation and maintenance expenditures. Capacity to use the improved monitoring systems and apply new operating procedures will be supported through the project and a specific indicator has been incorporated in the results framework to monitor the share of the required budget made available per state for adequate O&M of dams.

51. **The program will contribute to institutional strengthening and long term sustainability by reinforcing the capacity of line agencies at various levels.** The project includes a number of measures under Component 2 aimed at enhancing the institutional and regulatory framework of all agencies involved in the overall improvement and sustainability of dam safety measures. This includes establishment and institutionalization of technical and regulatory standards, codes, guidelines and norms for MARD, MoIT, MoNRE and other agencies involved in dam safety. The development of these regulatory instruments is intended to integrate the national framework through common norms, as well as provide sector specific procedures. With development and adoptions of new standards, norms, codes and guidelines at national and sectoral level the performance of the Government management system for dam safety, will be more standardized, transparent and accountable.

V. KEY RISKS AND MITIGATION MEASURES

A. Risk Ratings Summary Table

Risk Category	Rating

1. Political and Governance	Substantial
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Substantial
4. Technical Design of Project or Program	Substantial
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	High
7. Environment and Social	Substantial
8. Stakeholders	High
9. Other	
OVERALL	High

B. Overall Risk Rating Explanation

52. The overall risk rating of the project is **High**. The rehabilitation of a large number of dams presents a series of inherent risks that are accentuated by both the complexity of the civil works involved and the nationwide distribution. The complex institutional and legal arrangements require substantial coordination to facilitate implementation of a national regulatory framework for dam safety and joint operations for the inter-reservoir systems.

53. **Political and Governance.** The Government's position relating to on-lending concessional resources to the Provinces poses a potentially substantial risk to implementation. The rehabilitation requirements relate to the broader complex context tied to the national policies pertaining to the waiver of irrigation service fees and incentives for new investments. On-lending from the Central fiscal to the Provinces could create disincentives for investments in rehabilitation, particularly among poorer Provinces.

54. **Institutional Capacity for Implementation and Sustainability.** There is a complex and evolving institutional framework for dam safety management involving various line Ministries and Government authorities. Implementation arrangements, particularly those for Component 2, will require strong commitment and collaboration. Significant time, effort and commitment will also be required to reach agreement on implementation of the recommendations and amendments to Decree 72. The Government will establish a High Level Working Group to support the dam safety program and project implementation, reflecting a strong commitment and leadership to the national sectoral program and coordination.

55. There is an inherent risk associated with implementation through a large number of participating Provinces with uneven capacity and varying levels of experience. This risk could be accentuated by lack of counterpart funds from each participating provinces. This could result in a different pace of implementation across Provinces that would undermine the transparent and objective application of the framework, or limited oversight from the central level. However, the risks associated with an alternative centralized implementation arrangement through a single entity was considered to be higher for implementation given the large number of dams. Supporting a centralized implementation arrangement would further undermine the institutional arrangements and the application of the framework envisaged under the national program and supported by the project. This risk would be mitigated through confirmation of counterpart funds by provinces and close supervision and capacity support by MARD and its project-level TA.

56. **Sustainability - Operation and Maintenance.** The reliance on Government transfers for continued operation and maintenance and potential insufficient allocations pose a significant risk to long-term sustainability. A public expenditure review was carried out during preparation to better understand the budgeting process and allocation mechanisms and provisions have been included in the project to pilot the application of asset management systems. These will be directed toward establishing transparent, objective mechanisms for determining resource requirements for the operation and maintenance and informing budgeting decisions calculated on an actual need-basis. Given the resource constraints, ensuring sufficient budget allocations even within an objective asset management system at the scheme level presents a considerable residual risk.

57. **Fiduciary.** Given the large number of provinces and dams included under the project, and the decentralized project implementation arrangements, the fiduciary risks are considered to be High. These risks are to be mitigated through the development and application of the Procurement Strategy prepared for the project, as well we the mobilization of a third party monitor covering all engineering, safeguards and financial aspects.

58. **Program Design.** The project has developed a portfolio approach to prioritize those interventions where the risk of failure is high and the potential downstream impacts is significant. There is always an inherent risk of failure of these dams during implementation. Mitigation measures include detailed assessments, quality assurance during construction, along with development and implementation of emergency preparedness procedures. Implementation will be supported through technical assistance by both the national and international dam review panels, with an independent supervision consultant, or third party monitor, to ensure quality adherence. The expert panels will also provide guidance on the risk assessment framework, rehabilitation designs, and standard dam safety documentation.

59. **Stakeholder.** Given the risk of potential failure associated with dams under the Government program and the high profile nature of these in the public domain and media, there is a need to ensure a clear communications strategy to inform stakeholders about the aims and objectives of the Government's program and the Bank's supporting role. There has been substantial reporting related to previous dam failures and the downstream impacts associated with the flooding as a result. A package of communication products would be developed during implementation and training would be provided to Provincial Authorities to ensure that these are equipped to handle communication needs effectively. This will be reinforced through the development, sensitization and simulation around the emergency preparedness plans.

60. **Social and Environmental Historical Issues.** The rehabilitation of a large number of existing dams constructed over a period of more than 50 years may raise legacy issues associated with the environmental and /or social aspects associated with the original construction. The process for assessing the environmental and social risk has been integrated with the project design. The identification process codified in the Environmental and Social Management Framework (ESMF) includes screening criteria to identify any historical issues, such as those associated with any original resettlement, and provisions to ensure that if any such issues are identified, appropriate remedial measures will be considered to address them as required. The project has also prepared four framework documents and carried out assessments for the first 12 subprojects that has generated 54 specific safeguard instruments. Total safeguards instruments prepared including the four frameworks is 58. Provisions have been made to incorporate the cost of environmental and social management plan in the project and to be carried forward in the relevant bidding documents for individual works. In addition, each subproject will incorporate the cost of monitoring and relevant capacity

building cost.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

61. **The risk and economic impact of not undertaking the rehabilitation project was assessed and the potential consequences are deemed severe in term of losses and damages.** An Economic and Financial Analysis (EFA) of the project was undertaken in order to assess the economic benefits of the project and the likely impact of the project on the beneficiaries. Specifically, the economic and financial impacts associated with the project have been assessed at two levels: (i) economic impacts of the project from societal perspective resulting from a reduction in risk of dam failure; and (ii) economic and financial impacts of individual sub-projects on downstream communities and institutions involved in operation and maintenance, including gains derived from improved operations.

62. **The Government's irrigation policy and waiver of the service fee means that rehabilitation of publicly financed irrigation dams are heavily dependent on public sector financing.** The Bank's support package includes the structural and non-structural measures to assist Government in the formulation and execution of a comprehensive program to address the systemic issues associated with dam safety. Coupling the funds required for the physical rehabilitation with the global experience will enhance the project's development impact and address the underlying systemic issues beyond what can be realized by exclusive reliance on Government resources. The framework provides an objective, risk based portfolio management tool to help prioritize investment decisions, address those dams at highest risk, and ensure economic efficiency. Introduction of this portfolio framework approach also helps to consolidate the internal arrangements to address the underlying institutional issues required to ensure long-term sustainability and safety.

63. **The approach is based on an index of risk, which provides an indication and relative ranking but cannot be considered a direct measure of risk nor the probability of failure.** The probability of failure is a complex interplay between a range of variables. Given the project's focus on introducing a framework process that will assist MARD in appraising and prioritizing sub-project investments under this project, as well as the remaining investments envisaged under the Dam Safety Program, EFA will be a key activity during project implementation. Investments in dam rehabilitation will be prioritized based on both technical and economic criteria. Consequently, the methodology and tools developed during preparation for the EFA will provide the basis for adoption of the EFA as an integral part of the feasibility study to be carried out for each of the sub-projects during implementation.

64. **Project benefits accrue through avoided losses and damages associated with the continued degradation and possibility of dam failure in the absence of the project.** Benefits that have been quantified in economic terms include: (1) *On farm-benefits* through (a) avoided losses in agricultural production and farm income resulting from dam failure/breaks; (b) increased agricultural productivity and cropping intensity due to improved reliability of water supply; and (c) potential increases in irrigated area due to increased water supply with restoration of the operational water level; and (2) *Additional downstream benefits* through avoided flood damage to houses, industrial/commercial facilities[7] and infrastructure

[7] The physical rehabilitation under Component 1 is limited to publically financed irrigation dams and does not directly impact hydropower production.

(roads, bridges, irrigation facilities and other public infrastructure) resulting from dam failure[8]. It can also be expected that dam rehabilitation will result in reduced Operation and Maintenance (O&M) costs. However, given the reliance on Government transfers for O&M, the actual change in costs is difficult to estimate and therefore not included in the analysis.

65. **The Economic Internal Rate of Return (EIRR) of the overall project for the base case is 33.0 percent, with a Net Present Value (NPV) of US$1,001 million (VND 21,579 billion), discounted at 12 percent.** A sensitivity analysis was conducted to assess the impact of changes in main parameters affecting the economic outcome of the project due to: (a) the main risks that have been identified in the project's risk analysis – mainly resulting in delays in implementation and increases in costs; (b) changes in costs of rehabilitation of individual dams which will affect the number of dams that can be supported by the project; and (c) changes in the expected reduction of probability of failure for the main categories of dams supported. The detailed analysis is presented in Annex 5.

66. **A financial analysis was carried out for the 12 priority dams on the basis of financial prices.** The focus was on: (a) the financial sustainability of the proposed investments in dam safety; and (b) the impact on farm households engaged in irrigated agriculture downstream. The analysis clearly shows for all 12 dams that: (i) the financial benefits from dam rehabilitation are sufficient to cover incremental costs of O&M[9]; and (ii) farmers are generating sufficient income to be able to contribute to irrigation service fees which would cover a part of the dam O&M costs once the dams have been rehabilitated.

B. Technical

67. **The project has been designed to provide a comprehensive risk-based portfolio approach that provides a framework for the identification, selection and prioritization of dams at risk.** The project includes structural measures to support the physical rehabilitation of dams and appurtenant structures, along with non-structural, institutional and regulatory measures to enhance the long term operational sustainability. The framework approach is aimed at reinforcing the Government systems to guide the selection and prioritization of dams to be rehabilitated under Component 1 of the project and has been developed using a three step process. This is based on an *a priori* agreed set of selection criteria aimed at prioritizing those interventions that address the risks within an explicit poverty and inequality framework, including those to: (i) determine the eligibility for financing under the project; (ii) prioritize the interventions; and (iii) inform the level of readiness. This framework is based on established techniques and standard approaches for dam rehabilitation and management to enable implementation across a large number, distribution and type of dams. This provides a screening mechanism for MARD and MoIT to prioritize interventions in the annual work plan to be supported by the project. This framework will be institutionalized within Government line ministries involved in the management of dam safety, notably MARD and MoIT but also others as the program evolves, to provide a robust national system. Further details are provided in Annex 2.

68. **The framework approach introduced during project preparation is intended to support the Government to develop a risk-based portfolio approach to dam management.** The framework developed during preparation provides Government with the

[8] Dam rehabilitation is also expected to result in better flood protection but these additional benefits are difficult to estimate and have not been included in the analysis.

[9] It is expected that dam rehabilitation will result in a reduction in O&M costs. However, given the Government's policy relating to the irrigation service fees and the project interventions, the actual funding for O&M may increase (which is reflected in the model).

foundations for a national system that will be further refined during project's implementation. An initial 12 first phase sub-projects were identified during preparation to test the application of the framework and the safeguard instruments, assess Government capacity and review the proposed implementation arrangements. Implementation will use the framework to provide an iterative approach during implementation based on annual reviews. During implementation, the annual review process will be used to identify those investments that have completed the necessary due diligence, prepared the detailed designs and tender documents so that they are deemed ready to move into implementation. This review process will use the readiness filter to help ensure that those prioritized on technical grounds are fast tracked through the preparation process. Specific indicators have been included to monitor the progression of the pipeline of investments in subsequent years. The technical assistance will include time-based provisions to enable a rapid response mechanisms and scale up in response to specific issues identified during implementation.

69. **Twelve priority dams from 11 Provinces confirmed for assessment and implementation in the first phase of implementation** are earth embankment dams under the authority of the Provincial Departments for Agricultural and Rural Development (DARD). The dams meet the eligibility criteria and are situated in provinces with established PMUs that have sufficient capacity to start implementation immediately. Of these, seven can be classified as large dams, with six having a height of >15m and one between 10-15m with a storage of >3MCM. The average storage capacity of the 12 dams identified is 11MCM, with maximum 73MCM and minimum of 0.5MCM. These first year investments will help to validate the project framework and support the development and application of the national quality control systems. Works of a similar nature have been carried out under previous IDA financed projects (VWRAP) supporting the expectation that the rehabilitation program can be carried out successfully.

70. **Non-structural interventions include a series of common and mutually reinforcing sub-components within MARD, MoIT and MoNRE.** These are aimed at strengthening the instruments and coordination mechanisms for improved dam management to safeguard the downstream people and socio-economic infrastructure. Growing development pressures coupled with the vulnerability of the country to climate change are increasing the complexity of river basin management in general and the specific operation and management of dams. As a result, non-structural measures are becoming increasingly important to ensure effective and coordinated dam safety management. These non-structural measures include updating the observation network and information systems for improved dam safety at both the river basin and scheme levels, along with early warning systems; improving the underlying information available through undertaking catchment specific hydrological assessments and flood mapping. Many of these activities are being implemented in cooperation with the parallel initiative supported by the Government of New Zealand under the "Dam and Downstream Community Safety Initiative". These measures will be complemented through regulatory and institutional enhancements, including development of the legislation on dam safety; inter-sectoral, inter-provincial and basin wide governance and coordination mechanisms to enhance development planning and operational coordination; integrated reservoir operations plan; regulations to govern the safety of small dams; and asset management systems to improve the budget mechanisms for operation and maintenance of hydraulic infrastructure.

71. **The interventions are intended to follow a river basin approach within the context of the revised Decree 72**. These are intended to demonstrate the efficiency gains and safety improvements that can be realized by improving the inter-sectoral, inter-provincial and inter-reservoir operations. The 14 river basins were reviewed during preparation to prioritize basins for implementation of the pilot measures. The Vu Gia-Thu Bon and Ca river basins

were selected for piloting the basin implementation approach, with a multi-criteria framework identifying key constraints relating to operational dam safety being used highlight potential basins where project supported interventions could have substantial demonstrable impacts. These are aligned with the parallel support under the Dam and Downstream Community Safety Initiative financed by New Zealand in the Ca River basin that is intended to be replicated during implementation in at least three other river basins.

C. Financial Management

72. The CPMU established by MARD CPO (called as MARD CPMU) will play the leading role in financial management. Key proposed financial management personnel have experience in managing other Bank-financed projects. The financial management function in provinces will be performed by provincial authorities, who will use the existing PPMUs to manage this project. MoNRE and MoIT will also assign experienced, existing PMUs to manage the Project. The financial management function of the proposed Project arrangement meet the Bank's minimum financial management requirements at both central and provincial level.

73. The action plan to strengthen both central and provincial levels includes: i) Project Operations Manual with detailed financial management guidelines; ii) qualified experienced financial management staff in all levels of project management units; iii) internal audit function arranged by CPO for the Project; iv) adequate budget allocation for both ODA and counterpart funding for project implementation.

74. The flow of funds will be channeled through the designated accounts for the MARD CPMU and eight selected provinces.[10] The other remaining provinces will open secondary accounts (e.g. sub-accounts) at a commercial bank. MARD CPMU will manage one designated account for the activities implemented by the ministries. The designated account held by MARD CPMU will also be used for the purpose of providing funds to those provinces and MoIT and MoRE that do not have their own designated account through sub-accounts to support implementation of provincial activities.

75. Each of the Provincial PMUs and MoIT and MoNRE will maintain a sub-account in USD at a commercial bank to receive funds from the designated account held by MARD CPMU for the activities implemented by the province. For the eight provinces that have substantial investments and experience in administering World Bank projects, PPMUs will open designated accounts to receive funds from the Bank directly.

76. The MARD CPMU will be responsible for: i) project annual financial statements and external and internal audits; ii) management of designated account providing fund to provincial-level project accounts; iii) project financial reporting including interim and periodic reports; and iv) financial management of activities implemented by CPMU. The provincial PPMUs will be entirely responsible for the financial management function of the activities implemented, including expenditures approval, contract management and payments, maintenance of accounting records, and working with auditors/ inspectors.

D. Procurement

77. Procurement for the proposed project shall be carried out in accordance with the Bank's "Guidelines: Procurement of Goods, Works and Non-consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers" dated January 2011, revised July 2014 ("Procurement Guidelines"), and "Guidelines: Selection and Employment of

[10] Provinces of: Thanh Hoa; Nghe An; Phu Tho; Ha Tinh; Quang Binh; Quang Tri; Quang Ngai; and Binh Dinh.

Consultants under IBRD Loans and IDA Credits and Grants by World Bank Borrowers" dated January 2011, revised July 2014 ("Consultant Guidelines"). The project is subject to the World Bank "Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants", dated October 15, 2006 and revised in January 2011.

78. The MARD has been designated as the responsible line agency and is responsible for overall management and coordination of the project. MARD has assigned the Central Project Office (CPO) as the Project Implementing Agency (IA) to be in charge of coordinating and managing related activities under all three components of the project. The Central Project Management Unit (CPMU) has been established and is in charge of overall project implementation, including all procurement and contract management for MARD-allocated works under the three components.

79. Within the 34 participating provinces, the procurement functions and contract management will be carried out by the provincial PPMUs, who are the implementing agencies for provincial subprojects. To ensure economies of scale and accelerated implementation, procurement packages will be aggregated at the provincial level and, where appropriate, inter-provincial (e.g. regional) levels. At the authorization by MARD, the MoNRE will assign its Department of Water Resources and the MOIT will assign its Department of Environment and Industrial Safety to manage their activities financed by the Project.

80. A Procurement Capacity and Risk Assessment (PCRA) of implementing agencies was conducted in January 2015 and further updated in June 2015. All PPMUs have been screened and confirmed to have had previous experience with WB or ADB financed projects, with all but two having specific experience with agricultural sector projects. The PCRA was then carried out based on the assessment of capacity and risks of the CPO and three provincial PPMUs on a sampling basis. Specific assessments have been carried out for the CPMU and three PPMUs from the 11 participating provinces under the first phase.

81. The assessment identified major risks that would potentially cause procurement delays or inappropriate procurement decisions. Details of the risk assessment, as well as recommended measures to mitigate those risks, are presented in the procurement section to Annex 3 and recorded in Procurement Risk Assessment and Management System (P-RAMS). The procurement risk for the proposed project is rated as "High". To mitigate the identified risks and build up capacity, an Action Plan has been developed and agreed to.

E. Social and Environment (including Safeguards)

82. **The overall environmental and social impacts of the project are expected to be positive.** These will be realized through improved safety of those dams facing a high risk of failure and increased protection of people and socio-economic infrastructure downstream. Most of the dams in the project are small dams less than 15m high (~80 percent). All are earth embankment dams, with 90 percent having the water intake works embedded in the body of the dam. The project also includes non-structural measures aimed at improving the planning and operational framework for dam management.

83. **Physical rehabilitation works will be carried out for existing dams, over short periods with temporary impacts and limited spatial extent.** The works themselves are limited to public irrigation dams under MARD. Four types of civil works are envisaged to address structural safety concerns: (i) erosion control measures to safeguard the dam wall and slope stabilization by either concrete slab or stone paving; (ii) seepage control to prevent the passage of water undermining the dam wall or dam body, including grouting; (iii) increasing

the discharge capacity of the spillway to prevent overtopping of the dam and replacement of mechanical and electrical systems; and, (iv) interventions to arrest transverse and or longitudinal cracks along the dam. Supplementary works would also be included, such as refurbishment of existing intake structures, improvements to existing access roads including dam crest road and operational buildings. The project will not support significant structural modifications or expansions beyond that required to ensure dam safety. For small dams the typical construction time required to address these intervention areas is estimated to be one year or less with an average investment per subproject of around US$0.9 million. For large dams, the construction time required would be one year or more, with typical cost estimates between US$1 and 2 million.

84. **The project activities are not expected to have large scale, significant and/or irreversible impacts since the physical interventions just involve the rehabilitation of existing dams.** The rehabilitation and safety improvement activities are not expected to result in an increase in the reservoir capacity and accordingly no pristine or natural habitat area will be inundated. In general, hydrological regime and ecosystems are not expected to be significantly changed due to project-related activities. However, each of the sub-project Environmental and Social Impact Assessment (ESIAs) will assess the potential impact on aquatic ecosystems and impacts on downstream users of water from each of the dams.

85. **The project has been classified as Category 'A' considering the potential environmental risks and complexity due to a large number of subprojects to be implemented in a widespread area.** Eight of the World Bank's safeguard policies have been triggered to ensure that the project design and implementation will be focused on reducing adverse impacts and enhancing positive impacts. These are: (i) OP/BP 4.01: Environmental Assessment; (ii) OP/BP 4.04: Natural Habitats; (iii) OP/BP 4.09: Pest Management; (iv) OP/BP 4.10: Indigenous Peoples; (v) OP/BP 4.11: Physical Cultural Resources; (vi) OP/BP 4.12: Involuntary Resettlement; (vii) OP/BP 4.37: Safety of Dams; and (viii) OP/BP 7.50: Projects on International Waterways. In addition to the compliance of the World Bank safeguard policies, the project will also fulfil all Vietnamese environmental legislations.

86. **An ESMF has been adopted to guide the preparation of safeguards instruments of the subprojects to be confirmed during project implementation.** The ESMF meets the requirements of the World Bank Safeguard Policies and the requirement of the Government of Vietnam. The relevant Environmental, Health and Safety Guidelines of the World Bank Group are applicable to the project. The ESMF has been prepared based on: (i) a review of the environmental and social policy requirement of the World Bank and the national legislation; (ii) the findings of the environmental and social impact assessments for 12 first phase sub-projects; (iii) experience drawn from similar World Bank-financed projects; (iv) stakeholders consultations during project preparation; and (v) identification of institutional barriers and capacity requirements for environmental and social management.

87. **The ESMF is complemented by a range of other framework documents that will collectively provide the guiding document for sub-project identification and implementation.** Other instruments adopted include a Dam Safety Framework (DSF), an Ethnic Minorities Policy Framework (EMPF) and a Resettlement Policy Framework (RPF). The RPF has been prepared in accordance with OP 4.12 to guide the preparation, review and approval of Resettlement Action Plan (RAP). It also specifies how compensation will be made for permanent and temporary impacts on land, structure, crops, and businesses affected by the project. Since the construction activities at dams will not be known *a priori*, there is a possibility that due to excavation work, property of historical, cultural, or religious importance may be found. In such case, a 'chance find procedures' will be followed,

including specific steps for the contractor and the implementing agency to secure any cultural property. These instruments also establish the communication channels and grievance mechanisms to allow local communities to be involved in the decision making process and access to the appropriate grievance redress mechanisms.

88. **The four framework documents will be used to guide the overall preparation and assessment of sub-projects during implementation.** Specifically, the ESMF will inform: (i) activities description, influence areas and collecting baseline information; (ii) alternative analysis of the proposed activities; (iii) environmental and social screening and impact assessments; (iv) consultation and disclosure; (v) preparation of environmental and social management plans (ESMP) with budgeting; (vi) review and clearance of screening, assessment and management plans; (vii) implementation and supervision of ESMP; (viii) grievance redress mechanism; and (ix) reporting and quality control, etc. In addition the ESMF provides potential impacts and general mitigation measures including the bidding specifications for contractors' responsibility for environmental and social management.

89. **Each sub-project that will be considered for financing will go through an environmental and social screening process.** The screening will assess the risk associated with unexploded ordnance (UXO) and other potential legacy issues. A full scale ESIA is required for all category 'A' sub-projects. Category 'B' subprojects will require a limited ESIA or preparation of an ESMP, while category 'C' sub-projects will not require any further assessment. The bid specifications, general construction management and contractors' responsibility will be included in the bidding documents. Contractors will prepare Contractor Environment and Occupational Health and Safety Plan (CEOHSP) taking into consideration the sub-project ESMP, the requirements in the bidding documents and will detail the construction schedule, material, equipment and human resource requirements and plan for mitigating site specific issues. A Dam Safety Report (DSR) includes Dam Safety Plan (DSP) will also be prepared for each subproject to guide engineering design and Ethnic Minorities Development Plan (EMDP) and Resettlement Action Plan (RAP) will be prepared, where applicable.

90. **Fifty-four different safeguard instruments have been prepared during project preparation for the 12 first-phase sub-projects.** These include 12 integrated ESIAs, five stand-alone Social Assessment (SAs), 11 RAPs , five EMDPs, 12 dam safety reports (DSRs) and one consolidated Executive Summary of all ESIAs and confirm that most of the impacts are associated with the construction work and are mostly local and temporary. The risk of increased sedimentation from medium scale earthmoving activities is managed through standard construction practices and mitigation measures. Further, most sites have existing burrow pits and landfill sites that were carefully sited for minimal impacts in terms of runoff erosion and sedimentation. The majority of the remaining construction-related impacts relate to generation of dusts, possible degradation of the temporary construction sites due to litter, construction spoils, oil and grease, fuel spillages, occupational health & safety and sanitation at campsites and other construction areas. These impacts will occur at the construction sites and routes which will be under the control of the Contractor, and will be managed through proper site management enforced through the Contractor's Environmental and Occupational Health and Safety Plan (CEOHSP).

91. **The 12 Social Assessments (SAs) have been carried out and integrated with the ESIAs to encompass a gender informed development approach.** The objective was to examine the potential social impacts, inform the design of measures that address any potential adverse impacts, while proposing development activities to enhance the potential positive impact of the project. Social assessments carried out for the 12 first year projects show an

overall positive social impact. These included Gender Analyses to identify gender-related constraints and inform an action plan to facilitate gender mainstreaming and project level monitoring, promote gender equality, and identify opportunities for enhancing the project's development effectiveness. Similar analyses will be carried out as part of the social assessments during assessment of the sub-projects to inform the appropriate interventions.

92. **The project is gender-informed on three dimensions: analysis, action, and monitoring.** Gender analyses carried out for all 12 first-phase subprojects indicate that rural women typically carry out heavy work - in time duration, compared to men because they do both farm and domestic work. This is consistent with the findings from other gender studies conducted for rural Vietnam. In some cases, women migrate during off-farm seasons to work as hired labor for extra income. At home, women typically spend more hours (than men) doing housework. This practice typically deprives them of opportunities to participate in activities outside their family. When it comes to decision making (at household level), men tend to dominate. Predominant farm and domestic work, combined with limited, or even no access to clean water and sanitation, affect women's reproductive health.

93. **Actions have been proposed to address the identified gender gap.** For each of the 12 first-phase subprojects, an action plan has been developed alongside indicators to support monitoring of progress. The actions typically include activities to ensure communities in the subproject areas are aware of gender gaps and are trained to understand the underlying gender issues and take actions to improve gender equality, particularly at household level. The gender action plan will be updated, as necessary, on the basis of further consultation with local people prior to implementation. For subprojects to be identified during project implementation, the ESMF requires that an SA (which includes gender analysis) be done for new subprojects, to pave way for proposing actions and a monitoring plan. The Project's Financing Agreement requires subprojects to have Gender Analysis, Gender Action and Monitoring Plan – as per Bank's requirements.

94. **The social assessment shows that the rehabilitation works are largely taking place in situ on existing infrastructure and there is no expected permanent or temporary land acquisition.** When land acquisition is unavoidable, technical alternatives will be assessed to minimize the impacts. The 12 first phase sub-projects found that 985 households would be potentially affected. Most of these would be temporarily affected (89.5 percent with 10.5 percent permanently affected through land acquisition. A total of 13 households would be subject to physical relocation.

95. **Ethnic minorities (as defined by the OP 4.10) reside in some parts of the 34 Provinces under the project.** This includes five[11] of the 12 first-year subprojects. An Ethnic Minority Policy Framework (EMPF) has therefore been prepared to guide implementation. The EMPF was developed in accordance with OP 4.10 and relevant Governmental regulations. This builds upon the outcomes of the social assessment, which included free, prior, and informed consultation with ethnic minorities in the five sub-projects where they are present. Consultation with these ethnic minorities indicated broad community support and articulated their development needs. The EMPF has been used to guide the preparation of five Ethnic Minority Development Plans (EMDP) for the five first phase sub-projects to ensure ethnic minorities have the opportunity to derive socio-economic benefits from the project in a way that is culturally appropriate and beneficial.

[11] Specifically Khe Che (Quang Ninh), Dong Be (Thanh Hoa), Dai Thang (Hoa Binh), Song Quao (Binh Thuan), and Da Teh (Lam Dong)

96. **The first phase 12 sub-projects will not result in land acquisition from ethnic minority households.** However, some 223 ethnic minority households could be temporarily affected by restricted water access during the time of reservoir repair, specifically the Dai Thang sub-project in Hoa Binh Province. A RAP was prepared to ensure ethnic minorities potentially affected temporarily by the restrictions in access to water from the reservoir are compensated to prevent any negative livelihoods impacts. An EMDP was also prepared to provide additional development support. For all new subprojects that have ethnic minorities present in the sub-project area, a similar process of social assessment will be carried out, with free, prior, and informed consultation to confirm the findings and determine if there is broad support for the proposed interventions and derived development benefits.

97. **Livelihood impacts associated with the potential interruption in water availability will be minimized.** The typical construction time required to address these intervention areas is about one year. This takes place during the two crop irrigations seasons: winter-spring, and summer-fall crops. The type of intervention will determine the appropriate construction method and the potential impact on the availability of water for productive purposes. Where this possibility exists, specific assessments will be carried out to identify appropriate mitigation measures. The potentially negative impacts associated with the temporary interruption of water for downstream users will be minimized by carefully scheduling the construction works during canal-closure periods. In special circumstances, pumping may be used to provide water for irrigation but if these impacts cannot be avoided, the issues will be typically addressed in the RAP.

98. **Respective PPMUs are responsible for safeguard implementation under the oversight of MARD's CPMU.** The preliminary estimated budget for environmental and social management based on the initial assessments is about US$50.2 million. The cost allocation between the Government and IDA resources will be confirmed during implementation. The Provincial Government will finance all costs related to land acquisition and livelihood restoration of affected households. During project implementation, PPMUs obtain technical support from the CPMU. The CPMU will be responsible for implementation of the project in accordance with the framework documents for determining the eligibility, prioritization and readiness of the sub-project investments, as well as compliance with the safeguards framework, and the sub-project assessments. The provinces will be responsible for the sub-project specific environmental and social impact assessments, while the CPMU, with support from international technical assistance, will be responsible for monitoring compliance with the framework. An Independent Supervision Consultant, or Third Party Monitor, will be appointed within six months of effectiveness to carry out regular monitoring and compliance with the safeguard instruments.

99. **Key safeguard instruments have all been disclosed as part of the public consultation process.** The draft ESMF, RPF, EMPF, DSF, 12 sub-projects ESIAs, along with 11 RAPs, five EMDPs and five stand-alone SAs have been disclosed. The ESMF was disclosed in Vietnamese on the MARD website and in English through the Bank's Infoshop on May 29, 2015. The hard copies of the document have also been made available in CPO and DARD offices in the Provinces. An overview of the instruments prepared and disclosed for each of the 12 first year sub-projects is detailed in the safeguards section of Annex 3.

100. **Consultations have been held with locals during project preparation, representing both project beneficiaries and adversely affected households, including ethnic minorities.** Feedback from the consultations were not only used to prepare RAP/EMDP/SA/Gender Action Plan, Public Health Intervention Plan/Consultation and Communication Plan for the 12 subprojects, but were also employed to prepare the project's

safeguards frameworks, such as RPF, EMPF, ESMF, to ensure that new subprojects will adopt consistently the same procedure. For the 12 phase-1 subprojects, an average rate of 12 percent of both project beneficiaries and adversely affected peoples (including EM people) were consulted through focus group discussions, household surveys, and community meetings. EM people, in particular, were consulted in a free, prior, and informed manner, as per OP 4.10. To monitor that local people are consulted during preparation of new subprojects, and their feedback is incorporated into subproject design and implementation, two indicators have been developed, and included in the Results Framework and Monitoring.

F. Other Safeguards Policies Triggered

101. *Safety of Dams (OP/BP 4.37).* The project is focused on interventions aimed at improving the safety of dams with identified rehabilitation needs and at risk of structural failure and so the project is designed to directly address the requirements of the policy. A total of 116 dams >15m in height have been identified during preparation in 28 of the 34 provinces, with 50 percent of all large dams found in the eight provinces.

102. The project is aimed at implementing the provisions of the policy. Independent specialists have carried out safety inspections and evaluations of the 12 first year investments and their appurtenances, reviewed the performance history and evaluated the operation and maintenance procedures. This information has been incorporated into the feasibility study that provides the framework for implementing an effective dam safety program and the foundations for adoption of national systems for addressing the long term dam safety issues.

103. In accordance with the recommendations of OP 4.37, the project includes measures to strengthen the institutional, legislative, and regulatory frameworks for dam safety. The works will be designed and supervised by competent professionals. Large dams to be included under the project will require preparation and implementation of: i) a Construction Supervision and Quality Assurance Plan; ii) an Instrumentation Plan; iii) an Operation and Maintenance Plan; and, iv) an Emergency Preparedness Plan. A National Dam Safety Review Panel will be established to support implementation in parallel to the international Panel of Experts (PoE). The Terms of Reference have been prepared for: (i) the international PoE; (ii) project-level Technical Assistance covering both engineering and safeguards aspects; (iii) the Independent Supervision Consultant, or Third Party Monitor; (iv) an M&E consultant; and (v) establishment of National Dam Safety Review Panel. These have all been reviewed by the Bank and been found satisfactory. Site specific O&M Plans and EPPs will be developed for sub-project dams following the agreed dam safety framework. The PoE ais expected to be mobilized within three months of effectiveness and the technical assistance for the Project Implementation Consultant and the Independent Supervision Consultant within six months of effectiveness.

104. *Projects on International Waterways (OP/BP 7.50).* Vietnam is a riparian on six international river basins, of which it is an upstream riparian on two. The project will not finance any new dam construction and is focused on the rehabilitation of existing dams and their associated structures, along with improved safety measures. These activities are not intended to exceed the original schemes, change their nature, or so alter or expand the scope and extent as to make them appear as new or different schemes. As such, the interventions identified under the project are not expected to have an adverse effect on the quality or quantity of water flows to other riparian states and neither will the project be appreciably harmed by the other riparians' possible water use. An exception to the riparian notification requirement in OP/BP 7.50 was therefore processed.

G. World Bank Grievance Redress

105. Communities and individuals who believe that they are adversely affected by a World Bank supported project may submit complaints to existing project-level grievance redress mechanisms or the World Bank's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the World Bank's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of World Bank non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

106. **Communications approach**. Given the risk of potential failure associated with dams under the Government's dam safety program, there is a need for a clear communications strategy for this project. The objective of the communications strategy is to strengthen support from key stakeholder groups for the project and the Government's dam safety program and demonstrate the necessity and urgency to secure the safety of the existing dams to protect communities and their livelihoods. Project communications will target diverse groups of stakeholders to ensure understanding of the objectives of the Government's program and the Bank's supporting role.

107. Project beneficiaries: The objective of the communications efforts is to build support through knowledge and understanding of the project. Consultation and information disclosure with those directly and indirectly benefitting from the project are essential during project implementation. Two indicators for citizen engagement have been set to ensure strong participation from communities in the project areas. Various communications channels will be used to reach beneficiaries to raise awareness and build consensus around the project's objectives. Communications with project beneficiaries will be reinforced through the development of and sensitization and simulation around the emergency preparedness plans.

108. Other stakeholders: The objective is to gain their support through increased transparency and engagement and to maintain open channels of communications. Stakeholders in this category include: local media; Vietnamese NGOs and international service delivery NGOs working on emergency relief, agriculture and environment; development partners; academics; relevant government agencies and participating provincial authorities; etc.

Box 2. Key Principles for Communication

- *MARD will take the lead in communications*. Communications activities will be funded by the project. Close coordination of messages, sub-projects, channels, spokesperson mechanism among MARD, participating provinces and the World Bank is required. Communications related to Bank policy will be handled by the Bank. A detailed communication plan, including a package of communications products and a project website, would be developed during implementation with the Provincial Authorities to ensure the frontline proponents of the project are suitably equipped to effectively communicate about the project. Engagement with media, both nation-wide and provincial levels, will be further developed during the implementation.
- *Access to information:* Project and sub-project information must be made available to all stakeholders through various channels and in a language and format they can understand.
- *Two-way communications:* Communications activities must move beyond dissemination of information to promoting dialogue and stakeholder engagement in the project, particularly at the beneficiary level through such tools/processes as consultations, preparation of project-level activities, grievance redress, etc. to support strong project implementation.
- *Transparency:* Some unanticipated impacts may occur during project implementation as the adaptive management is adopted. Candid and responsive communications of these impacts and constructive dialogue with beneficiaries and other stakeholders is key to building trust and project sustainability.
- *Proactivity:* Project information will be communicated proactively with beneficiaries and stakeholders. A crisis communication mechanism, including a clear guideline, will also be

ANNEX 1: RESULTS FRAMEWORK AND MONITORING

VIETNAM: Dam Rehabilitation and Safety Improvement Project

Project Development Objective (PDO): *to improve the safety of targeted dams under the Government's Dam Safety Program to protect downstream communities and economic activities through priority investments and capacity enhancement.*

PDO Level Results Indicators	Core	Unit of Measure	Baseline	Cumulative Target Values							Frequency	Data Source/ Methodology	Responsibility for Data Collection
				2016	2017	2018	2019	2020	2021	2022			
1. Direct Project Beneficiaries, of which female													
(i) Direct beneficiaries	☒	Number (million)	0	0.0	0.5	0.8	1.8	2.1	2.5	2.7	Bi-Annual	Estimates	CPMU/PPMU
of which are female		Number (million)	0	0.0	0.2	0.4	0.9	1.0	1.2	1.3	Bi-Annual	Estimates	CPMU/PPMU
(ii) Downstream beneficiaries	☒	Number (million)	0	0.0	0.8	1.6	2.4	3.4	3.9	4.1	Bi-Annual	Estimates	CPMU/PPMU
of which are female		Number (million)		0.0	0.4	0.8	1.2	1.7	1.9	2.1	Bi-Annual	Estimates	CPMU/PPMU
2. Portfolio risk reduced in all risk categories under the project*	☐	%	0	0	5	15	48	62	73	90	Annually	Risk Index Assessment	CPMU
3. Irrigated area protected from the risk of dam failure as a result of structural and non-structural interventions		Ha *1000	0	0	13	52	85	115	135	177	Annually	Progress report	CPMU/PPMU
4. Adoption of Emergency Preparedness Plans for large dams by MARD and Provinces		Number	0	0	2	24	52	93		116	Bi-Annual	Progress Reports	CPMU/PPMU
5. Integrated Dam Database Operational*		Text		-	Concept	Design	Input	Tested	Operational	Formalized	Annual	Progress Reports	CPMU/MoNRE/MoIT

* Direct beneficiaries mean those water users relying directly on the water and services provided from the reservoir, including on-farm beneficiaries, aquaculture, water supply, hydropower, among others.

* The Portfolio Risk Assessment Framework is comprised of 14 categories, nine of which can be influenced through the project interventions. This indicator measures the share of dams rehabilitated under the project financed interventions that demonstrate reduction in all of the nine risk categories that can be influenced by project and provides a measure to monitor implementation of the rehabilitation for each of the dams in the portfolio.

* Operational is defined as "Database updated annually with information on all dams rehabilitated under the program, including both Government and those funded by the project".

Intermediate Results Indicators	Core	Unit of Measure	Baseline	Cumulative Target Values							Frequency	Data Source/ Methodology	Responsibility for Data Collection
				2016	2017	2018	2019	2020	2021	2022			
1. Large dams targeted under the Project having completed (according to dam safety framework, regulations and guidelines)													
(i) Risk screening (yr end)	☐	Number	116	112	98	75	48	25	10	0	Bi-Annual	Progress Reports	CPMU/PPMU
(ii) Technical Design	☐	Number	0	4	27	59	86	1160	0	0	Quarterly	Progress Reports	CPMU/PPMU
(iii) Rehabilitation works	☐	Number	0	0	6	42	68	85	106	116	Quarterly	Progress Reports	CPMU/PPMU
(iv) O&M plans	☐	Number	0	0	6	42	68	85	106	116	Bi-Annual	Progress Reports	CPMU/PPMU
2. Small dams targeted under the Project having completed (according to dam safety framework, regulations and guidelines)													
(i) Risk screening (yr end)	☐	Number	334	334	328	204	119	40	10	0	Bi-Annual	Progress Reports	CPMU/PPMU
(ii) Rehabilitation works	☐	Number	0	0	6	130	215	294	320	334	Quarterly	Progress Reports	CPMU/PPMU
3. Provinces with operational asset management system *(defined as asset management plan approved and budgeted)*		Number	0	0	11	15	20	25	32	34	Bi-Annual	Progress Reports	CPMU/PPMU
4. Share of targeted dams reporting having no upstream forecasting capacity		%	96	96	96	85	50	30	20	10	Annual	Progress Reports	CPMU/PPMU
5. Operational procedures for cascade dams in two river basins		Text	-	Concept	-	Revised	Finalized	Adopted	Monitored	-	Annual	Progress Reports	MoNRE
6. Hydropower Safety Inspection Guidelines		Text	-	Concept	Drafted	-	Finalized	Adopted		-	Annual	Progress Reports	MoIT
7. Dams rehabilitated for which consultation with at least 10% of direct beneficiaries and affected households were held		%	0	100	100	100	100	100	100	100	Annual	Progress Reports	CPMU/PPMU
8. Satisfaction rate with completed dam rehabilitation, disaggregated by affected households and project beneficiaries		%	0	80	80	80	80	80	80	80	Annual	Surveys M&E reports	CPMU/PPMU

(i) The risk screening indicator is on a cumulative declining basis based on the assessment of completed rehabilitation works at the end of each year.
(ii) Technical design of large dams is monitored to ensure the integrity of technical engineering as well as safeguards compliances while technical design of small dams is relatively simple and could be standardized. Thus, sampling review would suffice.

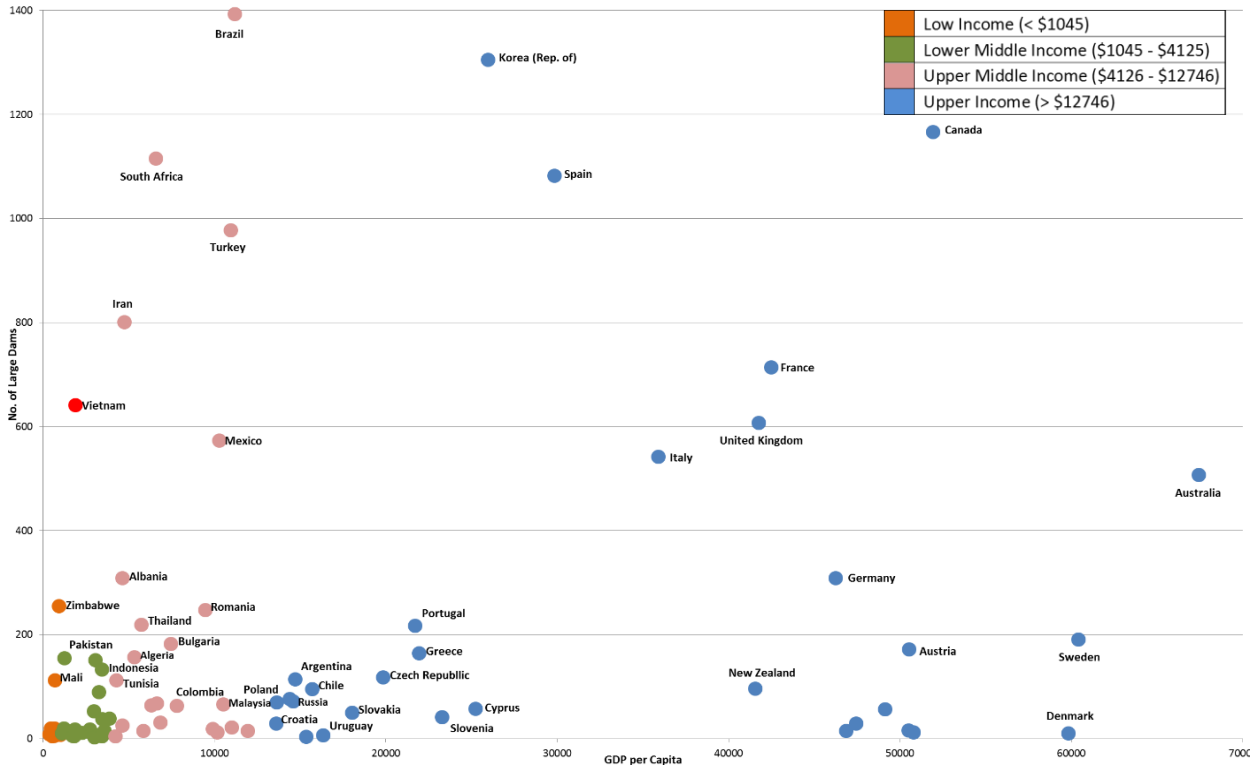
ANNEX 2: DETAILED PROJECT DESCRIPTION

VIETNAM: Dam Rehabilitation and Safety Improvement Project

1. The project is intended to support the Government's Dam Safety Program and contribute to the improved safety of prioritized dams and reservoirs, as well as the protection of downstream populations and assets. This will be achieved by supporting both the structural safety of the dams and reservoirs themselves, along with the operational safety required to safeguard the populations at risk and downstream socio-economic infrastructure. This is directly aligned with the Government definition and provisions relating to dam safety outlined in Decree 72. The project will also support Government to ensure a more holistic, basin level integrated development planning to improve institutional coordination, future development and operational safety.

2. Vietnam is unique in terms of the number of dams relative to the level of economic development. The country has made significant gains over the past two decades on the back of sustained economic growth and is considered a lower middle income country, with per capita income of US$1,730 at the end of 2013. The country has invested significant resources into ensuring the sustainable development of water resources and has an extensive network of hydraulic infrastructure with a combined storage capacity of about 50 billion cubic meters. This is in excess of its economic contemporaries, with the number of large dams similar to that of France, Germany and Australia. While the primary development has been for irrigation or hydropower, many of these dams are multi-purpose, supporting flood regulation, aquaculture and bulk water supply.

Relationship between the number of large dams and GDP per Capita.



3. The early foundations of this network are found in the irrigation sector, which remains the mainstay of the national economy. Many of the medium and small-size reservoirs were built in the 1960s-1980s with limited technical investigations, inadequate design, and poor quality construction. The risks are wide spreading, resulting from inadequate cross section e.g. too thin to be stable, through subsidence of the main structure, seepage through main and/or auxiliary dam and around the intake structure, deformation of up/downstream slope, spillway malfunction, and inadequate and ineffective use of safety monitoring devices. These issues have been compounded by limited operations and deferred maintenance. As a result, many of these dams have deteriorated and the safety is below acceptable international safety standards, presenting a substantial risk to human safety and economic security. Despite these challenges, the development of about 6,648 irrigation dams continue to support more than three million hectares of irrigated agriculture.

4. The demands for energy fueled by rapid economic growth has seen the rapid development of hydropower facilities by both the state and private sector investments over the past 15 years. There are more than 1,100 hydropower dams either under operation, construction, investigation or planned, with the 268 existing hydropower dams supporting an installed capacity of 13,066 MW. While the large hydropower facilities under the national power company are relatively well managed and constructed in accordance with international standards, there are a large number of small hydropower facilitates developed by the private sector with different standards, no national oversight, and of varying quality. The construction and operation of these has proven particularly problematic in ensuring safety of construction and operations.

5. The public sector investment in irrigation dams since the 1960s, coupled with more recent and rapid private sector led investment in hydropower dams, have resulted in a network of more than 7,000 dams of different types and sizes storing an estimated 50 billion cubic meters. More than 750 of these dams can be classified as large (over 15m in height or between 5 and 15m with reservoir storage in excess of 3 MCM), with the number of small dams (less than 15m and 3 MCM) estimated to be in excess of 6,000 and largely earth embankment dams.

6. The development of this infrastructure platform has resulted in a number of inherent challenges. The deterioration of the structural integrity of many dams, coupled with the increased risk and uncertainty resulting from hydrological variability due to climate change and rapid upstream development, has placed many reservoirs at risk. Typical safety related problems occur in three areas: (i) inadequate spillway capacity causing overtopping of dams, (ii) poor construction quality control (materials, compaction procedures, etc.) resulting in structural deformations of dam bodies (cracks, settlements, sloughing, etc.) and (iii) inappropriate structural designs, such as concrete structures inside embankment bodies (spillways and irrigation intakes) which are subject to cracking and settlement and suffer from loose fill materials in contact areas. Failure to secure the operational safety of the existing network and strengthen the capacity for further development has the potential to undermine Vietnam's economic gains.

7. In the past five years there have been an estimated 30 dam failures. These have resulted in devastating regional flooding, significant loss of human life, and substantial economic losses. The damage costs associated with water-related disasters have been estimated at VDN 18,700 billion or US$1.25 billion between 1995 and 2002. The impacts associated with natural flooding have been further exacerbated by the uncoordinated operation along cascades of dams within individual river basins and the limited capacity for timely monitoring and forecasting of high

flows, particularly in the narrow and steep topography of the Central Highlands. The public outcry resulting from recurrent flooding and dam failure has been reflected in the media and has led to civil society campaigns which have raised the awareness of this problem in all spheres of Government.

8. Recognizing the importance of securing the foundations for sustained and secure economic growth, the MARD first launched a sectoral program focused on dam safety in 2003. This has been revisited in an effort to revitalize the program and was expected to be approved by the Government in late 2015. The MARD has identified about 1,150 dams in need of rehabilitation or upgrading under the Government's Dam Safety Program. The total cost of the program is estimated to be in excess of VND17 trillion (approx. US$800 million). In support of this renewed effort, Government has allocated an estimated VND 15 billion (roughly US$0.75 million) annually since 2013 for each of the prioritized dams.

9. Long term solutions to improving dam safety lie in improving the institutional mechanisms for ensuring appropriate oversight, the guiding technical standards and sufficient revenues to ensure their execution. The Government program recognizes the need for a balance of structural and non-structural measures. Vietnam currently has a number of various regulatory agencies ranging from the central to the local levels. The MARD is designated the highest level of statutory powers and responsibilities in dam safety management, but the legal and regulatory and regulations currently contain only general provisions without giving detailed guidelines, standards and procedures. This has resulted in poor implementation and low levels of assurance with respect to dam safety. The rapid private sector lead development of hydropower facilities, coupled with the existing and extensive network of irrigation infrastructure is increasing the development pressure within a number of river basins, calling for increased coordination. This coordination needs to be based on enhanced data collection platforms and improved information management systems and coupled with predictable, assured revenue mechanisms to sustain these networks and the required operation and maintenance.

10. The project introduces the application of a framework approach to enhance the Government systems for screening and prioritizing dams based on multi-criteria risk index. This framework approach, which is described in more detail in Component 1 below provides an optimized mix of both structural and non-structural measures designed to improve the safety of the dams and related works, as well as the safety of people and socio-economic infrastructure of the downstream communities. This is aligned with the definitions governing the management of dam safety in Vietnam in Decree 72. This also adopts the international convention in defining dams based on height and volume. Specifically, the Decree defines the following: (i) large dams from 15m high or with reservoir capacity of three million cubic meters or more; (ii) medium dams from 10m to 15m high or dams with reservoir capacity from one to three million cubic meters; and (iii) small dams from 5m to 10m high or dams with reservoir capacity between 50,000 and one million cubic meters. Through the process of establishing this framework during preparation the project has already helped to inform a more transparent and accountable system for the Government to utilize in implementation of the broader dam safety program.

Component 1: Dam Safety Rehabilitation (est. cost = US$412m of which IDA US$388.5m)

11. This component will be implemented through the Provinces and MARD with the aim of improving the safety of irrigation dams through physical rehabilitation of existing infrastructure. This will include two different approaches required for the rehabilitation of large/medium and

small, community-managed dams. The difference between the two relates not only to the types of works and the regulatory framework, but also the institutional and implementation arrangements required to undertake such works and ensure their sustainable operation and maintenance.

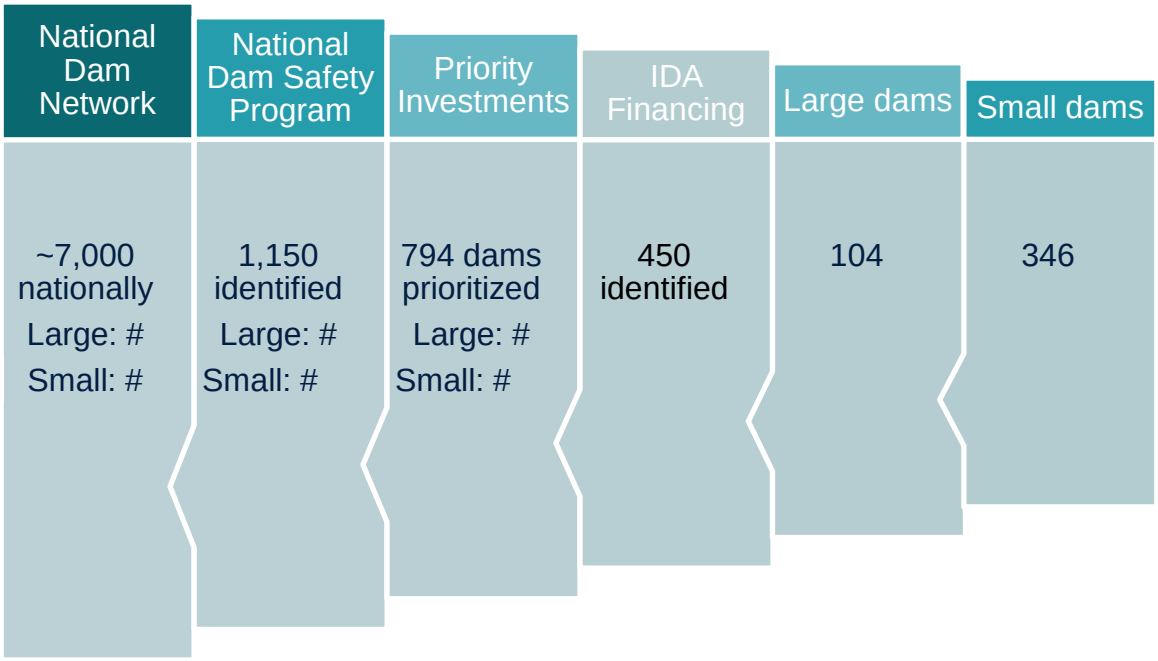
12. This component includes support to rehabilitate basic dam safety facilities such as up/downstream slope protection, reshaping of main and auxiliary dams, seepage treatment, spillway improvement or expansion, dam crest road, lighting and safety monitoring device system. The activities to be financed by the component would include: (i) Detailed engineering design, safeguards instruments, supervision and quality control of rehabilitation works and safeguard compliance for prioritized dams and associated infrastructure; (ii) structural rehabilitation, including civil and hydro-mechanical works, and installation of instrumentation and safety monitoring system equipment; (iii) preparation of Operation and Maintenance Plans and Emergency Preparedness Plans; and (iv) adoption of standardized safety checklist for community-managed dams.

13. The framework to guide the selection of those dams to be rehabilitated under the project has been developed using a three step process. This is based on an *a priori* agreed selection criteria aimed at prioritizing those interventions that address the risks within an explicit poverty and inequality framework. This process has facilitated preparation of the project investment but is also intended to support the Government to develop a risk based portfolio approach to dam management that will essentially provide the foundations for a national system, piloted and refined during implementation of the project.

14. **Step 1 Eligibility.** Eligibility for IDA financing is determined by the following:

i. inclusion in the Government Dam Safety Program;
ii. storage capacity greater than 200,000 cubic meters;
iii. recommendation from the Province; and
iv. no existing budget commitments.

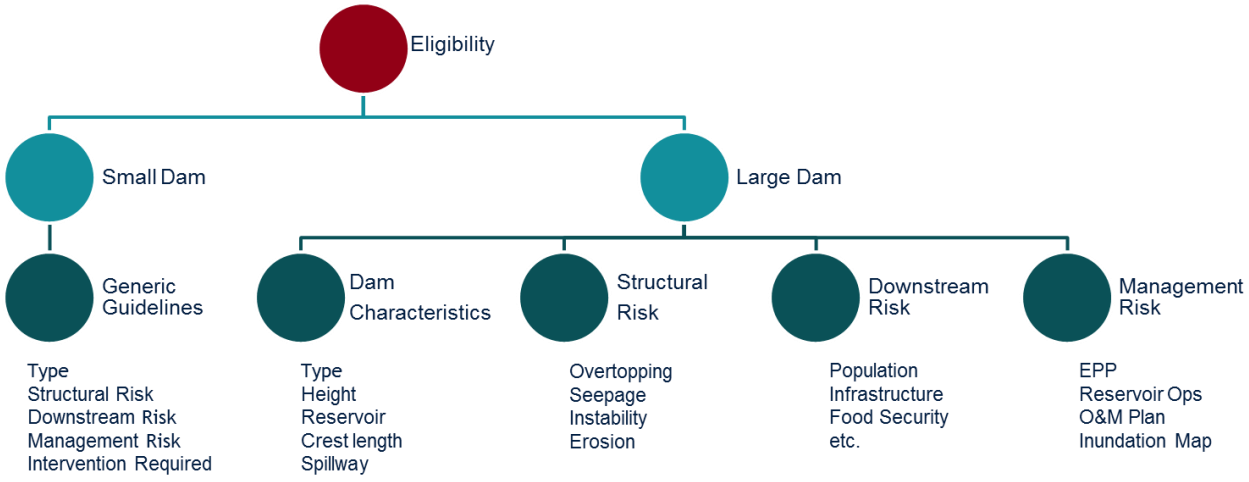
15. Based on these criteria, 450 dams from the estimated total of 1,150 under the Government's Dam Safety Program have been determined as eligible for inclusion under the project. These are drawn from 34 of the 64 provinces in Vietnam with a total estimated cost of roughly US$410m. The priority investments were identified through an iterative, consultative process with the national authorities and provincial agencies around the framework and will be subject to annual review. The annual review process is to be used to assess the list of dams at risk and the prioritization ranking to address the most critical of interventions.



Process framework for identification of dams to be rehabilitated under the Project.

16. **Step 2: Prioritization.** Prioritization of those interventions is based on a hierarchical, multi-criteria framework. This includes developing a risk index of the probability and impact of dam failure. The specific objectives of the risk rating exercise as part of project preparation are: (i) to prioritize the dams to be rehabilitated under the WB project, (ii) to understand the risk level "before" and "after" the project interventions, and (iii) to establish the framework of prioritization of dams to be rehabilitated under the national dam safety program. The risk rating framework will be subject to further review including possible failure mode analysis (PFMA) during project implementation.

Summary of prioritization process using risk-based approaches

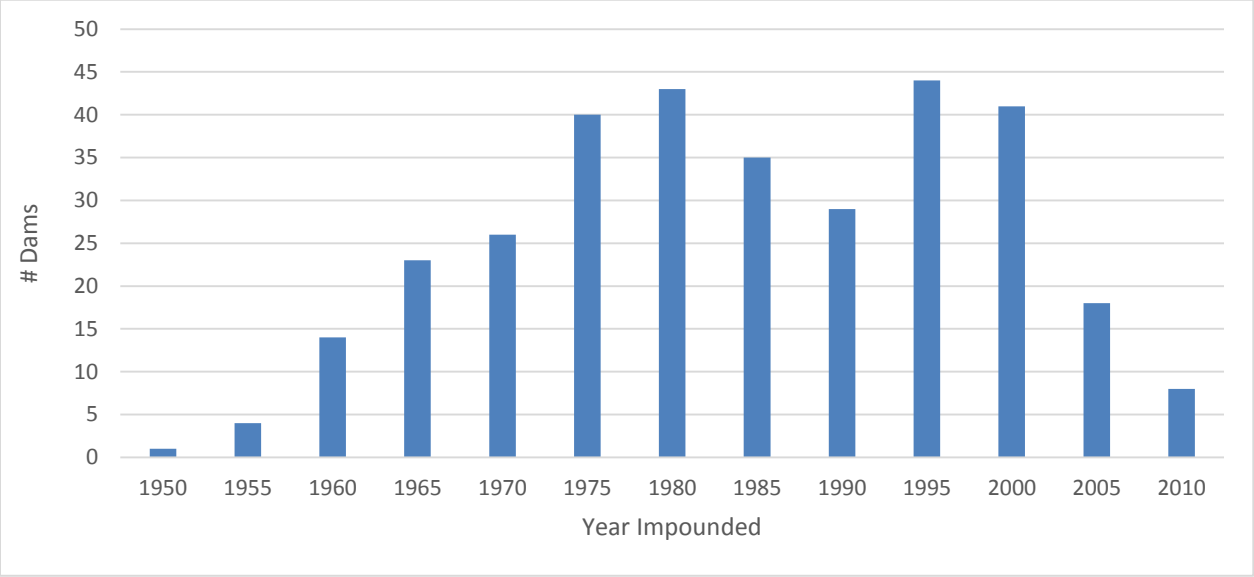


17. The first level of the hierarchy is based on large and small dams for which different levels of due diligence are required. Large dams are defined:

i. H > 15m, or
ii. 10m < H < 15m, reservoir capacity > 3Mm^3, or
iii. 10m < H < 15m, crest length > 500m, or
iv. 10m < H < 15m, spillway discharge capacity > 2,000m^3/s

18. The majority of those dams identified during preparation are classified as small, earth embankment dams, with 65 percent being less than 15m in height and with a storage capacity of less than 3 Mm^3. The majority of the dams for which data exists were constructed more than 15 years ago, with 50 percent constructed between 1970 and 1990.

Age of dams initially proposed for rehabilitation under the project.



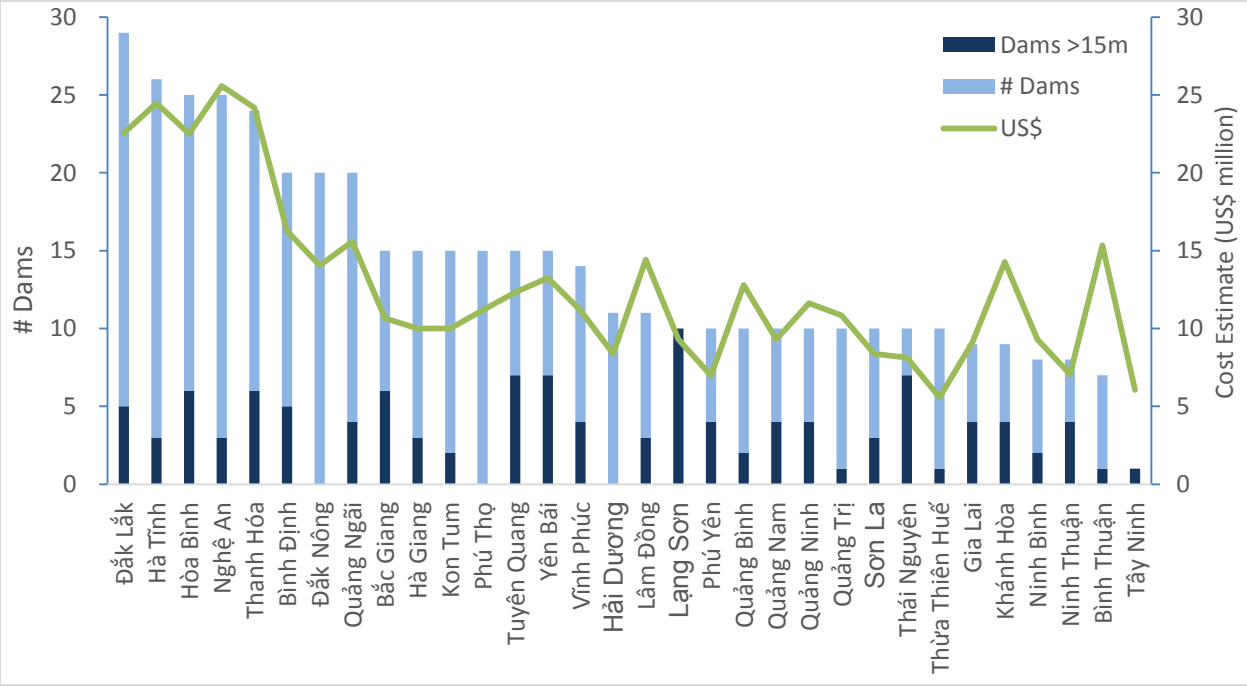
19. A total of 125 can be considered large dams, with 104 dams more than 15m in height, 11 having a height of between 10m and 15m and a reservoir capacity greater than 3MCM and another 10 having a height of between 10m and 15m and a crest length greater than 500m. In addition, there are 19 dams with a crest length greater than 500m but smaller than 10m in height and two dams with a reservoir capacity greater than 3MCM but a height less than 10m.

Type	Classification Criteria	Sub-criteria	# Dams	% Dams
Large Dams	Height > 15m		104	23
	Reservoir Capacity > 3Mm^3	10m < H < 15m		
		H < 10m		
	Crest Length > 500m	10m < H < 15m		
		H < 10m		
	Discharge Capacity > 2,000m^3/s	10m < H < 15m		
Small Dams	Height < 15m & Storage < 3Mm^3		346	77

Total			450	100.0

20. Ten provinces account for roughly 50 percent of the 450 dams currently proposed under the program and roughly 45 percent of the total cost estimate. The large dams over 15m in height are found in 29 of the 34 provinces with 55 percent in the top ranking ten provinces for dams over 15m. Only seven provinces have more than five large dams over 15m high with Lạng Sơn Province having all ten dams identified for inclusion under the project over 15m. These ten provinces account for roughly 37 percent of the total cost estimate.

Summary of the size and preliminary cost estimates for the initial list dams and budget distributed among the Provinces under the Project.



21. The second level is based on a risk rating of existing dams informed by the dams' physical and structural deficiencies, along with other conditions, such as size and extent of the downstream impacts hydrological risks. A simplified risk analysis method has been developed based on the International Commission on Large Dams (ICOLD) method to enable a rapid assessment across the portfolio. This allows for a balance of engineering judgment and calculations in estimating risks, and an understanding of those factors most influencing the risks. Thus, the numbers, while important, are less important than understanding and documenting what the major risk contributors are and why. This is based on similar kinds of risk assessments and ratings that have been undertaken in various countries for overall portfolio management. The risk analysis is intended to be carried out at different levels, with a preliminary rapid screening assessment conducted during preparation to be complimented by further refinement and development of more comprehensive risk analyses, including detailed field assessments, during implementation.

22. Four main prioritization criteria have been agreed for large dams to be supported under the project. These include: 1) Dam Characteristics; 2) Structural Risks; 3) Downstream Risks; 4)

Management Risks. A total of 14 criteria have been defined, with scores assigned to each and a relative weighting applied to each of the four criteria. Of these, only seven can be influenced by the proposed project interventions. Others, such as the population downstream, are considered static and beyond the scope of interventions to be supported under the project.

23. Risk categories: extreme; high; moderate and low. There are no low risk dams, as would be expected having already gone through the eligibility screening and found themselves on the list of dams to be included under the Government's dam safety program. This pre-selects those dams at risk.

24. Of the 450 dams eligible, three have been assessed with a very high risk and 225 with a high risk. The application of the framework is intended to provide a framework to guide the project throughout implementation and establish a rolling pipeline of investments to facilitate the Government's broader dam safety program. The framework will further give direction to the prioritization of those enabling activities required to advance the readiness of specific investments.

25. In particular for the structural criteria, four common potential failure modes have been prioritized: (i) overtopping due to insufficient spillway capacity, (ii) external erosion by inadequate surface protection, (iii) piping/excessive seepage due to insufficient seepage control, and (iv) movement/deformation by slope instability, uneven settlement, etc. Key parameters, such as the level of seepage, cracks, sliding, etc.to measure such structural damages/risks have been incorporated into the criteria. In addition, information has also been included on (i) anticipated types of rehabilitation works and (ii) preliminary estimate of rehabilitation costs.

Preliminary Risk Assessment Framework Used for Screening During Preparation

Dam Characteristics (Total Weighting = 25)											
Dam type/form/structure				**Reservoir Capacity (Mm^3)**				**Dam Height (m)**			
Description	Score	Program	Project		Score	Program	Project	Description	Score	Program	Project
Mixed materials dam (wood, soil, rock)	2.5	0	0	>25	12.5	8	4	>35	10	2	1
Earth dam with embedded water intake works	2	731	411	$10 \leq 25$	11.25	14	11	$25 \leq 35$	9	23	15
Earth dam without embedded water intake works	1.5	62	38	$3 < 10$	10	39	24	$15 < 25$	7	124	88
Rockfill dam	1	0	0	$1 < 3$	6.25	152	111	$10 < 15$	2.5	260	161
Concrete dam	0.5	1	1	< 1	2.5	581	300	< 10	1.25	385	185
Structural Risk (Total Weight = 50)											
Landslide / Erosion								**Seepage / Leakage**			
Description	Score	Program	Project					Description	Score	Program	Project
Erosion on the dam slope, erosion ht > 30% dam ht, across the dam crest	5	0	2					Erosion forms holes in the dam body caused by seepage	10	15	15
Erosion on the dam slope, the erosion height equals to 30% dam height	4	125	81					Seepage forms water flows, turbid water	8	226	175
Erosion on the dam slope, the erosion height equals to 15% dam height	3	495	296					Seepage forms water flows, clear water	6	378	239
Erosion forming grooves on the dam slope, no landslide	2	151	70					No sign of seepage flows, downstream wet and stagnant	4	145	20
No erosion/landslide/protecting layer/water drainage from dam slope	1	23	1					No sign of seepage or seepage drain in normal operation	2	30	1
Discharge capacity (Overtopping)				**Cracks**							
Description	Score	Program	Project	Description					Score	Program	Project
$Q < Q_{2\%}$	30	220	194	Transverse crack along the dam, lower limit not lower than the normal water level					5	2	2
$Q_{2\%} < Q <$ Qdesign	27	310	187	Transverse crack along the dam, lower limit not lower than the design flood water level					4	17	14
Qdesign $< Q <$ Qcheck	24	218	65	Transverse crack along the dam, lower limit not lower than the check flood water level					3	79	66
Qcheck $< Q < Q_{PMF}$	18	42	4	Longitudinal crack along the dam with the sign of slope landslide					2	284	190
$Q > Q_{PMF}$	9	4	0	Longitudinal crack along the dam, no landslide					1	412	178
Risks at the downstream (Total Weight = 15)											
Number of people affected				**Damage to infrastructure, construction**							
Description	Score	Program	Project	Description					Score	Program	Project
> 1,000	9	337	279	> 2000 Billion VND, very high in terms of infrastructure, publicity, trading, people					6	1	1
500 ÷ 1,000	8.1	207	115	200 ÷ 2000 Billion VND, significant in terms of infrastructure, publicity, trading					5.1	2	2
100÷ 500	7.2	166	44	20 ÷ 200 Billion VND, significant in terms of infrastructure, publicity, trading					4.2	123	89
0 ÷ 100	6.3	39	11	2 ÷ 20 Billion VND, limited in terms of infrastructure, publicity, trading					3.6	476	288
0 and the risk of losing assets	4.5	45	1	< 2 Billion VND, Minimal					3	192	70
Risks caused by operation, maintenance (Total Weight = 10)											
Staff capacity				**Equipment for forecasting, observing, monitoring**							
Description	Score	Program	Project	Description					Score	Program	Project
No one has been trained about O&M	6	537	311	Without upstream forecast, without observation and monitoring at the dam					4	747	431
< 30% of staff have been trained about O&M	4.8	123	70	With hydrological forecast, without observation and monitoring at the dam					3.6	25	12
30 ÷ 60% of staff have been trained about O&M	3.6	53	29	Without upstream forecast, with observation and monitoring at the dam					3.2	17	6
60 ÷ 80% of staff have been trained about O&M	2.4	73	33	With hydrological forecast, with observation and monitoring at the dam					2.4	4	1
100% of staff have been trained about O&M	1.2	8	7	With upstream forecast, observation & monitoring & downstream simulations					0.8	1	0
Operation and Maintenance Plan (YN)				**Emergency Preparedness Plan (YN)**				**Inundation Map (YN)**			

26. **Step 3 Readiness.** The prioritized list is categorized further according to the level of readiness, to prioritize those within the set of dams ready for rehabilitation with detailed engineering designs and those requiring rehabilitation for which detailed designs are still required. Readiness is based on the availability of documentation and used to inform implementation. Those prioritized dams that have completed the required safeguard instruments, designs and tender documents. For those prioritized dams that do not have the documentation available, the priority interventions will be to advance preparation of these to ensure readiness for implementation. This is intended to help schedule the implementation and guide the necessary interventions, including feasibility studies, detailed designs, bidding documents, environmental and social assessments, emergency preparedness plans, operation and maintenance plans, etc.

27. **Phase-1 Investments.** Twelve priority dams from 11 Provinces have been identified to be included in the first year of implementation. All of these are earth embankment dams under the authority of the Provincial Departments for Agricultural and Rural Development. The dams meet the eligibility criteria and are situated in provinces with established PMUs that have sufficient capacity to start implementation immediately. Of these, seven can be classified as large dams, with six having a height of >15m and one between 10-15m with a storage of >3Mm^3. The average storage capacity of the 12 dams identified is 11Mm3, with maximum 73Mm3 and minimum of 0.5Mm3. These first year investments will help to validate the project framework and support the development and application of the national quality control systems. It will also include the review of flood discharge capacity for about 30 irrigation large dams whose physically claimed to be safe plus information and awareness raising for downstream communities;

Characteristics of Phase-1 dams to be rehabilitated under the project.

	Province	Reservoir	Height (m)	Length (m)	Storage (MCM)	Area (km^2)	Irrigated (ha)
1.	Bình định	Thạch Bàn	11.0	155	0.70	3	58
2.	Phú thọ	Hồ Ban	11.0	305	1.20	2.48	150
3.	Quang Ninh	Khe Che	12.5	600	12.00	16	20
4.	Nghệ an	Hồ Khe Gang	12.5	486.5	2.15	5.25	175
5.	Quảng ngãi	Đập Làng	13.3	130	0.50		80
6.	Hòa bình	Hồ Đại Thắng	14.5	216	0.48		130
7.	Nghệ an	Hồ Khe Sân	15.0	389	1.42	5.2	120
8.	Tuyên quang	Ngòi Là 2	15.0	160	3.2	16	250
9.	Thanh hóa	Đồng Bể	17.0	734	2.54	3.3	
10.	Quảng bình	Phú Vinh	20.0	1776	19.16	36	1510
11.	Lâm đồng	Đạ Tẻh	27.3	600	24.00	198	2300
12.	Bình thuận	Sông Quao	40.0	1.421	73.00	296	8120

Component 2: Dam Safety Management and Planning (est. cost = US$20m of which IDA US$17m)

28. This component will improve dam safety through improvements to the planning and operational framework for dam management in order to safeguard the people and socio-

economic infrastructure within downstream communities. This includes a number of non-structural measures that will consolidate the overall framework proposed under the project for integration and implementation of the Government's Dam Safety Program. These include: i) Technical and Specialist Studies; ii) Institutional, Legal and Regulatory Instruments; and, iii.) Training and Capacity Enhancement. Many of the activities to be supported under this component are to be implemented in cooperation with the parallel initiative supported by the Government of New Zealand under the "Dam and Downstream Community Safety Initiative" in the Ca River basin.

29. Sub-component 2-1: Activities to be managed by MARD will include (i) the provision of monitoring and support equipment for disaster risk management by the Directorate of Water Resources; (ii) the development of a dam/reservoir database; (iii) the preparation of provincial disaster risk management plans for selected provinces; (iv) the development of legal, institutional and financial models for sustainable dam safety management; (v) the adoption of a standardized operational procedures for small community-managed dams; (vi) the provision of technical assistance to support the Project activities carried out by MARD; (vii) training, capacity building and information dissemination and awareness activities on dam safety; (viii) the study of new dam rehabilitation and safety management technologies; and, (ix) improvement of the monitoring capacity within MARD; and, monitoring and evaluation. The indicative budget for this sub-component would be about US$8.0 million.

30. Sub-component 2-2: Activities to be managed by MoIT will include: (i) hydropower dam and reservoir database for safety operations; (ii) the revision of operating rules for hydropower dams; (iii) the development and piloting of hydropower dam safety methodology with internationally-accepted safety indicators; (iv) the development of legal and institutional standards norms and regulations for hydropower dams; (v) the provision of technical assistance to support the Project activities carried out by MOIT; and, (vi) improvement of the monitoring capacity of MOIT's safety management department. The sub-component would cost around US$4.0 million.

31. Sub-component 2-3: Activities to be managed by MoNRE would include: (i) the installation and rehabilitation of hydro-met stations the Vu Gia-Thu Bon river and Ca river basins; (ii) the provision of equipment for the operation of cascade dams in, and disaster forecasting and early warning for, the Vu Gia-Thu Bon and Ca river basins; (iii) the development of an information database for monitoring dam operations; and, (iv) the provision of technical assistance to support the Project activities carried out by MONRE; and, (v) improvement of MONREs capacity to monitor implementation of the joint operating rules for cascade dams. The tentative budget for this sub-component is about US$8.0 million.

32. Regulatory and institutional support would assist the Government in implementation of the revisions proposed to Decree 72 and the supporting guidelines, instructions and regulations for implementation. The Government has indicated a strong commitment and leadership through the implementation of the sectoral dam safety program. However, there is a complex and evolving institutional framework for dam safety management involving a number of different line Ministries and Government authorities. Coupled with the high rate of development, particularly within the hydropower sector, the current institutional framework does not reflect the highly developed infrastructure platform and there are increasing pressures on the mechanisms for institutional coordination, the financial capacity for sustained operation and maintenance and a need for an independent regulatory regime to ensure the safe, sustainable operation and

management.

33. Recognizing these challenges, the revised Decree defines a set of dam safety related issues, providing for classification of individual dams, procedures for safety reviews and quality assurance for dam designs, acceptance of completed dams, operational procedures for reservoirs, dam safety and hydro-meteorological monitoring, periodic safety inspection and reporting requirements, rehabilitation and protection measures, along with flood storm prevention and the protection of downstream communities. A series of activities would be supported under this component to help draft the subsidiary instruments required under the Decree 72 including implementation instructions, guidelines and sanction mechanisms, enhance the coordination mechanisms and governance structures, as well as implementation of the regulatory provisions.

34. Integrated basin-wide dam reservoir operation and development plans are intended to demonstrate the efficiency gains and safety improvements that can be realized by improving the inter-sectoral, inter-provincial and inter-reservoir operations within the river basin context. One of the key challenges identified is the challenges arising from increasing levels of development in some of the key river basins. The presence of a large number of dams in a cascade owned by different agencies, with different design and construction standards, is complicated by a lack of operational monitoring and communication, as well as a lack of upstream warning mechanisms. The response in the event of flood releases or dam failure are further complicated through complex disaster risk management communication and mobilization mechanisms.

35. The Vu Gia-Thu Bon and Ca river basins have been proposed as pilots for implementation of a basin approach to operational dam safety. These were selected after a review of the 14 river basins in Vietnam through a multi-criteria framework to identify key constraints relating to operational dam safety and where project interventions could have substantial demonstrable impacts. This approach will complement the support being provided by the World Bank to the Natural Hazards Project that is supporting the development of river basin plans in eight basins across Vietnam. This includes Vu Gia-Thu Bon and Ca river basins. It is anticipated that these will be developed by the Natural Hazards Project during the first two years of implementation of the Dam Rehabilitation and Safety Improvement Project and will provide the foundation for further developed directed toward improved dam safety management.

36. The Vu Gia Thu Bon River basin has about 2.5 percent of the nation's water, produces about 1.5 percent of GDP, and has about 2 percent of total irrigation water use. There are a large number of existing dams within the basin and dry season abstractions mean the rivers of the basin are creeping up to the moderate stress level by international standards. Compounding these challenges, the hydropower capacity is projected to increase by 275 percent by 2025, representing over 88 percent of the technical and economic capacity of the basin. By 2020 water extractions would see the basin in the middle of the moderate stress range. The impacts of disasters on this central provinces basin are high, with 23 people per million of population killed on average each year, and damage costs equivalent to about 7 percent of the basin GDP per year.

37. The Ca River basin originates in Laos and accounts for nearly 3 percent of the nation's water, produces about 3 percent of GDP, and has about 2.5 percent of total irrigation water use. Hydropower capacity is projected to increase by 133% by 2025, representing over 77% of the technical and economic capacity of the basin. It is predicted that the Ca River basin will be experiencing shortages in the dry season by 2020 and will be at the high end of the moderate stress range. It is also the focus of the parallel process supported through New Zealand under the

"Dam and Downstream Community Safety Initiative" and so includes opportunities for collaboration around pilot initiatives.

38. Improvements in the hydrological observation network and information systems at both basin and scheme levels would be supported. The lack of monitoring equipment at the dam structure and upstream as being a major impediment, both to the safe operation of the dam and to being able to take preventative action to warn downstream communities. The existing hydro meteorological monitoring networks in upstream catchments are typically very limited and the forecasting capacity of MoNRE does not have the resolution required for smaller catchments. There are often parallel monitoring systems owned and operated among MoNRE, MARD, MoIT and some private dam owners. Only 18 irrigation reservoirs are installed with (semi) automatic measuring equipment, and monitoring is normally manual. Data management is typically very fragmented with each dam owners separately contracting data analysis and forecasting services in the rainy season and dam levels and operation are not communicated automatically to the relevant agencies.

39. Support will be provided to extending the network, through the provision and installation of observatory equipment. This would include onsite instrumentation as well as hydro-meteorological stations within the catchment. This is to be integrated within the national standards and aligned with the ongoing support under the VN-Managing Natural Hazards Project supported by the Bank. Within the pilot basins, support would be provided to establishing shared data management systems and analyses to provide decision support systems for Government Agencies and dam operators.

40. Improved flow monitoring and integrated basin wide forecasting, within the national monitoring system, is anticipated to help improve the safety of dam operations and downstream communities. Improving the operations of a relatively small number of targeted large dams with gated spillways could have a significant impact given the large reservoir capacities. The use of reservoir capacity for active flood control with the aid of hydrological and meteorological monitoring and flood forecasting is to be considered on a basin scale. Such improvements in flow monitoring and regulation operations could enhance the safety of smaller, un-gated irrigation dams and the integration of hydropower dams with improved safety, power production and financial gains.

41. A series of technical studies will be supported as part of the non-structural measures aimed at establishing a more effective national dam safety monitoring, operation and maintenance system. This would also include technical specifications and safety standards to ensure compliance with internationally-accepted levels. This includes emergency preparedness plans, dam break analyses, downstream flood mapping and benchmarking, along with strategic technical studies regarding dams planning, investigation, design, construction, operation and maintenance, dam safety auditing, etc. One of the subjects could be national hydrological assessment, including the review of overall hydro-meteorological monitoring data and broad estimate of large floods and PMP/PMF at the regional level, using and envelope curves of peak flows and runoff volumes, such as Creager and Francou-Rodier formulae. The exercise will be used to provide preliminary estimates or rough checks of spillway design flow volume for rehabilitation design of each dam.

42. The inter-reservoir joint operation procedures would also be supported. In 2014 the Government approved 11 of the 13 inter-reservoir operating procedures. However initial

indications suggest that the practical application of these procedures is limited. This is partly due to the level of complexity and also a lack of confidence in the forecasts provided due to a lack of upstream hydro meteorological monitoring.

43. The project will provide supplementary support to enhance the quality and performance of the national dam database. This is currently being supported by the IDA-financed Managing Natural Hazards Project. The aim of the additional support would be to further detail the safety information and flow of information pertaining to all small-size dams managed by local communities. Completing the database on dams would eventually help establish a national dam safety database which is crucial for the management of safety in the long-term operations.

44. Capacity enhancement, community awareness and improved education around dam safety would be supported through a series of Knowledge Products, Trainings and Exchanges. Specific products would include the production of national guidelines, manuals, and standards, etc., coupled with specific training events to develop a strong cadre of professionals in dam safety. Training would include training of trainers, as well as individual opportunities, with a focus on dam operators and managers, along with local communities. This would be facilitated through Knowledge Exchanges between practitioners and communities within and between basins, provinces, and nationally, as well as international events.

Component 3: Project Management Support (est. cost = US$11m of which IDA US$9.5m)

45. This component will provide the necessary enabling environment to support project implementation. This will include support for the following: (i) High Level Working Group composed of MARD, MoIT MoNRE and other Government representatives to coordinate and oversee all project interventions; (ii) the Central Project Management Unit (CPMU) within MARD to provide the necessary support services for timely and effective project implementation, including monitoring & evaluation, procurement, financial management, safeguard monitoring, etc.; (iii) Technical Assistance for beneficiary departments within MoIT and MoNRE to provide the necessary support services for timely and effective project implementation; (iv) Establishment and operations of a National Dam Safety Review Panel; (v) Independent audits of prioritized dams before and after rehabilitation; (vi) Monitoring and Evaluation of project progress and impact; and (vii) Incremental operating costs for project related activities.

ANNEX 3: IMPLEMENTATION ARRANGEMENTS

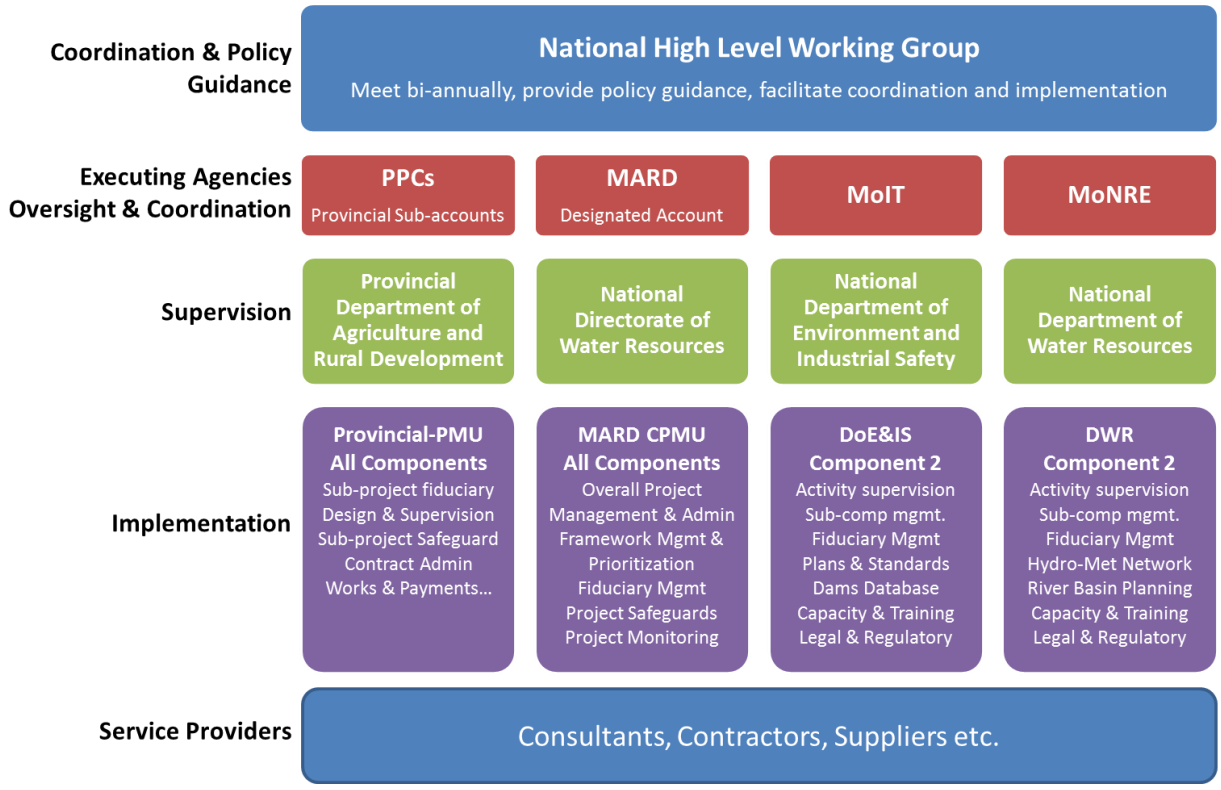
VIETNAM: Dam Rehabilitation and Safety Improvement Project

Project Institutional and Implementation Arrangements

1. The project provides support to structural and non-structural interventions aimed at improving dam safety and will be implemented by MARD, in coordination with MoIT and MoNRE, along with an estimated 34 Provinces. Project implementation will be guided by a High Level Working Group (HLWG) who will be responsible for providing guidance to implementation, ensuring alignment with the national policy framework as well as facilitating coordination among the three Ministries and other stakeholders. Implementation support will be enhanced through strategically aligned Technical Assistance, an Independent Supervision Consultant, or Third Party Monitor, and Panel of Experts.

2. The HLWG will be chaired by the Minister from the Ministry of Agriculture and Rural Development (MARD) or a designated representative. The HLWG will meet at least twice per year and be responsible for coordinating national policy positions and strategic issues relating to dam safety, providing overall guidance to implementation of the National Dam Safety Program, reviewing implementation progress and providing necessary guidance to accelerate the implementation of the program.

Institutional and Implementation Arrangements of the Project



3. The Ministry of Agriculture and Rural Development (MARD) has been assigned by the Government as the responsible line agency and as such will be responsible for overall implementation, management and coordination of the project. The MARD has been mandated with responsibility for the state management of dam safety under Decree 72. It will be assisted by the Dam Safety Unit (DSU) that was established within MARD under the IDA financed VWRAP (closed in 2010) and later merged within the Directorate of Water Resources. The Ministry has experience implementing various Bank financed projects, along with those financed by other partners (ADB and JICA), and so is familiar with Bank procedures and policies.

4. A Central Project Management Unit (CPMU) has been established in the Central Project Office (CPO) within MARD with responsibility for implementation of the project in accordance with the framework documents for determining the eligibility, prioritization and readiness of the sub-project investments, as well as in compliance with the safeguards framework, and the sub-project assessments. In addition to ensuring the project is implemented in compliance with the technical and safeguard frameworks, the CPMU will also be responsible for the overall project level administration, including oversight procurement, financial management, monitoring and evaluation, and communications.

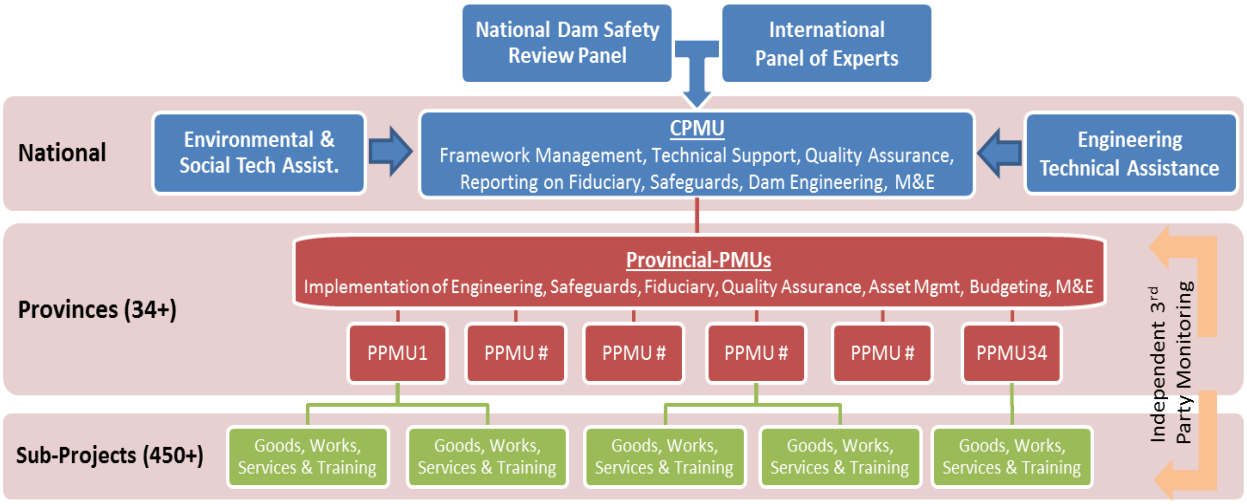
5. The CPMU will be supported by Technical Assistance on the aspects of engineering, environmental and social safeguards. This will be an international firm/s recruited through a competitive process to provide quality assistance and assurance to the central level during implementation. This will include support to MARD in reviewing, refining as needed, and re-enforcing the frameworks developed during project implementation so that they can serve as the framework for the national program. This process will be reviewed in the context of the revisions to Decree 72 to support MARD establish the necessary systems for implementation of the Government Dam Safety Program and with its responsibilities for national dam safety.

6. An Independent Supervision Consultant, or Third Party Monitor, will be procured to carry out regular, independent evaluations of project activities. The evaluation will be carried out against the approved framework documents for the technical and safeguard components, approved plans, including the detailed designs, financial management, procurement, contract and construction management and disbursements. The Third Party Monitor will also evaluate compliance with the applicable the Safeguard Policies and implementation of the various safeguard instruments, including the Environmental and Social Management Framework, Dam Safety Framework, Resettlement Policy Framework / Resettlement Action Plans, Ethnic Minority Policy Framework, and Gender Action Plans, among others, as well as any Environmental and Social Management Plans and other safeguard instruments.

7. **Component 1 Implementation Arrangements** will support the rehabilitation works for an initial estimate of 450 dams in 34 Provinces, estimated to account for roughly 90% of the financial support. The Provincial People's Committee (PPC) is responsible for project implementation within the Provinces and are the designated Executing Agencies for rehabilitation of dams within their administrative jurisdiction. The PPC will appoint existing Provincial Project Management Units (PPMU) under the Department of Agriculture and Rural Development (DARD) to be the implementing agency for individual sub-projects for Component 1. The PPMU will be in charge of day-to-day implementation activities including: (i) preparation and processing of sub-project investments; (ii) preparation of detailed technical engineering design, safeguards mitigation documents, implementation and procurement plans; (iii) carrying out fiduciary (procurement and financial management) and safeguards activities at the sub-

project level; (iv) operating and maintaining the project account; and, (v) monitoring and evaluating of implementation of the sub-projects. Each of the PPMUs will be fully staffed with qualified and experienced staff in all areas particularly on fiduciary and safeguards aspects. The diagram below illustrates the implementation arrangements for Component 1.

Implementation Arrangements for Component 1 – Dam Safety Rehabilitation



8. Central level support to implementation of sub-projects under Component 1 will be provided by the CPMU, with support from an international firm, competitively procured providing technical assistance on engineering, procurement, audit, environmental and social aspects. This technical assistance will assist the MARD in overseeing implementation of the sub-projects, providing quality assistance and assurance during implementation as well as monitoring and evaluation. This will include support to MARD in reviewing, refining as needed, and re-enforcing the frameworks developed during project implementation so that they can serve as the framework for the national dam safety program. The framework will be reviewed in the context of the revisions to Decree 72 to support MARD establish the necessary systems for implementation of the National Dam Safety Program and with its responsibilities for national dam safety. The firms will also assist in ensuring the quality management, data capture systems, oversight with technical audits of sub-projects based on a sample frame to ensure transparency and credibility.

9. **Component 2 Implementation Arrangements** will support non-structural measures to improve dam safety and facilitate collaboration and coordination between MARD, MoNRE and MoIT. The legal framework is clearly defined and assigns roles and responsibilities for key line ministries. However the institutional framework is complex and evolving in response to the rapidly increasing dam developments. Dam management has also shifted from a centralized to a decentralized system and there are now a large number of public and private management models, further complicating coordination in the sector. Traditionally MARD has been responsible for irrigation dams, which more recently have been coupled with development hydropower facilities under MoIT, with increasing coordination introducing MoNRE with responsibility for the inter-reservoir operating rules for those basins where there are multiple dams and hydraulic structures. These horizontal differences in mandates and operational functions are coupled with decentralized responsibilities held at the central, provincial, district and commune level. Moving forward within the sector and with the development of large

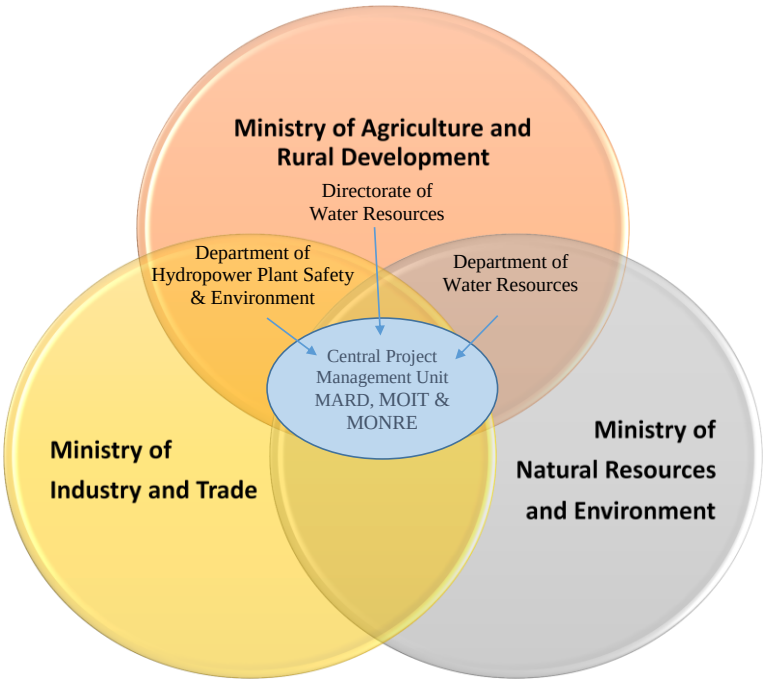
hydraulic infrastructure there is a need for greater horizontal coordination and vertical integration.

10. Implementation of non-structural activities under Component 2, representing less than 10% of the financial resources, will be the responsibility of the MARD CPMU in collaboration with MOIT and MONRE as project beneficiaries. While the MARD CPMU will be responsible for overall management, MOIT, acting through its Department for Environment and Industrial Safety, and MONRE, acting through its Department of Water Resources, will assign staff to carry out specific project financed activities. As requested by Government, staff from these two departments will be responsible for implementation of the planned activities without formally establishing or appointing dedicated PMUs. The two departments will be responsible for the preparation of the identification of activities, preparation of terms of reference, budgets, facilitating the procurement process, and will be designated as the client's representatives for all related contract administration and management, while the MARD CPMU will provide overall support. The same staff from the two Ministries will be appointed to the MARD CPMU to be the focal point for monitoring and supporting during the course of implementation. Progress review meetings of the three participating Ministries will be convened on a quarterly basis to strengthen the coordination amongst Government responsible ministries to ensure the dam safety program is being effectively implemented.

11. Activities under Component 2, representing less than an estimated 10 percent of the financial support, will be the responsibility of the MARD CPMU in collaboration with Ministry of Industry and Trade (MoIT) and Ministry of Natural Resources and Environment (MoNRE) as project beneficiaries. Both MoIT and MoNRE will be authorized as executing agencies with the implementation of specific activities to be carried out by technical departments within the relevant Ministries aligned with their mandates. MoNRE has appointed the Department of Water Resources and MoIT has appointed the Department of Environment and Industrial Safety. The two departments will be responsible for the preparation of the identification of activities, preparation of terms of reference, budgets, facilitating the procurement process, and will be designated as the client's representatives for all related contract administration and management, while the MARD CPMU will provide overall support.

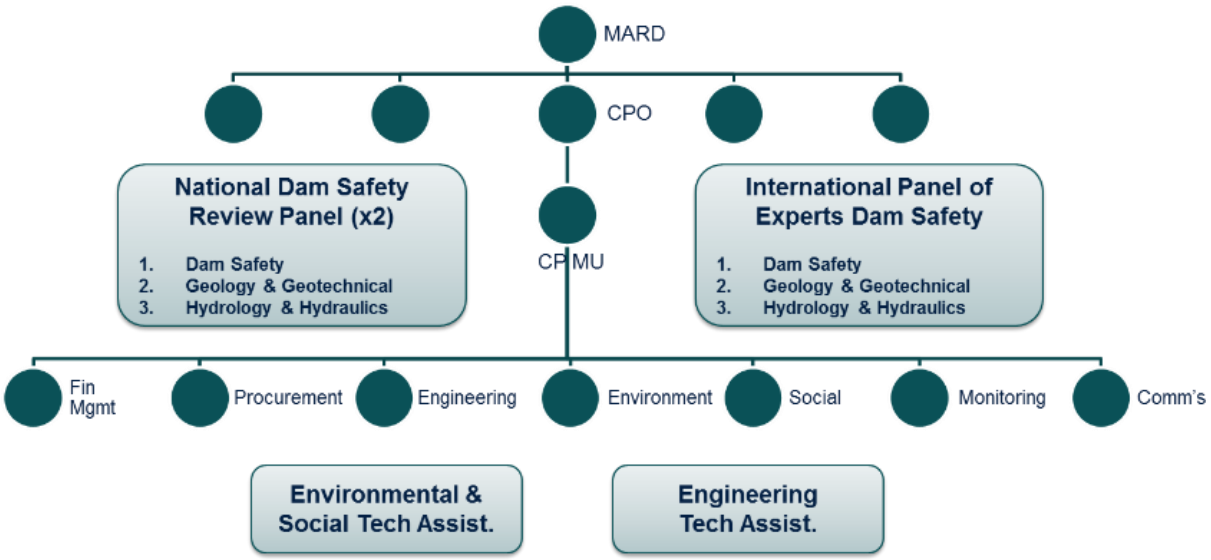
12. Coordination among the three Ministries will be in the form of quarterly implementation review meetings and the bi-annual meetings of the HLWG. The quarterly implementation review meetings will allow for the sharing of information, alignment of activities and consolidation of report requirements. Staff from the designated technical departments in MOIT and MONRE will be appointed to the MARD CPMU to serve as the focal points for monitoring and supporting activities during the course of implementation. Progress review meetings of the three participating Ministries will be convened on a quarterly basis to provide a work interface and strengthen the coordination amongst Government responsible ministries to ensure the dam safety program is being effectively implemented.

Implementation Arrangements for Component 2



13. **Component 3 Implementation Arrangements** will provide necessary support to project implementation. The CPMU under MARD is responsible for overall implementation and coordination. In addition to ensuring the project is implemented in compliance with the technical and safeguard frameworks, the CPMU will be responsible for overall project level administration, including procurement, financial management, monitoring and evaluation, and communications. During implementation the CPMU will be supported by a Project Implementation Consultant, which will be an international firm to provide Technical Assistance on Engineering, Procurement, Environmental and Social Services, along with an Independent Supervision Consultant, or Third Party Monitor which will provide monitoring support on construction supervision, quality control and internal audit, along with a National Dam Safety Review Panel and an international Panel of Experts.

14. The CPMU will include a Director and will be supported by, at a minimum, the following specialists: i) engineering; ii) environmental; iii) social; iv) procurement; v) financial management; vi) monitoring and evaluation; vii) communications.



Implementation Arrangements Diagram for Component 3

15. An International Dam Safety Panel of Experts (PoE) will be established to provide independent review and guidance to MARD and the Provincial authorities during implementation. The PoE will include specialists in at least three areas: Dam Safety, Geology and Geotechnics, and Hydrology and Hydraulics, each with considerable international experience in dam rehabilitation programs. The Terms of Reference for the PoE are to be finalized by the end of appraisal and the procurement process for appointment of the individual consultants launched by negotiations. The appointment of the PoE would take place immediately after project effectiveness and the release of funds. During implementation the international members of PoE would be accompanied by a minimum of two national experts in corresponding fields. The panels would be expected to visit at least twice a year for a period of two weeks, at minimum, to review, assess and advise Government on the program.

16. A National Dam Safety Review Panel (NDSRP) would be established under the project to provide independent review and guidance to MARD and the Provincial authorities during implementation. The NDSRP will be aligned with the international PoE and include specialists in at least three areas: Dam Safety, Geology and Geotechnics, and Hydrology and Hydraulics. The Terms of Reference for the NDSRP are to be finalized by the end of appraisal and the procurement process for appointment of the individuals launched by negotiations to ensure they are available following the release of funds after effectiveness. The NDSRP will work closely with the PoE in screening and prioritizing dams for rehabilitation and safety improvement efforts. This partnership doing this certain capacity and experience shall be built up and maintained throughout the project and then be institutionalized within MARD and MoIT at the end of project implementation ends.

17. The CPMU will be supported in implementation of the overall project by a Project Implementation Consultant that will provide Technical Assistance in Engineering, Procurement, Audit and an Environmental and Social Services. These will be international firms, and could be combined into one firm, that will be recruited through an international competitive process to provide quality assistance and assurance to the central level during implementation. This will

include support to MARD in reviewing, refining as needed, and re-enforcing the frameworks developed during project implementation so that they can serve as the framework for the national program. This process will be reviewed in the context of the revisions to Decree 72 to support MARD establish the necessary systems for implementation of the National Dam Safety Program and with its responsibilities for national dam safety.

18. An Independent Supervision Consultant, or Third Party Monitor, will carry out regular, independent evaluations, supported through the development and application of innovative, state-of-the art technologies to enhance citizen voice and stakeholder engagement during project implementation. The inclusion of additional geographical identification metadata through geotagging will help enhance project supervision and monitoring of results by enabling stakeholders find a wide variety of location-specific information from to various media and devices and enhance the citizen voice. The evaluations will be carried out against the approved framework documents for the technical and safeguard components, approved plans, including the detailed designs, financial management, procurement, contract and construction management and disbursements. The Independent Supervision Consultant, or Third Party Monitor, will also evaluate compliance with the applicable Safeguard Policies and implementation of the various safeguard instruments, including the Environmental Management Plans / Environmental Codes of Practice, Resettlement Policy Framework / Resettlement Action Plans, Ethnic Minority Development Plans, and Gender Action Plans among others.

19. Implementation Readiness. The phase-1 dams in the 11 provinces costing around US$30 million equivalent will be implemented through existing PPMUs who are experienced with Bank-financed fiduciary requirements including procurement handling. The technical engineering design are being carried out and will be available by negotiations. All safeguards instruments have been prepared, reviewed, and disclosed. Bidding documents will be prepared as soon as the engineering designs are approved by the Provinces. Procurement of civil works will start right after the negotiations and contract signing will be done once the effectiveness is met.

Financial Management, Disbursements and Procurement

Financial Management

20. The inherent risk to the project financial management is assessed as High and the project control risk is assessed as Substantial after mitigation measures are taken, leading to overall financial management risk is assessed as Substantial. The key risks identified at appraisal stage are: i) inexperienced implementing agencies and inexperienced financial management personnel may result in delay to project activities and disbursements or even mis-use of funds; ii) absence of internal audit function to early prevent or detect irregularities and non-compliances; iii) unclear design of project activities and inadequate guidance may cause confusion to sub-national level to disburse; iv) insufficient budget allocation for both ODA and counterpart fund to implementing agencies will cause delay to project implementation.

21. The proposed Action Plan is as follows:

Financial Management Action Plan

	Actions on Financial Management	**Expected Date of Completion**	**Responsibility**

1	Appointment of qualified experienced officers to be in charge of financial management of the Project at all implementing agencies	MARD Phase I sub-projects by effectiveness Other sub-projects: by sub-project proposal	All implementing agencies
2	Operation Manual, with detailed Financial Management section.	by effectiveness	CPMU
3	MARD CPO existing internal audit function is used for the Project Package to recruit a firm to support MARD CPO in performing internal audit at provincial level is included in Procurement plan for first year	Confirmed during appraisal Completed	MARD CPO
4	Adequacy of budget allocation for both ODA and counterpart	Phase I sub-projects confirmed at negotiations Subsequent sub-projects: by sub-project proposal	CPMU, PPCs
5	Package for financial audit included in Procurement plan for first year	Completed	CPMU

22. The financial management functions of the implementing agencies, including the MARD CPMU and PPMUs meet the Bank's minimum financial management requirements. Areas of weakness that need to be addressed during the project preparation and implementation are: i) lack of internal audit function at provincial level; ii) lack of experience in managing large donors funded projects in some provinces; and iii) inadequate budget allocation for both ODA and counterpart funding. A financial management manual was developed and included in the Proejct Operational Manual to guide processes and steps in financial management under the project. Extensive training will also be provided to financial and accounting staff of all PPMUs to ensure understanding and financial management compliance.

23. **Interim Financial Reports (IFRs).** PPMUs, who are the ultimate spending units at provincial level, will prepare financial reports for all project expenditures incurred at the province and submit to CPMU on semester basis. The MARD CPMU will prepare IFRs based on the information provided by the PPMUs and the responsible technical departments from MoNRE and MoIT, and submit these to the Bank a within 45 days of the end of the semester. Those PPMUs having designated accounts[12] will prepare IFRs for their own expenditures. The IFRs, which are unaudited, will cover all project activities.

24. The IFRs include the following forms:

[12] Provinces of: Thanh Hoa; Nghe An; Phu Tho; Ha Tinh; Quang Binh; Quang Tri; Quang Ngai; and Binh Dinh.

IFR1: Sources and Uses of Funds;

IFR2: Disbursement by component and by province;

IFR3: Statements of Designated Accounts Reconciliation

25. **External Audit.** Project financial statements will be prepared by each PPMU and the respective technical department from MOIT and MONRE and then submit to CPMU for consolidation and audit. The project's annual financial statements will be audited in accordance with international auditing standards and in compliance with the independent auditing regulations of Vietnam. CPMU will be responsible for the appointment of the auditor for the entire project in accordance with the Bank's guidelines. CPMU will submit the audited Project consolidated financial statements to the Bank annually by June 30 of the following year.

26. **Internal Audit.** The Independent Supervision Consultant, or Third Party Monitor, hired by the CPMU will perform the internal audit function for the project under the ToR acceptable to the Bank. CPMU will supervise the audit work and audit reports produce by the consulting firm and submit the internal audit reports to the Bank and Government agency.

27. **Governance and Anti-corruption.** The project is subject to the World Bank "Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants", dated October 15, 2006 and revised in January 2011". To strengthen the financial management arrangements for the project and to help reduce the risk of fraud and corruption, particular emphasis is needed in the following areas: (i) transparent criteria and procedures of approving sub-projects, including financial management arrangement; (ii) internal audit function with comprehensive TOR; (iii) authorization by Expenditures Verification Agencies (State Treasury and VDB) prior to payments, following the procedures in the country.

Disbursements

28. **Flow of Funds.** The primary disbursement method will be advances and replenishment. Funds will be channeled through the designated accounts (DAs) and sub- accounts opened at commercial banks. The MARD CPMU will manage one designated account for the activities implemented by the Ministry, along with those of MOIT and MONRE. The designated account held by MARD CPMU will also be used for the purpose of providing funds to sub-accounts for the implementation of subproject's activities. Another eight designated accounts will be opened for eight provinces throughout the project. The ceiling of the MARD designated account is US$ 30 million, and those for the eight provinces at US$ 2 million each.

29. Supporting documentation required for documenting eligible expenditures paid from the DAs are Statement of Expenditures and Records. The frequency for reporting eligible expenditures paid from the DA is quarterly. The Reimbursement, Special Commitment, and Direct Payment disbursement methods will also be available. Reimbursements would also be documented by Statement of Expenditures and Records. Direct Payments will be documented by Records. The Minimum Application Size for Reimbursement, Special Commitment and Direct Payments will be US$ 100,000.

30. Sub-accounts in USD will be opened by PPMUs, MoIT and MoNREto receive advances from CPMU. PPMUs, MoIT and MoNRE will use the sub-accounts for all activities managed by them , and report eligible expenditures to CPMU for replenishment to the sub-account. The ceiling of the sub-accounts will be US$ 1 million.

31. The Project will have a Disbursement Deadline Date (final date on which the Bank will accept applications for withdrawal from the Recipient or documentation on the use of Credit proceeds already advanced by the Bank) four months after the Closing Date. This "Grace Period" is granted in order to permit the orderly project completion and closure of the Credit accounts via the submission of applications and supporting documentation for expenditures incurred on or before the Closing Date. Bank financing of this project is at 100 percent, inclusive of taxes, of eligible expenditures consisting of goods, works, consultants' services, non-consulting services, incremental operating costs, training and workshop. Counterpart funds of US$28 million will finance project expenditures not being financed by the Bank, such as staff costs of MARD CPU, provincial PMUS and implementing agencies; land acquisition and compensation, site clearance/de-mining, technical review/appraisal, etc..

Procurement

32. **Procurement Capacity and Risk Assessment (PCRA).** The capacity assessment of implementing agencies was conducted by the Bank team in January 2015 and updated in June 2015. The 11 provinces participating in the Phase-1 program have appointed their PPMUs and confirmed it at negotiation.

33. The procurement capacity assessment was done based on the list of total 34 Provinces participating in the project and were classified into three categories of risk as follows: (i) 13 provinces, DARD of which have been implementing on-going WB-funded projects; (ii) 19 provinces, DARD of which have completed implementation of WB/ADB-funded projects; and (iii) two provinces (Son La and Bac Kan), with no experience with WB/ADB-funded projects.

34. As the project requires effective collaboration among three Ministries (MARD, MoNRE, MoIT) at the central level for activities under Component 2, the respective implementing agencies within MoIT and MoNRE will need to work closely with the MARD CPMU.

35. The assessment identified that risks may be in the form of procurement delays and noncompliance which could arise from:

(i) lack of sufficient capacity in handling procurement under Bank-funded projects that would result in significant delays in selection of consultants for technical assistance and policy advisory assignments under Component 2;

(ii) lack and uneven level of sufficient knowledge and experience in Bank's procurement rules and procedures by PPMU;

(iii) poor capacity of procurement planning and contract management by all implementing agencies at both ministerial and provincial levels;

(iv) delay in the procurement processing from procurement packaging, preparation of technical specifications, bid evaluation to contract award and signing. A special concern would be on procurement of specialized hydro-met equipment for hydrological observation networks and IT management systems

(v) possible governance and corruption issues

36. Given (i) the complex nature of the project that require institutional coordination among three central Ministries, as well as coordination and oversight of huge number of decentralized works scattered in 34 project provinces, (ii) uneven capacity and experience among participating ministries and provinces, (iii) the severity and probability of identified risks, (iv) sufficient

capacity by CPO under MARD with experience under several recent and ongoing Bank-financed project which include similar activities, the overall procurement risk for the proposed project is rated as "High".

37. **Procurement risk mitigation measures.** To mitigate the identified risks and build up capacity, an Action Plan has been developed and agreed to. Details of mitigation measures to address the identified risks, as well as the procurement arrangements for the project are presented below. The residual Risk after the mitigation measures have been implemented would be "Substantial".

Procurement Management Action Plan

	Actions	Responsibility	Time frame (expected Completion date)
1	Adoption of procurement manual (covering clear rules, procedures and division of responsibilities, sample documents and evaluation report, procurement Strategy and Planning, etc.) as part of the Project Operation Manual (POM) The use of Bank's sample Bidding Documents required in the POM shall be mandatory	MARD	POM including procurement manuals be cleared with the Bank and adopted by project effectiveness
2	Provide regular and ad-hoc trainings on the applicable Bank's procurement policies/procedures as well as on contract management to project staff of CPMU as well as other relevant staff of concerned departments of MARD/MoIT/MoNRE	MARD, MoIT, MoNRE & WB	By project effectiveness and throughout project implementation
3	Provide regular and ad-hoc trainings on Bank's procurement policies and procedures to project staff at provincial level including PPMUs and other relevant departments who will assist in procurement approval.	CPMU, PPMUs & WB	By project effectiveness and throughout project implementation
4	CPMU plays coordinating role, provides help-desk support, and regularly monitor procurement performance and contract management by PPMUs.	CPMU	During implementation
5	The Project Implementation Consultant should include specialists on procurement and contract management	CPMU	Consultant mobilized six months after project effectiveness
6	MARD/WB facilitates the exchange of experiences among DARDs/PPMUs for sharing/learning/replicating good practices	MARD, WB	During implementation
7	Organize sensitization workshop at project launch and subsequently systematic training on fraud and corruption for PMU staff, as part of the regular PMU trainings, for familiarization and implementation of relevant actions under the Strategic Action Plan to Address Fraud and Corruption Risk for Vietnam Portfolio.	WB, MARD	At project launch and throughout the project implementation
8	Engage the internal and external auditor(s) to do procurement audits besides the technical and financial audits.	MARD-CPMU, MoNRE, MoIT and PPMUs	During implementation

38. **Procurement Arrangements.** Applicable Guidelines: Procurement for the proposed project shall be carried out in accordance with the Bank's "Guidelines: Procurement of Goods, Works and Non-consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers" dated January 2011, revised July 2014 ("Procurement Guidelines"), and "Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits and Grants by World Bank Borrowers" dated January 2011, revised July 2014 ("Consultant Guidelines").

39. The specific procurement methods, their application thresholds, and the thresholds for the Bank's Prior Review to be applied under the proposed project are indicated in the Table below. During project implementation, these thresholds may be subject to change upon the Bank's official notice in sufficient time in advance to ensure smooth implementation without any disruption.

40. Procurement of Goods and Works under the NCB procedures shall comply with provisions stipulated in the "NCB Annex for Vietnam" – an Annex to Schedule 2 (Procurement) of the project Financing Agreement.

41. A Procurement Strategy (PS) has been developed and put into implementation. The PS addresses how procurement activities will support the development objectives of the project and deliver the best value for money under a risk-managed approach that reflects the country and market contexts. The strategy will give direction to the aggregation of procurement packages within or among the provinces, as appropriate, to improve economic efficiencies and help accelerate implementation. The PS is proportional, providing adequate justification for the selection methods chosen in the Procurement Plan. When and where appropriate, the slice-and-package approach will be followed under ICB and NCB procedures in order to improve efficiency of procurement processes by minimizing transactional burdens and to increase competition by allowing bidders to participate for one or more lots in accordance with their capacity and qualifications.

42. Procurement Plan: The Procurement Plan (dated November 17, 2015) will be updated on an annual basis or as needed throughout the project to reflect the actual project implementation needs and improvements in institutional capacity. The updated Procurement Plan will specify procurement methods and their applicable thresholds, as well as the applicable thresholds for the Bank's prior review. When the slice-and-package approach is followed the total estimated cost of all lots consisting the particular package will be the basis to determine the estimated cost of the package.

43. The project Procurement Plan for the first 18 months of the project was discussed and finalized. It includes 12 phase-1 sub-projects for rehabilitation. There would be no ICB contract for civil works under Component 1 is foreseen, given the size and nature of rehabilitation works. However, there will be large consulting services and ICB contracts for goods category under Components 1, 2 and 3 of the project. Due to procurement risk it has been agreed that the first NCB contract for works in each out of 11 first-year provinces will be subject to Prior review by the Bank. Please refer to the below-Table on Summary of Procurement Arrangements for more detail. Determination of the Bank's prior/post review for NCB works contracts (for dam rehabilitation) in subsequently updated procurement plans will follow the risk-based approach and should be agreed during finalization of each Annual Procurement Plan, on the basis of

respective Annual Work Plan and rating of the procurement risk assessment for performance (as recorded in P-RAMS) in the previous year.

44. Contracts not subject to prior review will be subject to ex-post review by the Bank as per procedures set forth in paragraph 5 of Appendix 1 of the Procurement Guidelines and Consultant Guidelines. Such Procurement Ex-post Reviews by the Bank will approximately cover 20 percent of the total post-reviewed contracts and will be on a frequency of every twelve (12) months. The Bank will also carry out regular procurement supervision missions on a bi-annual basis.

Summary of Procurement Arrangements

Expenditure Category	Contract Value (US$)	Procurement Method	Bank Prior Review (*)
Goods and Non-consulting services	>=$3,000,000	ICB	All ICB contracts
	<$3,000,000	NCB (**)	First NCB contract during each annual procurement plan agreed with the Bank
	<$100,000	Shopping	None
	N/A	Direct Contracting	Justifications for all DC contract shall be provided in the Procurement Plan for prior review
Works	>=$20,000,000	ICB	All ICB contracts
	<$20,000,000	NCB	For the first-year procurement plan, the first NCB contract in each first-year province. For each subsequent annual procurement plan would be the first and the largest NCB contracts of new provinces (***).
	<$200,000	Shopping	First shopping contract
	N/A	Direct Contracting	Justification for all DC contracts shall be provided in the Procurement Plan for prior review
Consulting Services (****)	>$500,000	QCBS: preferred method	Firms: All contracts >= $ 500,000 for firms; first contract for each method regardless of value; all SSS contracts? Individuals: TORs and budget estimates; all SSS contracts The same threshold applies for Audit contracts (*****)
	>=$300,000	QCBS, QBS, FBS, LCS	
	<$300,000	CQS	
	N/A	SSS	
	N/A	IC	

Acronyms:

ICB – International Competitive Bidding
NCB – National Competitive Bidding
DC – Direct Contracting
QCBS – Quality and Cost Based Selection
QBS – Quality Based Selection
LCS – Least Cost Selection
CQS – Selection Based on Consultants' Qualification
SSS – Single (or Sole) Source Selection
IC – Individual Consultant selection procedure
FBS – Fixed Budget Selection

Notes:

* Contracts below these Prior Review thresholds shall be subject to Post Review on an annual basis. The rate of post review will be initially 20 percent. This rate may be adjusted during project implementation based on the procurement performance.
**Where goods are not normally available within Vietnam, the method of procurement will be ICB even if the contract value is less than US$3 million/contract.
***Determination of number of NCB works contracts to be prior reviewed following risk-based approach.
***The NCB procedures shall be those set forth in Vietnam's procurement laws and regulations, but subject to modifications, waivers, and exceptions as set forth in the "NCB Annex" to the Financing Agreement.
**** Shortlists for contracts below US$0.5 million/contract may comprise entirely national consultants.
***** For Audit contracts below the prior review threshold, the TTL may require to prior review TOR, shortlist, TER, draft contract, etc. from a technical perspective.

Environmental and Social (including safeguards)

45. **Scope of the Project Activities:** The project has been assigned environment Category A due to anticipated scope and nature of project activities. The project includes rehabilitation of a large number of dams of different sizes across 34 Provinces intended to improve the safety of the dams and related works, as well as the safety of people and socio-economic infrastructure of the downstream communities as defined in Decree 72 - governing the management of dam safety in Vietnam. The decree adopts the international convention in defining dams based on height and volume. Specifically, the Decree defines the following: (i) large dams from 15m high or with reservoir capacity of three million cubic meters or more; (ii) medium dams from 10m to 15m high or dams with reservoir capacity from one to three million cubic meters; and (iii) small dams from 5m to 10m high or dams with reservoir capacity between 50,000 and one million cubic meters.

46. The project will be supporting the physical rehabilitation of existing dams which are deteriorated over times due to low technical specifications and construction quality control during their development. The works are expected to be carried out in situ on existing infrastructure to secure operations in accordance with international dam safety standards and avoid potential downstream impacts on populations and infrastructure. The rehabilitation would include reshaping of the main and auxiliary dams, slope stabilization by either concrete slab or in-situ or stone paving, strengthening or expansion of existing spillway to increase the discharge capacity, refurbishment of existing intake structure, replacement of mechanical and electrical system of the intake and spillway, grouting for seepage control and improvement of the existing access management roads connecting to the main dam. The rehabilitation measures are not expected to have any significant adverse environment and social impacts, and it is anticipated that there will be limited land acquisition and physical relocation.

47. The proposed project is not intended to support significant structural modifications or expansions beyond what is needed to ensure safety. The rehabilitation will be limited to reshaping of the main and auxiliary dams, slope stabilization by either concrete slab or in-situ or stone paving, strengthening or expansion of existing spillways to increase the discharge capacity, refurbishment of existing intake structures, replacement of mechanical and electrical systems of intakes and spillways, grouting for seepage control and improvement of existing access management roads. However, the feasibility study indicates some dams may require an increase in height and or storage capacity to improve dam safety perspective. The project will support the increase of height and/or associated increase in storage capacity of a dam or a reservoir only after assessing the supporting evidence to demonstrate the improved safety benefits.

48. **Applicable Safeguards Category and Policies.** The project is classified as a Category A project considering the potential environmental risks during implementation and the complexity related to a large number of subprojects to be implemented in a widespread area. Eight of the World Bank's safeguard policies have been triggered to ensure that the project design and implementation will be focused on reducing adverse impacts and enhancing positive impacts. The policies are: (i) OP/BP 4.01 - Environmental Assessment; (ii) OP/BP 4.04 - Natural Habitats; (iii) OP/BP 4.09 – Pest Management; (iv) OP/BP 4.10 Indigenous Peoples; (v) OP/BP 4.11 - Physical Cultural Resources; (vi) OP/BP 4.12 Involuntary Resettlement; (vii) OP/BP 4.37

- Safety of Dams; and (viii) OP/BP 7.50 - Projects on International Waterways. In addition to the compliance of the World Bank safeguard policies, the project will also fulfill all Vietnamese environmental legislations.

49. **Approach to Address Environmental Safeguard Issues.** The proposed project will be financed by the World Bank and the Government Socialist Republic of Vietnam. The Environment and Social Impact Assessment (ESIA) of the subprojects will require fulfilling the policies and legislative requirement of the World Bank and the Government. Since the subprojects to be funded under the projects will be identified during the implementation phase, the project has adopted a framework approach. The ESMF will be complemented by the Dam Safety Framework (DSF), the Resettlement Policy Framework (RPF) and the Ethnic Minorities Policy Frameworks (EMPF). The relevant Environmental, Health and Safety Guidelines of the World Bank Group will also be applicable to the project.

50. The PPMUs will engage local consulting firms to carry out the necessary environmental and social assessments in accordance with the approved Framework documents. All safeguards documents required, such as RAPs and EMDPs, will be prepared as applicable and submitted to the CPMU for review and quality assurance. The Project Implementation Consultant appointed by the CPMU will provide Technical Assistance to assist the PPMUs in ensuring quality of any instruments before submitting them to the Bank for review and clearance prior to any works being undertaken.

51. The ESMF has been prepared based on: (i) reviewing the environmental and social policy requirement of the World Bank and the requirement of the national legislation; (ii) environmental and social impact assessment of 12 subprojects of the first year; (iii) experience of similar kind of the World Bank supported project implementation; (iv) stakeholders consultations during project preparation; and (v) identification of the institutional barriers and capacity building needs for environmental management. The ESMF will be the guiding document for subproject-specific: (i) activities description, influence areas and collecting baseline information; (ii) alternative analysis of the proposed activities; (iii) environmental and social screening and impact assessment; (iv) consultation and disclosure; (v) preparation of environmental and social management plan (ESMP) with budgeting; (vi) review and clearance of screening, assessment and management plan; (vii) implementation and supervision of ESMP; (viii) grievance redress mechanism; and (ix) reporting and quality control, etc. In addition the ESMF provides potential impacts and general mitigation measures including the bidding specifications for contractors' responsibility for environmental management.

52. Most of the environmental and social impacts are linked to the Component 1 (dam safety rehabilitation). The ESMF has been designed mainly to address this impact. However, the ESMF will also be applicable to Component-2 (dam safety management and planning). The improvements in hydrological network and information systems and establishment of hydro-meteorological stations within the catchment will go through the screening process, which will determine the appropriate instrument for further assessment and management.

53. The ESIA of the first year 12 subprojects have been carried out before the ESMF preparation. The screening of these subprojects has been carried out using the similar screening formats suggested in the Vietnam In-country Technical Guidance Note: Environmental and Social Management Framework Toolkit for World Bank-Financed Projects in Vietnam. Based on

the findings of the 12 subprojects ESIA, a simplified screening tool has been adopted in the ESIA.

54. The implementation approach followed for the first year subprojects and subprojects to be implemented from second year are almost identical. The provincial level Environment and Social (E&S) consultant prepared the ESIAs, which were reviewed by CPMU. From the second year subprojects, these documents will be reviewed by the Environment and Social experts of the Project Implementation Consultant (E&S PIC). In addition to the provincial supervision and monitoring of safeguards, the E&S PIC will monitor the implementation of mitigation and monitoring plans for each of the identified subprojects at least once in each quarter. They will also prepare their own regular monitoring reports 15 days after the end of the quarter or semester. It will include the key steps, outputs and results of the environmental management actions taken for all investments throughout the project cycle. The E&S PIC will review and comment on the regular provincial progress reports.

55. **Environment and Social Screening and Impact Assessment.** Key steps in subproject preparation during project implementation are safeguard screening and impact assessment. The safeguard screening includes two steps, eligibility screening and technical screening for assessment of potential impacts, policies triggered and instruments to be prepared. The technical screening needs to be carried out all the major components of the subprojects. A subproject that falls under one of the ineligibility criteria will not be eligible for project financing. The principle of avoidance usually applies for subprojects that can create significant loss or damage to nationally important physical cultural resources, critical natural habitats, and critical natural forests. Such subprojects would not likely be eligible for financing under the project.

56. The scope of the ESIAs will depend on the screening results. The full scale ESIA will be carried out for all category 'A' subproject. Category 'B' subproject will require limited ESIA or ESMP and category 'C' subproject will not require any further assessment. Data collection, field survey, and consultation with local communities and affected population will be carried out. ESIA will examine the subproject level potential negative and positive environmental impacts. The ESMF provides standard guidelines for carrying out Subproject ESIA.

57. ESIA includes the Environmental and Social Management Plan (ESMP) of the subproject. The bid specification- general construction management and contractors' responsibility will be included in the bidding document. In addition, the winning contractor/bidder will prepare Contractor Environment and Occupational Health and Safety Plan (CEOHSP) taking into consideration of the subproject ESMP, the bidding document requirements and explain the construction schedule, material, equipment and manpower requirement and plan for mitigating site specific issues. Dam Safety Report includes Dam Safety Plan (DSP) will also be prepared for each subproject and Ethnic Minorities Development Plan (EMDP) and Resettlement Action Plan (RAP) will be prepared, where applicable.

58. The project activities are not expected to have large scale, significant and/or irreversible impacts since physical interventions are focused on in situ rehabilitation of existing dams. The majority of the spillways are also free flow structures. The rehabilitation and safety improvement activities will not result in reservoir capacity increase and accordingly, no pristine or natural habitat area will be inundated. In general, hydrological regime and ecosystems are not expected to be significantly changed due to project related activities. However, ESIA of each subproject will assess the impact on aquatic ecosystems and downstream users of dam.

59. Most of the environmental impacts are associated with the construction work and these impacts are mostly local and temporary. The interruption of irrigation water for downstream users can be minimized by carefully scheduling construction works on fallow periods and constructing cofferdams around the structures to be repaired in the dam. If these impacts cannot be avoided, the issues will be typically addressed in the RAP.

60. Another important impact would come from medium scale earthmoving activities. The risk of increased sedimentation is always present. However, these impacts can be managed by standard construction practice and mitigation measures. Further to that, most of these dams have existing burrow pits and landfill sites that were carefully sited for minimal impacts in terms of runoff erosion and sedimentation.

61. The rests of the construction related impacts are generation of dusts, possible degradation of the temporary construction sites due to litters, construction spoils, oil and grease, fuel spillages, occupational health & safety and sanitation at campsites and other construction areas. These impacts will occur at the construction sites and routes which will be under the control of the Contractor. This will be managed through the Contractor's Environmental and Occupational Health and Safety Plan (CEOHSP), good housekeeping at the sites and compliance with occupational health and safety standards.

62. Another impact would be the potential damage of construction traffic to the existing infrastructure. Some subprojects will be factored in this impact and included in the proposed works repair of the construction routes. At any rate, construction routes will be identified and the ESMP requires all contractors to undertake repairs of the construction routes during construction.

63. Since the constructional activities at dams will not be known a priori, there is a possibility that due to excavation work property of historical, cultural, or religious importance may be found. In such case, a 'chance find procedure' will be followed, i.e., specific steps will be followed by the contractor and the implementing agency to secure the found property.

64. Since most of these works are located in the upstream, mountainous areas where ethnic minority peoples live, a social assessment (SA) will be carried out as per Bank's OP 4.10 (Indigenous Peoples) for each of the sub-projects. The purpose of the SA is two-fold: 1) assess the potential impact (positive and negative) of the project on the downstream population, and 2) explore opportunities to improve existing institutional arrangements among relevant stakeholders to improve operation/coordination of the existing dams/reservoirs, O&M, operational capacity building for dam/reservoir operational units and local communities to minimize the risk and potential impact of flooding. As a cross-cutting issue, gender analysis will be an integral part of the social assessment to ensure the project is gender informed.

65. Based on the Social Assessment, the project will aim to 1) confirm whether there is a broad support from affected ethnic minority communities for project implementation, and 2) prepare an Ethnic Minority Policy Framework (EMPF). The SA will also explore if there are opportunities for ethnic minorities to receive socioeconomic benefits from the project in a way that is culturally appropriate to them. The EMPF will provide guidelines for the preparation of Ethnic Minority Development Plans (EMDP) for site specific subprojects. For subproject(s) that will be identified at project preparation and to be implemented in the first year of the project, where applicable, EMDP(s) for identified subprojects will be prepared prior to project appraisal.

66. The sub-projects may require land acquisition (permanently and temporarily) to allow the rehabilitation/upgrading of the select dams/reservoirs. These activities may affect houses, assets, crops, perennial trees, graves, business and livelihood of the households living in the vicinity of the works. However, the magnitude of adverse impact (as a result of land acquisition) is anticipated to be small and site specific given the nature of structural rehabilitation. A Resettlement Policy Framework (RPF) has been developed to guide how a Resettlement Action Plan (RAP) for a sub-project would be prepared. The RPF will specify steps that need to be taken for the preparation, review, and clearance of subproject RAPs which will be prepared during project implementation. For subprojects to be implemented in the first year that involve land acquisition, subproject RAPs have been prepared and reviewed.

No.	Name of Subprojects	Land Acquisition (m2)			Total Number of Affected										
		Temporary	Permanent	Residential	Households	Persons	Households by land acquisition	Persons by land acquisition	Resettled households	Resettled persons	Ethnic Minority Households	Ethnic Minority Persons	Households by water availability during construction		Graves
													HHs / Ppl	Crops (m2)	
1	Ngoi La 2	2,000	21,100	495	12	51	12	51	01	04	0	0	0	0	0
2	Ban	11,000	15,000	0	15	78	15	78	0	0	0	0	0	0	0
3	Dai Thang	4,438	15,935	500	257	933	12	45	01	04	0	0	244 / 888	571,297	0
4	Khe Che	4,000	0	0	01		0		0	0	0	0	0	0	0
5	Dong Be	10,815	0	0	13	78	13	78	0	0	0	0	0	0	0
6	Khe Gang	10,000	5,000	0	01	04	01	04	0	0	0	0	0	0	0
7	Khe San	10,000	10,315	215	03	05	01	05	01	04	0	0	0	0	0
8	Phu Vinh	0	23,155	0	27	130	27	130	0	0	0	0	0	0	0
9	Dap Lang	39,875	12,500	0	284	1,251	23	119	0	0	0	0	266 / 1,132	431,920	0
10	Thach Ban	0	41,969	0	357	1,233	02	07	0	0	0	0	355 / 1,226	747,765	0
11	Song Quao	0	164,332	2332	18	77	18	77	10	39	0	0	0	0	0
12	Da Teh	10,000	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	102,128	309,201	3,542	985	3,840	124	594	13	51	0	0	865 / 3,246	1,750,982	0

67. The project may require acquisition of land (both permanently and temporarily) to allow rehabilitation of the existing dam/reservoirs. The social assessments carried out for the 12 first year projects show that the potential negative social impacts include largely temporary disruptions to local livelihoods, due to interruptions in the availability of water, with only limited resettlement. Of the 985 households identified as potentially affected under the 12 sub-projects, 865 are due to interruptions in water availability, with 103 households being impacted by acquisition of about 31 hectare of mostly agricultural land and only 13 of these households (51 people) subject to possible physical relocation. Of those 41 people potentially subject to relocation, all but two individuals are associated with the Song Quao Dam. Given that the rehabilitation includes civil works, provisions will also be included for chance find procedures for physical and cultural heritage. In terms of temporary impact, 10.2 hectare of land would be temporarily acquired. Farming activities of about 865 households would be temporarily affected (for one season) due to water cuts for dam repair.

68. Ethnic minorities are found in a number of the provinces proposed under the project. The social assessments included free, prior, and informed consultations with potentially affected peoples to confirm if there is broad support from ethnic minorities. The screening was carried out in accordance with OP 4.10 and vis-à-vis the scope and coverage of the social and environmental assessment. None of the 12 first year sub-projects will result in land acquisition from ethnic minority households. However, some 223 ethnic minority households in Hoa Binh Province will be temporarily affected by the availability of water during construction. A RAP and EMDP have been prepared to address those temporary impact identified, as well as to support the affected ethnic minority households with development opportunities.

69. A gender analysis was also carried within the context of the 12 first year subprojects with the purpose of analyzing gender-related constraints at household and community level and exploring opportunities for promoting gender equality and enhancing the project's development effectiveness. The analysis informed the development an action and monitoring plan to promote gender equality and enhance the project's development effectiveness. A gender analysis will be carried out as part of the social assessments for subprojects identified during project implementation to inform the design of specific gender action and monitoring plans.

70. For all subprojects, the design process will include a screening of possible historical and or legacy issues associated with past resettlement and propose interventions if deemed necessary. The screening will first confirm if there was any resettlement associated with original construction, and if so, the year in which this was carried out. The second step in the screening process is to determine the scope of the due diligence review required. If the resettlement process is deemed to have been completed less than two years before the World Bank involvement, the PPMU will be required to conduct a due diligence review. The due diligence review would focus on the following: (a) Reviewing of outstanding complaints, if they exist; (ii) checking whether an effective grievance redress mechanism has been in place; and (iii) determination if affected people, especially vulnerable ones, were able to restore the livelihoods. If significant issues/gaps are found, recommendations and actions will be proposed to the project-responsible line agency to remedy the situation. If any resettlement process have been completed within the past two to five years, the PPMU will be required to conduct a due diligence review to determine whether there are outstanding issues and/or reputational risks. If such issues are identified, recommendations will be proposed for the PPMUs and relevant government agencies to take action to remedy the situation. This may include addressing outstanding complaints or failure to

restore income and livelihoods. If the resettlement process has been completed more than five years prior to the project, the PPMU will be required to confirm whether there are no pending issues and or reputational risks for the project.

71. **Borrower's Capacity on Environmental and Social Safeguards.** MARD has reasonable experience in implementing the environmental management framework of the World Bank funded projects. A Central Project Management Unit (CPMU) has been established by MARD with responsibility for implementation of the project in accordance with the framework documents for determining the eligibility, prioritization and readiness of the sub-project investments, as well as compliance with the safeguards framework, and the sub-project assessments.

72. A National Dam Safety Review Panel and an International Dam Safety Panel would be established under the project to provide independent review and guidance to MARD and the Provincial authorities during implementation.

73. **ESIA Preparation, Review, Disclosure and Approval:** The Provincial/Regional E&S Consulting Firm will be responsible for environmental and social screening and preparation of the ESIA following the guidelines mentioned in the ESMF. Consultation is the essential part of the ESIA preparation. Once the Draft Final sub-project ESIAs has been submitted by the Provincial/Regional E&S Firm, the report will be first reviewed by PPMU with field cross-checking. The PPMU will then submit the Draft Final ESIA to the CPMU for further review and clearance to proceed. On behalf of the CPMU, the International E&S Firm will review the screening report, ESIA and relevant plans in detail. The International E&S firm will check the relevant information, impact assessment and robustness of the mitigation and monitoring plan. Field verification will be required in the process. Based on the recommendation of the International E&S Consultant, CPMU will notify the PPMU for processing the government clearance. During the review process, both PPMU and CPMU can ask further detailed information and analysis and the report needs to be updated. ESIAs including other relevant plans of subproject prepared during project implementation will be disclosed locally before approval of these subprojects. These documents will be posted in the official website MARD and Provincial level and hardcopies will be available at PPMU and project site in Vietnamese. A notification will be published about the disclosure and comments will be sought within one month of the disclosure date. The English and Vietnamese version of the ESIA have been disclosed in the VDIC of the World Bank office in Hanoi and English version subproject has been disclosed in the Infoshop of the World Bank.

74. The PPMUs will submit the final ESIA Report to the Provincial People's Committee (PPC). Considering the nature of the subproject, the Provincial People's Committee (PPC) shall assess and approve ESIA reports. PPC shall arrange to verify the report on environmental social impact assessment in respect of investment projects within their territories. The assessment of ESIA report shall be conducted by the EIA report assessment council established by the Heads of the EIA report assessment authority. Deadlines for assessment of ESIA report is within 30 working days from the date on which the satisfactory application is received. PPMU will have to comply requests specified in the approval of their report on EIA. For any change, the project-responsible line agency must send their explanation to PPC.

75. The World Bank will review the ESIAs of all category 'A' subprojects and also the ESIA of first subproject (irrespective of category) of each province. However, this process will be

reviewed from time to time and once the capacity has been built with the support of the E&S consultant, the World Bank will randomly review some ESIAs.

76. **Bid Document and Contractor's Plan:** After the approval of the ESIA, PPMU is responsible to ensure that ESMP and environmental mitigations have been included in the Bidding Document. The cost for the environmental and social management needs to be allocated for the subproject contract. PPMU will confirm the bidding document has been properly included the environmental mitigation measures and adequate budget has been allocated. The winning contractor/bidder will prepare Contractor Environment and Occupational Health and Safety Plan (CEOHSP) taking into consideration of the subproject ESMP, the bidding document requirements and explain the construction schedule, material, equipment and manpower requirement and plan for mitigating site specific issues. This plan will be reviewed by E&S consultant firm both at Provincial level and Central level. The plan will be approved by PPMU with the recommendation by Central level E&S firm.

77. **Implementation, Supervision and Monitoring:** The contractor is responsible for implementation of ESMP and CEOHSP of the subproject. The Environmental, Health and Safety Manager (EHSM) will play the key role in managing the environmental and social management of the subproject. The contractor will have to follow all environmental mitigation and management measures as defined in the technical specification, ESMP and CEOHSP. The contractor has to ensure that a comprehensive Health and Safety Program in place for the workers and also nearby community during the construction period. Prior to monsoon season during construction, the contractor will ensure that all temporary or permanent drainages are free from construction related debris.

78. The contractor will self-monitor the mitigation measures and prepare monthly report for submission to PPMU. The provincial E&S consultant will review the monthly report. Both Provincial E&S consultant and PPMU will review the regular implementation of the mitigation and monitoring plan. In addition, the provincial E&S consultant will prepare the quarterly monitoring report and provide recommendation to further strengthen the implementation of the mitigation and monitoring plan. Non-compliance by contractor will be reported by E&S consultant and PPMU will impose penalty for any noncompliance of agreed action plan. PPMU will submit a quarterly safeguard progress report of implementation of mitigation and monitoring plan in the province to CPMU within 10 days after end of quarter.

79. The International E&S firm will monitor the implementation of mitigation and monitoring plan of each subproject at least once in each quarter. They will also prepare their on monitoring report 15 days after end of quarter. It will include the key steps, outputs and results of the environmental management actions taken for all investments throughout the project cycle. The International E&S firm will review and comment on the provincial quarterly progress report.

80. **Completion Certificate and Reporting:** PPMU will have to notify PPC and the rehabilitated dam will be commenced only after PPC (approval authority of EIA) has inspected and certified the completion of environmental protection works. PPMU will prepare a completion report for environmental protection work and within 15 days of receiving the report, PPC must examine and issue the certificate of completion of environmental work.

81. The PPC shall send a report on assessment and approval for EIA report, registration and inspection of specific environment protection plans, inspection and approval for environment protection works in the province of the previous year to the Ministry of Natural Resources and Environment before every January 15. MARD shall send reports on assessment and approval for EIA report, inspection and approval for environment protection works of the previous year related to project under their management to the Ministry of Natural Resources and Environment before every January 15.

82. **Monitoring during Operation Phase:** PPMU and the Provincial E&S firm will continue to continue to monitor the operation and carryout the parameter testing as agreed in the Monitoring Plan for the first year of operation. After first year, PPMU will continue to monitoring by own officials. PMU will also periodically monitor the operation phase issues. According to the Decree on Environmental Protection Planning, Strategic Environmental Assessment, Environmental Impact Assessment and Environmental Protection Plans (No. 18/2015/ND-CP) dated February 14, 2015, the inspection of environment protection works serving the operation phase of the subproject shall be carried out by an Inspectorate which is established by the Head of PPC (Ref. Article 17 of Decree). Based on the field visit, the International E&S firm will prepare a six-month report on safeguard for subprojects under implementation phase. CPMU will review the report and send to the World Bank before the implementation support mission.

83. The implementation of the RAPs and EMDPs will be the responsibilities of the respective PPMUs. The costs for land acquisition will be financed by the Government whereas the budget for EMDP implementation will be financed from the Bank's fund under the project. During project implementation, provincial PMUs obtain technical support from the CPMU who is responsible for providing guidance and technical support to the PPMUs in implementation of RAP and EMDP. The provincial government will finance all costs related to land acquisition and livelihood restoration of affected households. A social specialist will be appointed at CPMU (central level) and at PPMU (provincial level) to provide support to RAP and EMDP implementation. CPMU will ensure social safeguards implementation and monitoring are in accordance with the project's RPF. An independent monitoring agency will also be hired by the project to carry out periodic monitoring to ensure social safeguards implementation under the project is in full compliance with the project's RPF. Both RPF and EMPF specify a grievance redress mechanism.

84. **Consultation and Disclosure.** The ESMF and all of the safeguard instruments have been prepared in consultation with the key stakeholders. During preparation stage, a consultation was held with the relevant stakeholders. Rehabilitation and safety of the dams have been identified as one of the key development priorities. None of the participant noted any significant, long-term impacts from the proposed project activities. Most of the impacts they identified are local and temporary. Preparation has been benefited with the consultations held at field level for the preparation of the 12 subprojects. Extension consultations were held locally with the relevant stakeholders. The findings of 12 ESIAs are reflected in the respective ESIA. The draft ESMF and the twelve (12) subproject ESIAs with Vietnamese version has been disclosed in Vietnamese at the Vietnam Development Information Center in Hanoi, as well as through the MARD website on May 29, 2015 and the Bank's Infoshop on May 29, 2015 for public comments. The hard copies of the document have also been made available in provincial level DARD offices.

Summary of disclosure of Safeguards Instruments

		Height (m)	Storage (MCM)	Dam Safety Report	ESIA & ESMP	Social Assessment	Resettlement Action Plan	Ethnic Minority Development Plan
	Framework			X	12/11 June		X	X
	Executive Summary				29/28 May			
	Consultation & Comm. Strategy							
	Public Health Intervention Plan							
1	Thạch Bàn	11.0	0.70	X	28 May	28 May	28 May	
2	Hồ Ban	11.0	1.20	X	X	X	X	
3	Khe Giang	12.5	2.15	X	28 May	28 May	28 May	
4	Khe Che	12.5	12.00	X	28 May	28 May	28 May	27 June
5	Đập Làng	13.3	0.50	X	X	X	X	
6	Đại Thắng	14.5	0.48	X	02 June	02 June	02 June	27 June
7	Khe Sân	15.0	1.42	X	X	X	X	
8	Ngòi Là 2	15.0	3.2	X	28 May	28 May	28 May	
9	Đồng Bể	17.0	2.54	X	29 May	29 May	29 May	27 June
10	Phú Vinh	20.0	19.16	X	29/30 May	29/30 May	29/30 May	
11	Đạ Tẻh	27.3	24.00	X	29 May	29 May	29 May	27 June
12	Sông Quao	40.0	73.00	X	28 May	28 May	28 May	28 May

Note: Disclosure dates reflect in country date / InfoShop date

85. **Grievance Redress Service.** Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the World Bank Group's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS),

please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

86. **Dam Safety.** The project will finance rehabilitation and improvement of existing dams including large dams (15 meters or more in height). Thus, an independent dam safety panel is required to (a) inspect and evaluate the safety status of the existing dam, its appurtenances, and its performance history; (b) review and evaluate the owner's procedures for operations and maintenance; and (c) provide written report of findings and recommendations for any remedial work or safety-related measures necessary to upgrade the existing dam to an acceptable standard of safety. Policy and practice relating to dam safety needs to meet international benchmarks, such as those laid out by ICOLD and the World Bank regulatory frameworks for dam safety. These measures are designed into the project, which includes the establishment of a national dam safety review panel.

87. **Projects on International Waterways.** There are six transboundary river basins in the country; however Vietnam is an upstream riparian only in the Sesan-Srepok basin – a tributary of the Mekong, upstream of Cambodia, and the Bang Giang-Ky Cung basin, upstream of China. It is expected that some of the dams will be located on international river basins and therefore the policy is triggered. However, the project will not finance any new dam construction and is focused on the rehabilitation of existing dams and their associated structures, along with improved safety measures. These activities are not intended to exceed the original schemes, change their nature, or so alter or expand the scope and extent as to make them appear as new or different schemes. As such, the interventions identified under the project are not expected to have an adverse effect on the quality or quantity of water flows to other riparian states and neither will the project be appreciably harmed by the other riparians' possible water use. An exception to the riparian notification requirement in OP/BP 7.50 was therefore processed.

88. **Capacity Building, Training and Technical Assistance.** The ESMF focused on technical capacity in the human resource base of implementing institutions as well as logistical facilitation. Implementers need to understand inherent social and environmental issues and values and be able to clearly identify indicators of these. Even with existence of policies and laws such as the Law on Environment Protection 2015 evidence on the ground still indicates that there is significant shortcoming in the abilities of local and district level stakeholders to correctly monitor, mitigate and manage environmental performance of development projects. Sufficient understanding of the mechanisms for implementing the ESMF will need to be provided to the various stakeholders implementing subprojects under the project. This will be important to support the teams appreciate their role in providing supervision, monitoring and evaluation including environmental reporting on the projects activities. One of the major task of the International E&S consultant is to conduct series of the capacity building training for the different stakeholders.

Monitoring & Evaluation

89. Data collection regarding the indicators in the results framework (Annex 1) would be carried out by the PPMUs and complied by CPMU. The Provinces will submit information on project progress to the CPMU on a quarterly basis, including (a) progress of dams rehabilitation works, (b) introduction and use of operational rules, safety plans, and communication procedures for individual dams and cascades of dams; and (c) consultation with intended beneficiaries,

dissemination of information and level of public awareness. To estimate the total number of beneficiaries the CPMU will provide information on the dam break analysis and the area of influence and the provincial authorities will collect data on households and infrastructure within the area of influence.

90. The CPMU will compile all information from the provinces and will monitor progress on regulation and policy changes, preparation of Basin-wide operation plan and emergency preparedness and response plans. The CPMU will assess the compiled data, including the risk indices before and after rehabilitation, and report to the HLWG.

91. The current capacity of the above-mentioned entities is adequate to complete these monitoring and evaluation roles. During the first six months of the implementation the CPMU will develop a simple database for monitoring indicators for Components 1 and 2.

Role of Partners

92. Given the importance of dam safety within the national context there are a number of active programs being supported by a range of development partners (DPs).There are a number of initiatives to support Government's efforts to implement the Dam Safety Program. A number of informal arrangements have been established during preparation of the project to ensure alignment. These build on experiences in a number of related fields, including disaster risk management with an increasing shift toward the river basin management approach and, specifically, integration of reservoir/dam infrastructure. Specific collaboration has been initiated with the Asian Development Bank (ADB), New Zealand and Japan (JICA) to align implementation of support to the national dam safety program. This collaboration mode have helped improve the project design by incorporating good practices and lessons among the DPs and gradually formalizing a consistent approach toward the risk-based framework approach as a common framework. It is envisaged that the project would help formalize a framework for implementation which could then easily be scaled up in a coordinated manner amongst development partners.

ANNEX 4: IMPLEMENTATION SUPPORT PLAN

VIETNAM: Dam Rehabilitation and Safety Improvement Project

Strategy and Approach for Implementation Support

1. The strategy for support to implementation has been developed based on the nature of the project and its risk profile and will require resources in excess of the regional norms for implementation support. The Systematic Operations Risk Rating Tool (SORT) rates the overall implementation risk High. The profile of the project is informed by the large number of participating provinces, the complexity associated with parallel works in a number of large, medium and small dams and the downstream implications in the case of failure. This is coupled with the development of sector policies and institutional capacity for enhanced implementation, and the implications of key Government policies pertaining to sustainability.

2. The World Bank's Water Resources Sector Strategy published in 2004 outlined "Strategic Directions for World Bank Engagement" associated with these types of complex, high-risk high-reward water related projects. The Strategy acknowledged these should be treated as "corporate projects" and recommended a fine tuning of institutional arrangements to ensure accountability and resources with the following key elements:

- *Accountability.* Regional vice presidents and country directors will be accountable for these projects. From an early stage these projects will be brought to the attention of senior management, who in support of the regions, will participate in decisions on whether the World Bank will engage and how risks will be managed.
- *Improved implementation of safeguards.* Good preparation, including adequate attention to environmental and social issues, involves higher short-term costs, but lower long-run costs. For these projects there will be an agreed-on corporate strategy for ensuring that the objectives of the safeguard and other operational policies are respected, while focusing attention and resources on safeguards that are material in particular circumstances.
- *Communication.* An essential element will be the development of a unified communication strategy for addressing head-on in an open manner the concerns of different stakeholders, including critics.
- *Resources.* While there will not be an automatic provision of special corporate resources to such projects, management will continue to use a common-sense approach to such projects, providing additional resources on a case-by-case basis as the need arises during preparation and implementation.
- *Incentives for front-line staff.* Central to this approach is the necessity to reduce transactions costs and to change the incentives facing front-line staff. Task managers leading risky projects will not be left on their own, but will have consistent support from regional and corporate management and will get recognition for this difficult and vital work.

3. Reflecting this complexity, and the broad nature of the framework, the project has triggered a large number of operational policies requiring certain level of due diligence. The framework approach means that this due diligence is not only front loaded during preparation but

also confers obligations during implementation to ensure compliance with the agreed framework and that the individual sub-projects to comply with the operational policies and laws of Vietnam. This is further complicated by the large number of documents that will require review and the language constraints. As such, the Implementation Support Plan proposes a risk based, prioritization approach to differentiate the level of effort required.

Implementation Support Plan

4. During the first 18 months of the project implementation, Implementation Support Missions will be fielded by the World Bank every three to four months. This will include short follow-up missions in order to proactively provide support to the MARD Project Management Unit (CPMU), MoIT, MoNRE and the Provincial PMUs. These would focus on technical guidance and monitoring the quality of implementation. These missions would also provide fiduciary oversight to facilitate project implementation and efficient use of financial resources. A specific focus of implementation support from appraisal to effectiveness will be toward procurement of the quality and cost based procurements for the engineering, environmental, social and third party consultancies that will be crucial to re-enforcing Government's capacity.

5. Implementation Support Missions will work with the CPMU, PPMUs and the National Dam Safety Panel on technical issues associated with integration and implementation of the framework, such as prioritization, compliance with the ESMF, safety measures during rehabilitation, risk indices before and after rehabilitation and so on. Environmental and social safeguards will also be followed up to ensure the design and implementation of dam rehabilitation and community consultations take Bank safeguard polices into account as they are developed.

6. Timely review and clearance of safeguard instruments during implementation will require specific attention and efforts. The Regional Safeguards Team has advised that all documentation for large dam category will need to be submitted to the World Bank for review while the small dam category could be submitted based on sampling basis. The Environmental and Social Management Framework provides a screening process to identify the required level of review and clearance. This differentiated, risk based approach is intended to help establish a clear, transparent mechanism to facilitate timely implementation. Given the large number of documents to be reviewed, at least one environmental and one social safeguards specialist fluent in Vietnamese will need to be available in Hanoi. This will be critical to support the CPMU and the PPMUs in the initial review of safeguards instruments prepared by local consultants.

7. At least one international environmental and one international social safeguard specialist will need to be assigned to the team with sufficient resources to provide review and guidance to the country based staff during the initial review and then to review and clearance of the final draft instruments. The Regional safeguards Advisor will be responsible for review and clearance of safeguard instruments for all large dams (those greater than 15m in height). An annual safeguards compliance report would also be proposed in the Project Operations Manual to inform an annual review. This could be based on the bi-annual reports of the Independent Supervision Consultant, or Third Party Monitor.

8. After the first 18 months Implementation Support Missions would be completed every six months. However, a just-in-time approach will be support with additional missions fielded throughout the project implementation period. These would be on demand from the Client or in

response to the identification of specific issues, informed by the number and risk profile of the dams being rehabilitated.

9. In parallel, fiduciary and safeguards training courses would be carried out during the earliest implementation period for the PPMUs to ensure full understanding of the governing guidelines and operational policies. The Bank will also review and confirm that adequate qualified staff and consultants are in place for project management, safeguards management and technical aspects.

10. In order to provide timely implementation support through missions and on-demand guidance, the majority of the Bank task team, particularly fiduciary and safeguards staff, will need to continue to be based in the region. The table below indicates the level of effort required annually that will be needed from the Bank to provide implementation support for the project.

Time	Focus	Skills Needed	Resource Estimate	Partner Role
First 18 months	Setting up effective supervision and quality control systems Procurement of project implementation consultant to provide engineering, environmental and social technical assistance Appointment of the Panel of Experts Procurement of the Independent Supervision Consultant, or 3rd Party Monitor	Institutional, Fiduciary, Dam Safety, Locally based safeguards specialists, supporting international safeguard specialists Early warning and risk management		
18-48 months	Dam rehabilitation – quality control and risk management	Institutional, Safeguards, Fiduciary, Dam rehabilitation		Ongoing discussions on program development
48-60 months	Implementing framework for dam safety program.	Safeguards, Fiduciary, Dam management		Initial interventions to scale up dam safety program
60-66 months				

Skills Mix Required

Skills needed	Number of Staff weeks average / year	Number of trips/year	Comments
Task Team Leader Water Resource Specialist	6	6	Hanoi based
Co-Team Leader Water Resource Specialist	4	4	Field based
Dam Specialist	4	2	HQ based

Disaster Management Specialist	2	2	HQ based
Hydropower Specialist	1	2	Hanoi or HQ based
Watershed management specialist	1		Hanoi based
Economist	1	1	(mid-term review)
Environmental Specialist (Vietnamese speaking)	12	4	Hanoi based
Environmental Specialist	6	2	
Social Specialist (Vietnamese speaking)	12	4	Hanoi based
Social Specialist	6	2	
Hydrologist	2	1	HQ based
Procurement Specialist	8	2	Hanoi based
Financial Management Specialist	4	2	Hanoi based

Partners

Name	**Institution/Country**	**Role**
New Zealand	Bilateral	Complementarity
ADB	Multilateral	Complementarity
JICA	Bilateral	Complementarity

ANNEX 5: ECONOMIC AND FINANCIAL ANALYSIS

VIETNAM: Dam Rehabilitation and Safety Improvement Project

1. An Economic and Financial Analysis (EFA) of the project was undertaken in order to assess the economic soundness of the project and the likely impact of the project on the beneficiaries. Specifically, the economic and financial impacts associated with the project were assessed at two levels: (i) economic impacts of the project from the point of view of society resulting from a reduction in risk of dam failure; (ii) economic and financial impacts of individual sub-projects on downstream communities and institutions involved in operation and maintenance, including gains derived from improved operations.

2. The project has introduced a framework approach that provides a risk-based prioritization process based on eligibility, prioritization and readiness. Within the context of the framework approach there will be an annual review and planning process to identify specific investments on a rolling basis during implementation. A preliminary list of 794 dams deemed eligible was prepared and 450 dams were prioritized for implementation under the IDA financing. This makes it difficult to predict exactly which dams will actually be rehabilitated under the project and to quantify, ex-ante, the benefits for each dam. Therefore, the EFA is based on an analysis of representative dams for the main dam categories and attempts to quantify the main expected benefits mentioned above, taking into account the project costs and project phasing assumptions at the time of appraisal. Furthermore, numerous potential project benefits were not included in the analysis, as some benefits cannot be easily quantified in monetary terms, particularly those relating to the economic and financial costs associated with the loss of human lives, and institutional and environmental benefits.

3. A sensitivity analysis was conducted to assess the impact of changes in main parameters affecting the economic outcome of the project as a result of (a) the main risks that have been identified in the project's risk analysis; (b) changes in project costs; and (c) changes in the expected reduction of probability of failure for the main categories of dams supported. The findings of the EFA are summarized below and the details are provided in the Project File.

4. The EFA will be a key component of the framework to be used during implementation. This will assist MARD in appraising and prioritizing sub-project investments under the project, but also help establish a mechanism to guide implementation of the Government's Dam Safety Program, with investments prioritized based on both technical and economic criteria. Consequently, on the basis of the EFA approach presented below, the project will review and revise the methodology for EFA of sub-projects as an integral part of the feasibility study to be undertaken for each sub-project prior to funding. This will be reflected in the Project Operation Manual.

5. The EFAs to be carried during implementation would include, as appropriate: (i) capacity development in EFA of project staff, service providers, beneficiaries and other relevant stakeholders; (ii) integration of the EFA data generated during overall project and sub-project design, including baseline, in the project's and MARD's M&E systems and the national dam data base; and (iii) allocation of adequate financial and human resources for EFA. The EFA data used for appraisal should be periodically updated as an integral part of the project's M&E system and as an input into the project evaluation at mid-term and completion stages. Specifically, the

mid-term review will review and update the EFA carried out at appraisal to assess progress, review the risk profile and rating for each dam before and after the project intervention and re-assess the economic estimates. This review will also identify whether the intended roll-over impacts have been realized, for example rehabilitation of dams not included in the project using the same approach.

Project Area

6. The project will be implemented in 37 provinces and targets an estimated 450 dams (sub-projects) for rehabilitation[13] serving a total irrigated area of 176,467 ha. The selection of dams to be actually rehabilitated by the project will be subject to an annual review process to assess the dams most at risk and prioritize them in order to address the most critical interventions. Further details are provided in Annex 2.

7. Detailed assessments were carried out for 12 prioritized first-phase investments. The characteristics of these are summarized in Table 1. The 12 first-phase sub-projects were then compared to the portfolio of 450 dams initially proposed to be included for IDA financing under the project in Table 2.

Table 1: Overview of 12 First Phase Investments

No.	Province	Reservoir name	Age	Dam height	Storage capacity	Crest length	Irri-gated area	Estimated cost		Est. cost / ha irrigated area	Down-stream popu-lation at risk	Farm house-holds /a	Risk index
			(years)	(m)	(Mm3)	(m)	(ha)	(VND billion)	(USD '000)	(USD)	(no.)	(no.)	
1	Tuyên Quang	Ngòi Là 2	16	15.3	3.3	160	360.0	35	1,602	4,450	7,880	1,200	50.8
2	Hòa Bình	Đại Thắng	55	16.0	0.6	198	130.0	35	1,602	12,322	3,430	433	69.3
3	Thanh Hoa	Đồng Bể	24	11.0	2.0	734	255.0	50	2,288	8,974	15,770	850	56.4
4	Nghệ An	Khe Gang	24	12.5	2.2	487	175.0	43	1,968	11,246	3,000	583	67.0
5	Nghệ An	Khe Sân	35	14.9	1.4	389	120.0	32	1,465	12,204	2,150	400	70.9
6	Quảng Binh	Phú Vinh	22	20.0	19.2	1,776	1,510.0	100	4,577	3,031	170,000	5,033	73.2
7	Bình Thuận	Sông Quao	27	40.0	73.0	886	8,120.0	180	8,238	1,015	182,500	27,067	69.5
8	Quảng Ngãi	Đập Làng	35	13.3	0.5	130	80.0	30	1,373	17,162	1,820	267	69.6
9	Bình Định	Thạch Bàn	8	11.0	0.7	155	58.0	39	1,785	30,774	1,180	193	66.7
10	Phú Thọ	Ban	43	11.0	1.2	305	150.0	30	1,373	9,153	2,920	500	71.3
11	Lâm Đồng	Đạ Tẻh	22	27.3	24.0	600	2,300.0	83	3,799	1,652	56,350	7,667	58.1
12	Quảng Ninh	Khe Chè	28	20.0	12.0	600	213.0	50	2,288	10,743	4,195	710	67.0
TOTAL							**13,471**	**707**	**32,357**		**451,195**	**44,903**	

a/ Engaged in downstream irrigated agriculture.

[13] Sub-projects have been pre-selected from the list of dams meeting the eligibility criteria and prioritized in an iterative, consultative process with the national authorities and provincial agencies on the basis of the risk index developed for assessing the probability and impact of dam failure (see Annex 2).

Table 2: Characteristics of Portfolio and 12 First Phase Sub-Projects
Number of Dams and Average Dam Cost per Category (USD '000)

	Year 1 Priority Dams (12)			Pre-selected Dams (450) /a		
	No. of dams	% of total	Avg. cost per dam (USD '000)	No. of dams	% of total	Avg. cost per dam (USD '000)
Dam height (m)						
< 10	0	0	NA	193	43	744.9
10 < 15	5	42	1,732	152	34	808.1
15 < 25	5	42	2,552	86	19	1,109.4
25 ≤ 35	1	8	3,852	18	4	1,389.5
> 35	1	8	8,353	1	0.2	8,352.7
Storage capacity (Mm3)						
< 1	3	25	1,609	306	68	747.9
1 < 3	4	33	1,798	105	23	930.7
3 < 10	1	8	1,624	24	5	1,281.9
10 < 20	2	17	3,480	9	2.0	2,000.5
20 ≤ 50	1	8	3,852	3	0.7	2,119.1
> 50	1	8	8,353	3	0.7	4,547.6
Irrigated area (ha)						
< 100	2	17	1,601	264	59	764.8
100 < 200	4	33	1,624	96	21	844.0
200 < 500	3	25	2,088	62	14	1,009.7
500 < 1,000	0	0	0	16	4	1,055.7
1,000 < 2,000	1	8	4,640	6	1.3	2,235.1
2,000 ≤ 5,000	1	8	3,852	4	0.9	1,635.7
> 5,000	1	8	8,353	2	0.4	6,496.5

\a Including 12 priority dams.

Rationale for Public Sector Financing

8. The Government's irrigation policy and waiver of service fees means that rehabilitation of publically financed irrigation dams are reliant on public sector financing. The key value proposition of the support from the World Bank and the use of limited IDA resources is the package of support that is provided. This combines structural and non-structural measures to assist Government in the formulation and execution of a comprehensive program to address the systemic issues associated with dam safety. Coupling the funds required for the physical rehabilitation with the World Bank's global experience will help increase the project's development impact and address the underlying systemic issues in ways that go beyond what can be realized by exclusive reliance on the Government's own resources. The framework provides an objective, risk-based portfolio management tool to help prioritize investment decisions, address those dams at highest risk, and ensure economic efficiency. Introduction of this portfolio framework approach also helps to consolidate the internal arrangements to address the underlying institutional issues required to ensure long-term sustainability and safety.

Project Benefits

9. Project benefits accrue through avoided losses and damages associated with the continued degradation and possibility of dam failure in the absence of the project. Benefits that were quantified in economic terms include: (1) *On farm-benefits* through (a) avoided losses in agricultural production[14] and farm income resulting from dam failure/breaks; (b) increased agricultural productivity and cropping intensity due to improved reliability of water supply; and (c) potential increases in irrigated area due to increased water supply with restoration of the operational water level; and (2) *Additional downstream benefits* through avoided flood damage to houses, industrial/commercial facilities[15] and infrastructure [roads, bridges, irrigation facilities and other public infrastructure] resulting from dam failure[16]. It can also be expected that dam rehabilitation will result in reduced Operation and Maintenance (O&M) costs. However, given the reliance on Government transfers for O&M, the actual change in costs is difficult to estimate and therefore not included in the analysis.

10. The project will also safeguard economic gains and promote economic benefits at *national and provincial level* derived from the establishment of a national framework for dam safety and management, although these benefits were not quantified. Public entities are expected to derive benefits at the central and local levels (e.g. provincial, district and commune levels) through capacity enhancements, resulting in stronger institutions, improved effectiveness and better coordination which will extend the project benefits beyond the initial target areas. Benefits will result from: (i) improved dam safety and reduced downstream risks; (ii) enhanced Government coordination and improved regulatory frameworks; and (iii) efficiency in operations and management through better monitoring and technical coordination, data collection, and early warning systems. In addition, the private sector will benefit from increased opportunities resulting from the investments, and from a strengthened policy and regulatory framework, as well as technical guidance.

11. The following additional benefits can be expected from the project, but are not included in the EFA due to lack of information or difficulty estimating intangible benefits:

(a) Reduced loss of human lives and injuries by potential dam failure is potentially one of the most significant benefits, however it was not been attempted to assign a monetary value to human lives and impact of injuries.

(b) Improved capacity of public entities at the central and local levels is expected to ensure that the project benefits would be extended beyond targeted dams.

(c) Benefits from joint operation could be estimated based on approximate figures for increased reliability of supply for irrigation, increased and more stable production of hydropower and flood mitigation.

[14] Including livestock production and fisheries/aquaculture.

[15] The physical rehabilitation under Component 1 is limited to publically financed irrigation dams and does not directly impact hydropower production.

[16] Dam rehabilitation is also expected to result in better flood protection but these additional benefits are difficult to estimate and have not been included in the analysis.

(d) Support for a regulatory framework for dam safety and capacity enhancement of oversight ministries/agencies will lay the foundations for addressing a broader series of interventions under the Dam Safety Program.

Table 3: Overview of Dam Rehabilitation and Safety Improvement Benefits

Benefits captured in EFA		
	Avoidance of losses due to dam failure	***Benefits from improved water storage and supply capacity***
On farm-benefits	Avoided losses of agricultural production (crop/livestock, fisheries/aquaculture)[17] and farm income.	Improved reliability of supply for irrigation resulting in (a) increased irrigated area; (b) increased agricultural productivity and cropping intensity.
Additional downstream benefits	Avoided flood damage to (a) houses; (b) irrigation facilities; (c) public infrastructures [e.g. roads, bridges, railway lines, electricity/ telecommunication facilities; (d) industrial/commercial facilities[18].	

Additional benefits from the project not included in EFA	
Benefit	***Remarks***
Reduced loss of **human lives** and injuries.	Potentially one of the most significant benefits, however it was not attempted to assign a monetary value to human lives and impact of injuries.
Reduction in costs of **Operation and Maintenance (O&M)**.	Given the prevailing under-funding of O&M for most dams which is a main factor contributing to the poor state of the dams, the actual reduction in costs of O&M is difficult to estimate
Improved **capacity** of public entities at the central and local levels.	Resulting in enhanced efficiency in operations and management through better monitoring and technical, improved coordination, data collection and early warning systems. The national framework for dam safety and management will lay the foundations for addressing a broader series of interventions under the National Dam Safety Program.
Enhanced Government **coordination** and improved **regulatory frameworks.**	
Benefits from **joint operation.**	Resulting in increased reliability of supply for irrigation, increased firm production of hydropower and flood mitigation.

Economic Analysis

12. The economic analysis attempts to quantify the benefits described in paragraph 9 on the basis of an estimation of the reduction in the average Probability of Failure (POF) for the set of dams likely to be rehabilitated under the project. It takes into account the expected phasing of interventions and total project costs. For the purpose of the analysis, the 450 dams expected to be rehabilitated by the project were grouped by dam height into five main categories[19] and a model was developed for each category. In addition, the Dầu Tiếng reservoir in Tây Ninh Province was

[17] Potential forestry losses have not been captured in the analysis due to lack of data.
[18] Including value of production lost. In the case of hydropower dams which are currently not included in the list of proposed dams, the expected benefits in terms of avoided reduction in hydropower generation and damages to hydropower structures would be estimated.
[19] < 10m; 10<15m; 15<25m; 25≤ 35m; >35m.

presented as a separate model as it accounts for around half of the total downstream population, irrigated area, and farm households under the project benefit assessment and is managed directly by MARD. Table 4 shows the distribution of the 450 dams by height category.

Table 4: Overview of 450 Pre-selected Dams by Dam Height Category

	Dam height (m)					Total
	< 10	**10<15**	**15<25**	**25≤35**	**>35**	
No. of dams	193	152	86	18	1	450
% of total	43%	34%	19%	4%	0.2%	100%
Total cost (USD million)	143,758.7	122,830.6	95,406.0	25,011.6	8,352.7	395,359.6
(VND billion)	3,098.0	2,647.0	2,056.0	539.0	180.0	8,520.0
% of total	36%	31%	24%	6%	2%	100%
Avg. cost per dam (USD '000)	744.9	808.1	1,109.4	1,389.5	8,352.7	878.6
(VND billion)	16.1	17.4	23.9	29.9	180.0	18.9

13. **Probability of Dam Failure.** The project approach is based on a risk index, which provides an indication and relative ranking, but cannot be considered a direct measure of risk nor the probability of failure. The probability of failure is a complex interplay between a range of variables and so difficult to estimate for any given dam in the absence of complex modeling and detailed analyses. However, global estimates suggest that a comprehensive program like DRaSIP can reduce the POF by at least one order of magnitude from the existing conditions. The present POF for the "without project" scenario (doing nothing) was estimated on the basis of available information of past dam failures in Vietnam[20]. Given the difficulties with estimating the POF, sensitivity analyses were carried out for different scenarios (see below).

14. **Benefits.** The quantification of benefits is based on the detailed EFAs carried out for the 12 first phase sub-projects which was also applied to the six models mentioned in paragraph 12. The following methodology was used:

15. **On farm-benefits.** *Crop production:* The cropping area and pattern of the downstream irrigated area was established for all seasons and crop budgets for individual crops in the different seasons were calculated per ha. The net income from the total cropped area in the main season (summer-autumn) was subsequently calculated. For each dam model it was assumed that a dam failure would affect a certain percentage of the irrigated crop area in this season and the following four seasons and the resulting loss of the value of output on that area was calculated. Applying the different POFs for the "With Project" (WP) and "Without Project" (WOP) scenarios yields the potential value of agricultural production losses avoided. In addition, the potential impact of improved reliability of water supply for irrigation was estimated in terms of (a) increased irrigated area/cropping intensity; and (b) increased agricultural productivity per ha of cropped land and cropping intensity. In this regard, detailed crop budgets for the WP and WOP scenarios were prepared (see EFA Appendix in Project File).

16. *Livestock production and fisheries/aquaculture:* The total value of livestock and annual

[20] In the past seven years there have been an estimated 34 dam failures resulting in devastating regional flooding, significant loss of human life, and substantial economic losses. Details are provided in the Project File.

output from fisheries/aquaculture in the downstream area at risk was estimated. For each dam model it was assumed that a certain percentage of livestock and of fisheries/aquaculture production would be affected by a dam failure, and the resulting loss of the total value of livestock and total value of annual output from fisheries/aquaculture was calculated (see EFA Appendix in Project File).

17. **Additional downstream benefits.** The existing structures in the downstream area at risk were identified (houses, roads, bridges, irrigation facilities and other public infrastructure, as well as industrial/commercial facilities) and their replacement value estimated. For each dam model it was assumed that a certain percentage of the structures would be affected by a dam failure, and the resulting damages were estimated (see EFA Appendix in Project File).

18. **Phasing of investment over six-year project implementation period.** For the EFA of the project as well as for the Project Development Objective level indicator targets, the following assumptions were made about the total number of dams supported under each dam category and the phasing.

Table 5: Assumed Phasing of Investments for Economic and Financial Analysis

Dam height	Project Year					
(m)	1	2	3	4	5	6
	No. of dams started rehabilitation – new					
< 10	0	71	48	45	29	0
10<15	6	53	37	34	22	0
15<25	4	30	21	19	12	0
25 ≤ 35	1	6	5	4	2	0
>35	1	0	0	0	0	0
Total	12	160	111	102	65	
	No. of dams completed rehabilitation – new					
< 10		0	71	48	45	29
10<15		6	53	37	34	22
15<25		4	30	21	19	12
25 ≤ 35		1	6	5	4	2
>35		1	0	0	0	0
Total		12	160	111	102	65
	No. of dams completed rehabilitation - cumulative					
< 10		0	71	119	164	193
10<15		6	59	96	130	152
15<25		4	34	55	74	86
25 ≤ 35		1	7	12	16	18
>35		1	1	1	1	1
Total		12	172	283	385	450

19. **Economic costs and assumptions.** The analysis was based on total project costs excluding estimated taxes as these represent transfer payments and are therefore not economic costs. It was carried out for a 25-year period, which is the estimated project life including the six-year project implementation period. The analysis is based on 2015 constant prices, and a discount rate (i.e. opportunity cost of capital) of 12 percent was assumed. The Vietnamese Dong (VND) was used

as the unit of account and the official exchange rate of VND21,850 to US$1 (June 2015) was applied when converting to US$. The economic benefits were quantified as described in paragraphs 15 – 17, using current (June 2015) prices.

20. **Economic viability and sensitivity analysis.** The Economic Internal Rate of Return (EIRR) of the overall project for the base case is 33.0 percent, with a net Present Value (NPV) of USD 1,001 million (VND 21,579 billion), discounted at 12 percent. A sensitivity analysis was conducted to assess the impact of changes in main parameters affecting the economic outcome of the project due to (a) the main risks that have been identified in the project's risk analysis – mainly resulting in delays in implementation and increases in costs; (b) changes in project costs; and (c) changes in the expected reduction of probability of failure for the main categories of dams supported. The sensitivity analysis for the 12 priority investments for different scenarios of reduction in POF is presented in Table 6 below. Table 7 presents the Economic Rate of Return for different POF scenarios for the six categories of dams which are used as a basis calculating the overall economic analysis of the project.

Table 6: Economic Analysis of 12 First phase Sub-Projects

No.	Province	Reservoir Name	Dam height	Irrigated area	Estimated cost		Economic Rate of Return /a					
			(m)	(ha)	(VND billion)	(USD '000)	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
1	Tuyên Quang	Ngòi Là 2	15.3	360.0	35	1,624	11.4%	19.5%	25.4%	10.3%	17.9%	23.3%
2	Hòa Bình	Đại Thắng	16.0	130.0	35	1,624	13.9%	22.7%	29.2%	12.7%	21.0%	27.2%
3	Thanh Hoa	Đồng Bể	11.0	255.0	50	2,320	12.2%	19.4%	24.9%	11.2%	18.0%	23.2%
4	Nghệ An	Khe Gang	12.5	175.0	43	1,995	12.0%	18.1%	22.8%	11.1%	16.9%	21.3%
5	Nghệ An	Khe Sân	14.9	120.0	32	1,485	11.5%	17.8%	22.7%	10.7%	16.6%	21.2%
6	Quảng Binh	Phú Vinh	20.0	1,510.0	100	4,640	13.1%	21.8%	28.4%	11.8%	20.1%	26.4%
7	Bình Thuận	Sông Quao	40.0	8,120.0	180	8,353	29.9%	36.8%	42.7%	29.1%	35.4%	40.9%
8	Quảng Ngãi	Đập Làng	13.3	80.0	30	1,392	10.9%	15.5%	19.0%	10.3%	14.6%	17.9%
9	Bình Định	Thạch Bàn	11.0	58.0	39	1,810	11.9%	18.7%	23.9%	10.9%	17.4%	22.2%
10	Phú Thọ	Ban	11.0	150.0	30	1,392	17.8%	18.3%	18.8%	17.8%	18.2%	18.6%
11	Lâm Đồng	Đạ Tẻh	27.3	2,300.0	83	3,852	12.2%	15.5%	18.1%	11.8%	14.8%	17.3%
12	Quảng Ninh	Khe Chè	20.0	213.0	50	2,320	15.9%	25.5%	32.8%	14.6%	23.6%	30.5%

\a Scenarios:	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
POF WOP after 25 years	25%	50%	75%	25%	50%	75%
POF WP (% of POF WOP)	10%	10%	10%	20%	20%	20%

POF = Probability of Dam Failure; WOP = Without Project; WP = With Project.

Table 7: Economic Analysis of Representative Dams for Main Dam Categories

No.	Province	Name	Dam Height	Economic Rate of Return /a					
				Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
1	Ha Tinh	Khe Nhay	< 10 m	13.4%	22.0%	28.4%	12.2%	20.4%	26.4%
2	Thanh Hoa	Đồng Bể	10<15 m	12.2%	19.4%	24.9%	11.2%	18.0%	23.2%
3	Hòa Bình	Đại Thắng	15<25 m	13.9%	22.7%	29.2%	12.7%	21.0%	27.2%
4	Lâm Đồng	Đạ Tẻh	25 ≤ 35m	12.2%	15.5%	18.1%	11.8%	14.8%	17.3%
5	Bình Thuận	Sông Quao	>35m	29.9%	36.8%	42.7%	29.1%	35.4%	40.9%
6	Tay Ninh	Dầu Tiếng	MARD (28m)/b	55.5%	87.8%	114.8%	51.4%	81.2%	106.2%

\a See definition of scenarios under Table 5.

\b \a Represent around half of all 450 dams in terms of total downstream population at risk, irrigated area and farm households.

21. Table 8 provides a breakdown of the estimated economic benefits included in the analysis for each main dam category. While a large variation of the composition of benefits can be observed across dam categories, it should be noted that the figures are based on the representative dams analyzed. As the dams to be rehabilitated under each category will vary widely, e.g. in terms of irrigated area, land use and infrastructures downstream, an aggregation of economic benefits by dam category can only be indicative. However, overall, it can be assumed that benefits from avoided infrastructure damages represent the largest share of economic project benefits (around 63% in the present analysis) while avoided crop production losses and increased agricultural production together account for almost 22% of total economic benefits (around 11% each). Estimated benefits from avoided livestock losses account for around 14% of total benefits while avoided fisheries/aquaculture losses account for less than 2% of total benefits.

Table 8: Estimated distribution of economic benefits by main dam category

Dam category /a	No. of population affected downstream /b	% of total	Number of farm house-holds /b	% of total	Benefits (Scenario A) /c				
					Avoided Economic losses				Increased agric. production
					Crop production	Livestock	Fishery / aqua-culture	Infra-structure damages	
< 10 m	369,995	9.0	53,769	9.2	4.0%	21.3%	0.4%	74.3%	0.0%
10<15 m	464,025	11.3	60,753	10.3	6.9%	4.5%	0.4%	76.2%	12.0%
15<25 m	675,470	16.4	77,526	13.2	5.6%	41.7%	2.5%	50.1%	0.0%
25 ≤ 35m	417,130	10.2	57,013	9.7	13.5%	6.9%	0.8%	19.2%	59.6%
>35m	182,500	4.4	27,067	4.6	18.2%	5.0%	18.2%	17.1%	41.6%
Dầu Tiếng (MARD)	2,000,000	48.7	311,300	53.0	76.4%	1.5%	0.1%	22.1%	0.0%
Total /d	**4,109,120**	**100.0**	**587,428**	**100.0**	**10.6%**	**14.3%**	**1.4%**	**62.8%**	**10.9%**

\a Based on representative dams presented in Table 7.
\b Population and no. of farm households based on list of 450 dams.
\c Percent of total benefits - only benefits included in EFA (see Table 3). Scenario A: see Footnote Table 10.
\d Total share of benefits based on 450 dams and distribution by dam category.

22. Table 9 presents the main risks that have been identified and may affect the economic outcome of the project. A sensitivity analysis was conducted to assess the potential impact of these risks resulting in (a) reduced benefits; (b) increased costs; and/or (c) delayed benefits (see Table 10). The analysis suggests that the economic viability of the project is robust and the EIRR remains well above 12 percent for all scenarios. Considering that many potential project benefits as described above have not been quantified in economic terms (e.g. reduced losses of human lives, related economic benefits at national and provincial level, and institutional and environmental benefits), the project has a strong justification on economic grounds.

Table 9: Overview of Main Risks affecting Project Economic Outcomes

Risk category	Main risks affecting economic outcomes /a	Rating	Potential impact reflected in sensitivity analysis		
			Reduced benefits	Increased costs	Delayed benefits
Political and Governance	Inefficiencies and increased costs due to fraudulent procurement practices.	Moderate		X	X
Macro-economic	Macro-economic policy, external or domestic shocks (negligible).	Moderate	X	X	X
Sector Strategies and Policies	Established system for prioritization not yet in place and therefore selection of priority dams for rehabilitation could be influenced by political factors.	Substantial	X		
Technical Design	Distribution of dams across the country, and various sizes and structural types, making the logistics for supervision and quality control more difficult.	Substantial		X	X
Institutional Capacity for Implementation and Sustainability	Significant coordination risk between the MARD/MONRE/ MOIT and their provincial offices. Potential risks include a lack of clear accountability in project implementation, fiduciary risks (see below) and technical difficulties in coordination (see above).	Substantial		X	X
Fiduciary	(i) Suboptimal use of funds (e.g., abuse of the operation costs, inefficient procurement arrangement). (ii) Errors or financial misstatements at the implementing agencies might not be detected in a timely manner for corrective actions. (iii) Delay in the procurement process; including specifically delays or failure to complete the ICB process with quality documents and proper evaluation.	Substantial		X	X
Environmental	Risks of major floods during dam rehabilitation may increase the risk of failure (the impacts of which could potentially include injury and loss of life in addition to damage to infrastructure and agriculture downstream)	Substantial	X	X	X

\a See PAD Annex 2, Systematic Operations Risk Rating Tool (SORT) for further details including additional risks and risk mitigation measures included in project design.

Table 10: Economic Rate of Return and Sensitivity Analysis

Scenario /a			EIRR
Base Case (POF Scenario A)			**33.0%**
Changes			
Project Costs	**Incremental Benefits**	**Benefits delayed by**	
+20%	POF Scenario A		29.5%
+40%			26.8%
Base Case	POF Scenario B		41.5%
	POF Scenario C		30.9%
+20%	POF Scenario B		37.1%
+40%			33.8%
Base Case	POF Scenario A	1 year	28.2%
		2 years	24.7%
		3 years	22.1%
	POF Scenario B	1 year	34.6%
		2 years	30.0%
		3 years	26.5%
Switching Values /b			
Costs	335%		
Benefits	77%		

\a Probability of failure (POF) for various scenarios:

	Scenario A	Scenario B	Scenario C
POF WOP after 25 years	50%	75%	50%
POF WP (% of POF WOP)	10%	10%	20%

WOP = Without Project; WP = With Project

\b Switching value: percent change in cost and/or benefit streams to obtain an EIRR of 12 percent, i.e., economic viability threshold.

Financial Analysis

A financial analysis was carried out for the 12 priority dams on the basis of financial prices and the quantification of benefits as described above with a focus on (a) the financial sustainability of the proposed investments in dam safety; and (b) the impact on farm households engaged in irrigated agriculture downstream. The analysis takes into account the information from the Public Expenditure Review of the sector and the detailed information on O&M costs over the last five years for each of the 12 dams. The analysis clearly shows for all 12 dams that: (i) the financial benefits from dam rehabilitation are sufficient to cover incremental costs of O&M[21]; and (ii) farmers are generating sufficient income to be able to contribute to irrigation service fees which would cover a part of the dam O&M costs[22] once the dams have been rehabilitated. The financial analysis provides an input into the sub-project specific O&M plans for sustainable

[21] It is expected that dam rehabilitation will actually result in a reduction in O&M costs. However, given the Government's policy relating to irrigation service fees and the project interventions, the actual funding for O&M may increase (which is reflected in the model).

[22] As Government abolished irrigation service fees in 2008 through Decree 115, O&M of irrigation dams rely mainly on Government budget transfers.

O&M. It will thereby allow to assess the feasibility of giving financial responsibility for O&M of different types of dams to water users/farmers. (See details in EFA Appendix in the Project File).

ANNEX 6: MAPS

VIETNAM: Dam Rehabilitation and Safety Improvement Project