Environmental Assessment Report

Initial Environmental Examination
Project Number: 40282
September 2006

VIE: Calamity Damage Rehabilitation Project

CALAMITY DAMAGE REHABILITATION PROJECT
INITIAL ENVIRONMENTAL EXAMINATION

A. Introduction

1. The proposed Calamity Damage Rehabilitation Project (the project) aims to support the Government's rehabilitation of infrastructure that was damaged by the 2005 series of typhoons and floods. The affected areas encompass parts of Ha Giang, Ha Tinh, Nam Dinh, Nghe An, Phu Tho, Phu Yen, Quang Binh, Quang Tri, Thanh Hoa, and Yen Bai provinces. The project will (i) reinstate essential infrastructure, including roads, flood protection, irrigation systems, and social infrastructure; and (ii) concurrently provide equivalent or enhanced storm and flood protection to vulnerable areas where feasible. The project will use a sector-like approach in preparing subprojects for implementation. Subprojects will be selected from among those inspected during the damage and needs assessment mission (March-April 2006), at which time 105 subprojects were considered suitable on the basis of rapid visual inspection.[1] A list of 39 priority subprojects has been agreed.

B. Description of the Project

2. The project responds to the Government's request to ADB for emergency assistance to reinstate infrastructure damaged by the series of typhoons and storms that battered the country between July and December 2005. The damage was not the outcome of a single event but the cumulative impact of successive, intense storms that struck many provinces, some of them repeatedly. The total cost of repairing or reconstructing damaged infrastructure was estimated by Provincial People's Committees (PPCs) and provincial departments of agriculture and rural development to be about $114 million. This is beyond the capacity of the provinces to finance, and there is a strong risk that already poor areas will fall deeper into poverty if the facilities are not restored quickly. The general scope of rehabilitation under the project is shown in Table 1.

Table 1: Project Scope of Work

Component	General Scope of Work
Flood Protection	Rehabilitate damaged sea dikes and flood protection embankments, including rebuilding dikes and embankments and related structures, protecting them against future recurrence of typhoons and floods, and adding protective works.
Irrigation	Rehabilitate and protect damaged irrigation facilities, including reinstating damaged weirs, irrigation and drainage pumping stations, culverts, canals, drains, river banks, reservoirs, bridges, and access roads.
Roads and Bridges	Rehabilitate and protect damaged district and commune roads and bridges, including restoring and protecting road embankments, replacing damaged pavements, resurfacing roads, and reinstating drainage works.
Social Infrastructure	Rehabilitate and protect damaged schools, water supply systems and markets.

[1] Based on the information provided, these satisfy two critical selection criteria for subprojects: (i) located within the defined impact area and for which the proposed rehabilitation is directly related to typhoon damage in 2005; and (ii) not requiring significant land acquisition or resettlement.

3. The project is categorized as environmental category B for which the environmental assessment procedures for sector loans will apply. This initial environmental examination (IEE) is based on the findings and observations from field visits during the damage and needs assessment mission to representative subprojects. The IEE identifies key environmental issues that will be assessed more closely during the subproject feasibility study and detailed design stages. Final acceptance of subprojects will depend on, among other things, absence of significant negative environmental and social impacts.[2]

4. The project has been prepared as an emergency assistance loan (EAL) to ensure prompt restoration of services to the population. The project does not attempt to address medium- to long-term economic rehabilitation investments or other needs unrelated to the emergency, and the nature and extent of rehabilitation are based on considerations of technical feasibility, cost-effectiveness, financial viability, and sustainability. The works therefore represent least-cost solutions which nevertheless incorporate natural disaster risk reduction measures where necessary and feasible. The scope of each subproject reflects the pre-damage situation and may not include additional features (e.g., road widening, canal lining, expansion of irrigation service area, etc.). However, to prevent a recurrence of the damage caused by the 2005 series of typhoons and storms, subprojects may incorporate higher design standards than the original infrastructure (e.g., higher deck level for bridges).

5. The overall impact of the project is positive. Rehabilitation will improve rural communities' access to basic infrastructure and, in particular, enable rapid resumption of income-earning activities. Rehabilitation will also render subproject areas less vulnerable to natural disasters by enhancing the level of flood protection or improving the resistance of infrastructure to floods, storm surges, waves, and related effects of typhoons and tropical storms. No subprojects will be located within or adjacent to protected areas, and the works are not likely to cause any major changes in the environment. Classification of individual subprojects in terms of environmental acceptability and other screening criteria will be done during implementation. An environmental assessment and review framework (EARF) has been prepared to guide environmental screening of each subproject and preparation of mitigation measures, and environmental management and monitoring arrangements (see para. 38).

C. Description of the Environment

1. Physical Resources

6. **Climate, rainfall, temperature.** Viet Nam has a tropical monsoonal climate with frequent typhoons affecting the northern and central regions. The temperatures are subtropical in the north and tropical monsoon in the central region. In the central region air temperature remains high around the year and the average daily maximum temperature in these areas is greater than 30 degree Celsius (ºC) in every month. The average daily minimum temperature is in the 20-25 ºC range. In the north there is a definite cooler season when colder air from China intrudes. Frost and occasional snow only occur on the highest mountains in the north for a few days a year. However, the temperature variations in the northern region (above latitude 20º north) are significant during the winter season and can have an appreciable effect on crop growth and yields.

[2] Significant environmental impacts are those that would raise the environmental classification of the subproject to category A, requiring the preparation of a full EIA. Similarly, significant social impacts are those that would raise the resettlement or indigenous peoples classification of the subproject to category A, requiring the preparation of a full resettlement plan and/or indigenous peoples development plan. Any such reclassified subproject would be incompatible with expeditious reinstatement of the infrastructure to be rehabilitated under this Project.

7. The seasonal distribution of rainfall is closely related to monsoons. Rainfall intensity can be high, producing both extensive flooding in the deltas of the Red and Mekong river basins and flash floods in mountainous regions and along the central coast. Both the north and central regions experience an annual rainfall of 1,800-2,500 millimeters (mm), distributed unevenly through the year. Approximately 70% of the rainfall occurs during the main wet season from May to September/October.

8. **Topography and flooding.** The northern region is characterized by mountainous or hilly terrain except for the Red River valley and the coastal plain, making this region extremely vulnerable to floods and other natural hazards. Along the central Viet Nam coastal plains the rivers are short and steep. Storms frequently produce flash floods which are a serious hazard for the population concentrated within the alluvial flood plains. This area also suffers from severe droughts. On average, 4–6 typhoons reach Viet Nam each year. They raise sea levels, often by several meters, and cause extensive loss of land through wave-induced erosion. The resultant storm surges extend for considerable distances inland, flooding valuable land with salt water and causing loss of life, damage to infrastructure, and disruption of livelihoods. The sea dikes constructed over most of the exposed length of coastline are themselves vulnerable to damage by wave action. Each year several sections of dike are overtopped or destroyed by wave action during typhoons.

2. Ecological Resources

9. **Rivers and streams*:*** The major rivers, rising in the mountains to the west, flow through hilly terrain into narrow flood and coastal plains. The transition from mountains with steep slopes to narrow flood plains gives fast-flowing rivers that scour flood protection embankments and destroy structures and farmland through erosion and deposition of sediment. The dominant river system in the north is the basin of the 1,149 km-long Red River. Rivers in the central region are relatively short with sharp transitions from steep mountains to flat coastal plains, the average distance from the mountains to the coast being only 70 km. The major system is the Ma River which flows for a part of its length through the Peoples Democratic Republic of Lao before reaching the East China Sea in Thanh Hoa province. During the 2005 series of typhoons and floods, the Ma River and its tributaries experienced serious floods which caused deaths and injuries in the local population. Associated land slides and coastal erosion caused substantial damage to houses, agricultural land, aquaculture ponds, and key infrastructure.

10. **Natural resources, flora and fauna:** Different types of vegetation exist throughout the north and the central region, including typical mixed stands in the rain forests containing a wide variety of pines, broadleaf trees, vines, and bamboos. Dense mangroves bordering the distributaries of the deltas often hinder access to the water's edge. The tropical rain forests are inhabited by large mammals such as elephants, deer, bears, tigers, and leopards. Smaller animals, including monkeys, hares, squirrels, and otters are found throughout the country. Reptiles such as crocodiles, snakes, and lizards, as well as many species of birds, are also indigenous. Viet Nam's long coast has many mangrove forests with high biodiversity such as Giao Thuy and Nghia Hung (Nam Dinh province).

11. Viet Nam has a number of national parks in the north and central region which protect a wide range of rare species of flora and fauna, such as and Pu Mat and Phong Nha national parks (Quang Binh). The northern region aslo contains valuable minerals, including iron, anthracite coal, phosphate, zinc, chromite, tin, and apatite.

3. Socioeconomic Conditions

12. **Typhoons and Storms in 2005.** The 2005 northwest Pacific season featured 24 tropical storms, 16 typhoons, and 9 intense typhoons. The following major typhoons and tropical storms caused 109 deaths in Viet Nam: typhoon Washi (28–31 July); tropical storm Vincent (16–18 September); typhoon Damrey (27–29 September); typhoon Kaitak (28 October–2 November); and tropical storm 25 W (20–22 December). Typhoon Damrey was the strongest typhoon to hit Viet Nam in 10 years.

13. The 2005 series of typhoons and storms was the most damaging since 1996 due to the cumulative effects of several high intensity events hitting a broad area repeatedly over a short period. The estimated damages for 2005 were 5,800 billion Vietnamese dong ($365 million). The major damage is shown in Table 2.

Table 2: Cumulative Impact of Floods in 2005

Nature of Impact	Number Affected
Human lives	397 persons killed or missing
Houses, schools and health centers:	
- destroyed houses	7,100
- flooded houses	210,500
- flooded classrooms	5,000
- damaged health care centers	250
Agricultural production:	
- rice crops destroyed	497,000 ha
- fish ponds destroyed	54,000 ha
- shrimp stock lost	3,500 tons
Boats lost/destroyed	382
Road embankments	3,223,000 m^3 of earthfill removed
Bridges destroyed	200

Source: Central Committee for Flood and Storm Control.

14. Disaster preparedness was efficient with the central government and local authorities taking responding with early warnings, dike protection, measure to improve the safety of fishing and other boats before the typhoon, and evacuation of people in high risk areas. Their quick response in each event resulted in relatively few human losses.

15. **Poverty.** In general, the project provinces (except Nam Dinh and Phu Yen) have high percentages of poor. High levels of poverty in the central region and northwest provinces are associated with low levels of economic development and insufficient local revenue to finance rehabilitation or reconstruction of damaged infrastructure.

16. These provinces experience high birth rates. In all provinces visited the average household size is 8–9 people with 4–9 children per family. The inability of subsistence agriculture to support the future generations given the limited land per capita remains the biggest challenge to these communities. Infrastructure that improves services, provides product supply chains, and lowers prices through reduced travel time and better market access is an important contributing factor to move people out of poverty.

17. The northwest provinces where subsistence agriculture provides the major source of employment and income are the poorest provinces and have the highest proportion of ethnic minority groups. In the coastal regions, sources of income are fisheries, agriculture, paid employment, salt production, processing of dry seafood, and a number of trades such as carpentry.

18. **Ethnic Minorities.** Within the project provinces, ethnic minority groups account for 90% of the population in Ha Giang and 80% in Yen Bai provinces, but significantly less in the other 8 provinces (Table 3). These groups are over represented in high poverty areas with far greater reliance upon subsistence agriculture for livelihoods. Typically these groups have extremely limited access to development assets and as a consequence have moved onto marginal lands with inappropriate technologies. Progress is being made in reducing poverty and improving social development for ethnic groups, but the rate of progress is generally slower than the national average.

Table 3: Ethnic Minority Groups

Province	Representative Minority Group	% to total Population
Ha Giang	Dao, H'mong, Tay and Nung	90
Yen Bai	H'mong, Dao, Tay, Thia, Nung, San Chay, Phu La	80
Phu Tho	M'nong, Dao, San Diu	30
Nam Dinh	Tay and Hoa	Less than 1
Thanh Hoa	Dao, H'mong, Lao, Lu, Muong, Red Thai, Tahi, Tho	16
Nghe An	H'mong, Kho Mu, O du, Tho, San Diu	15
Ha Tinh	Chut	Less than 1
Quang Binh	Bru-Van Kiu, Chut, Lao	Less than 1
Quang Tri	Van Kieu, Hoa, TA Oi	8
Phu Yen	Cham, Bana, E De	5

19. The ethnic groups and women are over represented in agricultural activities and the selling of firewood, produce, and seasonal vegetables in the markets. With increased migration of men to sources of labor, agriculture is increasingly becoming feminized with the result that female-headed households are becoming more common and are extremely vulnerable to the various hazards caused by floods and storms including loss of water supplies, road access, and services.

D. Screening of Potential Environmental Impacts and Mitigation Measures

20. The main purpose of the project is to ensure rapid resumption of livelihoods in the affected areas by reinstating essential flood-damaged infrastructure (including roads, flood protection, irrigation systems, and social infrastructure) and concurrently providing equivalent or enhanced storm and flood protection to vulnerable areas. The scale of rehabilitation work in each subproject is mostly small (less than $1 million equivalent)[3] and environmental impacts are expected to be mostly minor and easily mitigated. Reinstatement of infrastructure will have many positive social impacts, including employment opportunities for the poor during the period of implementation. As much as possible, the project will rehabilitate or reconstruct facilities at

[3] Four sections of sea dike/flood protection are estimated to cost in the range $3.4–8.5 million each.

their original sites. Hence, there will be little need for land acquisition and no involuntary resettlement. [4]

21. The following sections and the attachment summarize the overall impacts, mitigation measures, and environmental management and monitoring requirements.

1. Impacts related to Design and Location

22. **Protected/Conservation and Archeological Areas.** There are several national parks and protected areas in the project provinces. To avoid impacting such areas, potential subprojects will be screened to exclude any subprojects that (i) are located within or adjacent to designated protected or conservation areas and their buffer zones, (ii) are likely to change the course of a river or alter river characteristics in a significant way, or (iii) have the potential to make significant changes in the surrounding environment, including existing wetlands.

23. The flood-damaged Quynh Di dike in Quynh Luu district, Nghe An province is adjacent to about 45 hectares of secondary mangrove forest planted in 2000 under a Belgian-funded project.[5] The mangroves and dike serve as protection against waves and tidal surges resulting from typhoons and storms. Rehabilitation work will cause some damage to existing mangroves adjacent to the dike, but the impact is expected to be minimal. The detailed design of the subproject will include appropriate mitigation measures (i.e., the planting of an area of mangroves equal at least to the area lost due to rehabilitation work).

24. **Hydrology/Morphology.** Rehabilitation and reconstruction of sea dikes and flood protection embankments along rivers could have morphological impacts on the foreshore and river banks, manifesting itself as beach or river bank erosion and river course changes. The scale of any such impacts will depend on the scale and nature of the works to be undertaken (i.e., repair of damaged section only or reconstruction of the entire structure). During the detailed design phase, analyses will be made of the potential morphological impacts and suitable mitigation measures will be included in the structures to minimize any negative long-term impacts.

2. Impacts during Construction

25. **Dust and Noise.** Dust and noise may be created by construction plant (such as rock and aggregate crushers) or by heavy machinery working within and moving to and from construction sites. Such impacts will be temporary and are not expected to be significant given the small scale of works in most subprojects. On larger subprojects (such as long sections of sea dikes, flood embankments, and roads) or for any subprojects where dust and noise generation could create a local hazard or nuisance, the construction specifications will require contractors to (i) water exposed earth surfaces to limit the generation of dust, (ii) provide covers on spoil heaps to prevent wind-blown soil loss, (iii) reinstate vegetative cover on all bare surfaces upon completion of the works, (iv) locate rock and aggregate crushers (and any potentially hazardous chemicals) at sites remote from habitation, (v) maintain construction plant and their mufflers in good condition, (vi) limit working hours in populated areas, and (vii) enforce

[4] Subprojects requiring significant land acquisition and/or relocation of people are not eligible for funding under the project.

[5] The project was prepared in 1992-1994 and implemented by Oxfam-Belgium. In view of the long period which has elapsed, none of the staff involved in the project are available on site. The Quynh Di estuary is not listed as a designated area in the list of protected/conservation areas maintained by the Ministry of Natural Resources and Environment.

the use of ear protection and dust filtering masks for workers. As much as possible, contractors will be required to avoid routing construction plant through populated areas. In addition, construction traffic will be managed by signals, flagmen, and appropriate signs.

26. **Soil and Land.** The potential negative impacts on soil and land associated with rehabilitation of rural infrastructure include damage to agricultural land, river banks, public spaces, and other nearby areas by (i) passage of construction plant; (ii) temporary storage of construction materials; (iii) disposal of excavated spoil; (iv) establishment of the contractor's camp and working areas for assembly of structural elements (e.g., pre-cast concrete components), aggregate crushing, or servicing of machinery; (v) disposal of liquid and solid wastes; and (vi) removal of earthfill material for use in constructing embankments (i.e., creation of borrow areas). Excavation for borrow materials can also render sites susceptible to landslides and collapse.

27. The main adverse impacts will be associated with sea dike, flood embankment, irrigation canal, and road reconstruction. To minimize the temporary impacts and avoid any long-term degradation of soil and land, construction specifications will require contractors to (i) use public roads for accessing work sites in agreement with local authorities (subject to adequate provision being made for repair of any damage caused by construction plant), and work within the right-of-way of the original structure or within the boundaries of land leased from the owner(s); (ii) store construction materials in designated areas (preferably on hard, impermeable surfaces) for which prior agreements have been negotiated with the land owner(s); (iii) dispose of excess earthfill material in designated areas, reshape any such disposed material in such a way as to avoid subsequent erosion or collapse, and replace topsoil and vegetation on all exposed surfaces if so required by the land owner(s); (iv) establish working areas in designated sites remote from population clusters; (v) establish and maintain in good working order proper means of collecting and disposing of solid and liquid wastes; and (vi) extract all earthfill materials from licensed borrow areas or other environmentally non-sensitive areas, and reshape borrow areas to avoid subsequent erosion or collapse on completion, revegetating exposed surfaces if required by the land owner(s). Contractors will also be required to stabilize the slopes of any road cuttings that would be susceptible to collapse and to provide appropriate drainage. The contractors' performance will be checked regularly and monitored by construction supervisors.

28. **Surface and Groundwater.** Rehabilitation of damaged water supply and drainage systems will improve water quality and reduce health risks. However, during rehabilitation of hydraulic structures and roads along river banks, there may be some negative but short-term impacts on river beds and water quality. Such impacts may result from (i) extraction of construction materials from river beds and banks; (ii) increased soil erosion leading to deposition of sediment in rivers; (iii) inappropriate disposal of spoil, excavated materials, fuel, oil, grease, and other industrial products; and (iv) sewage effluents from work camp. This could affect water quality to the detriment of human settlements and aquatic life. Contractors working in or near rivers will be required to develop detailed construction plans setting out procedures to minimize such impacts. In particular, appropriate waste handling and management procedures will be set in place before approval is given for works to commence.

3. Impacts during Operation

29. The reconstruction and rehabilitation of flood damaged infrastructure will improve the utility and general serviceability of infrastructure. This could lead to increased road traffic or the generation of larger volumes of waste water due to increased use of irrigation and water supplies, but such impacts are expected to be minor. The main environmental issues during the

operation phase are (i) increased erosion and/or deposition of sediments, together with possible morphological changes in rivers and seashore areas, due to the reconstruction of bridges, diversion weirs, and sea dikes; (ii) increased soil erosion in road cuttings and other excavated sites; and (iii) increased use of agricultural chemicals and consequent pollution of groundwater and rivers due to increased intensity of irrigation. Upon completion of rehabilitation work, the respective department of natural resources and environment (DoNRE) will ensure compliance with the environmental management and monitoring plans as part of ongoing environmental monitoring programs (see paras. 40-46).

4. Resettlement Impacts

30. Rehabilitation of flood protection, irrigation, roads and bridges, and social infrastructure will generally be done within the existing right-of-way of the damaged infrastructure. Some small areas of land may need to be acquired where infrastructure cannot be reinstated within the boundaries of the original site. This may occur if the site has been eroded or otherwise rendered unsuitable, an alternative nearby site offers greater security in terms of future flood events, or there are sound technical and financial reasons for selecting another site.[6]

31. The main impacts of rehabilitation will be temporary loss of access to or use of small areas of land adjacent to the works, minor damage to agricultural land or other assets caused by construction works and the movement of construction plant and materials to and from work sites, and permanent occupancy of some areas of land in isolated cases. The involuntary resettlement impacts are deemed not significant and, in accordance with ADB's Policy on Involuntary Resettlement and Operations Manual (OM) F2 on Involuntary Resettlement, the project is classified Category B for resettlement.[7] Significant resettlement impacts are not expected because subprojects requiring significant land acquisition and/or relocation of people are not eligible for funding under the project.

32. Short resettlement plans (RPs) will be prepared for any subprojects found to have resettlement impacts up to the limits of Category B. A resettlement framework has been prepared to guide the preparation of RPs in such cases (Supplementary Appendix A). The framework sets out the policy, procedures, and institutional requirements for preparing RPs during project implementation to comply with the Government's applicable laws and regulations, and ADB's policy and OMF2 (footnote 7). It also describes the procedures to be adopted by the implementing agencies, the provincial departments of agriculture and rural development (DARDs), in the screening of subprojects.

33. Within the project provinces, ethnic minority groups account for 90% of the population in Ha Giang and 80% in Yen Bai provinces (Table 3). Any subprojects in these provinces that involve land acquisition and/or resettlement are highly likely to have impacts on indigenous peoples (IPs). However, the project is unlikely to affect IPs' (i) customary rights of access to or use of land and natural resources; (ii) socioeconomic status; (iii) cultural and communal integrity; (iv) health, education, livelihood, and social security status; or (v) recognition of indigenous knowledge. The types of temporary disturbance or damage that may be caused by

[6] Until such time as the feasibility studies and detailed designs of individual subprojects have been completed, it is not possible to make an accurate assessment on the scale of permanent loss of land or change in land use.

[7] ADB. 1995. Policy on Involuntary Resettlement. Manila, defines resettlement as "significant" where 200 or more people experience major impacts. Major impacts are defined as involving affected people being physically displaced from housing and/or losing 10% or more of their productive, income generating assets. ADB. 2003. Operations Manual (OM) F2 on Involuntary Resettlement. Manila, defines the requirements for resettlement frameworks and full and short resettlement plans.

rehabilitation activities will affect both IPs and the Kinh people in the same ways. A social analysis will be carried out during the detailed design phase to identify any special attention or needs that should be included during implementation.

34. The project is classified category B/C in relation to ADB's Policy on Indigenous Peoples.[8] During implementation, labor will be recruited from among local residents of the subproject as much as possible. Specific indicators will be included as part of the project performance monitoring system to ensure that IPs participate in all phases of subproject selection, preparation, and implementation, and that they will share equitably in project benefits.

E. Environmental Impact Assessment Procedures of Viet Nam

35. Viet Nam's environmental impact assessment (EIA) review procedures are largely guided by four policies:

(i) Article 18 of the Environmental Protection Law (27 December 1993) requires that any individual or organization wanting to implement an investment or development project must conduct an EIA and submit the report to the authorized agency for appraisal to form a legal basis for licensing project implementation.
(ii) Governmental Decree 175/CP (18 October 1994) on Guiding the Implementation of the Environmental Protection Law has specific regulations on the objectives, content (both at preliminary and detailed levels), methods, and requirements of an EIA. It also describes the application dossier for the EIA report appraisal, time-limit for appraising the EIA report, appraisal power and decentralization of appraisal power, and Contents for Category I (full-scale) reports.
(iii) Circular 490/1998/TT-BKHCNMT on Setting Up and Appraising Environmental Impact Assessment Reports clarifies EIA submission and review procedures, identifies the types of projects that require a Category I assessment, and provides a Table of Contents for Category II (limited scale) reports.
(iv) Decree No. 143/2004/ND-CP in regard to the Amendment of Decree 175/CP Article 14 clarifies central and provincial level responsibilities for EIA review.

36. Under Circular 490/1998, the subprojects to be financed under the project are all likely to be classified as Category II. Therefore, a simplified EIA[9] will be required and the respective DoNRE will be the approval agency.

F. Screening of Potential Environmental Impacts and Mitigation Measures

1. Institutional Arrangements

37. The Ministry of Agriculture and Rural Development (MARD) will be the executing agency (EA) for the project. MARD, through the Central Project Management Unit (CPMU) of its Central Project Office, will assure overall planning, coordination, and reporting for the project. The director of CPMU[10] in Hanoi will be the project director. In each of the 10 project provinces, DARD through its provincial project management unit (PPMU) will select, prepare, and implement subprojects. CPMU will liaise with the Provincial People's Committee (PPC) and

[8] ADB. 1998. Policy on Indigenous Peoples. Manila.
[9] A simplified EIA is equivalent to ADB's IEE in terms of required scope of analysis and contents.
[10] CPMU is based on the resources and staff used for the recently completed Rural Infrastructure Sector Project (Loan 1564-VIE[SF]). [ADB. 1997. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Socialist Republic of Viet Nam for the Rural Infrastructure Sector Project*. Manila.]

DARD in each province to coordinate subproject implementation. International consultants will assist the CPMU. Where MARD/DARD are not directly responsible for any particular type of infrastructure, DARD will work closely with the relevant authority (see Table 4).

Table 4: Authority over Infrastructure

Type of Infrastructure	Responsible Agency
Large flood protection works	MARD (CPMU)
Small flood protection works Irrigation and water structures Rural water supply	DARD (PPMU)
Roads and bridges	Provincial Department of Transportation (PPMU)
Urban water supply Schools Market facilities	Provincial Department of Construction (PPMU)

2. Environmental Assessment Process

38. The environmental assessment and review framework (EARF), provided in Supplementary Appendix B, will guide the environmental assessment process led by DARD for each subproject in compliance with the environmental assessment requirements of the Government of Viet Nam and with ADB's environment policy[11] and *Environmental Assessment Guidelines*.[12] A summary of institutional responsibilities is provided in Table 5.

Table 5: Institutional Responsibilities

Stage	Responsibilities of Each Agency	
	DARD (PPMU)	**ADB**
Environmental assessment at the feasibility study and detailed design stages	• Work with environmental specialists to screen subprojects and determine the appropriate environmental classification (eliminate any category A subprojects). • Conduct public consultation and incorporate the concerns of APs in design, implementation, and operation arrangements to the extent possible. • Prepare IEEs for subprojects classified as category B and submit them to ADB. • Incorporate changes in the IEEs to reflect ADB's comments and submit IEEs to DoNRE for approval.	• ADB will only review IEEs/Summary IEEs if so requested by PPMU. This could be occur if there are particular environmental issues for which ADB's assistance is needed.
Preparation of contract documents	• Based on the IEE report ensure that the site specific environmental management plan is faithfully reflected in the contract documents.	• Review first set of contract documents in each province and provide comments if necessary.

[11] ADB. 2002. Environment Policy. Manila.
[12] ADB. 2003. Environment Assessment Guidelines. Manila.

Construction	• Supervise construction and ensure implementation of mitigation measures and environmentally sound construction methods. • Perform environmental monitoring. • In case any unexpected environmental impacts are found, take appropriate remedial actions in consultation with ADB. • Prepare and submit semiannual environmental monitoring reports to CPMU. • Conduct compliance review upon completion.	• Review the implementation of mitigation measures and EMPs. • Review the semiannual reports and provide feedback to CPMU if necessary. • Conduct semiannual review to monitor the effectiveness of safeguard procedures.

3. Environmental Management and Monitoring Plan

39. Table 6 (attached) summarizes the typical environmental impacts associated with rehabilitation, and the corresponding mitigation measures and environmental management plan. This generic environmental management and monitoring plan (EMP) was prepared based on the assessments conducted on site for the selected subprojects visited during the damage and needs assessment mission (March-April 2006). Site specific mitigation measures for each subproject will be formulated during the feasibility study and detailed design stages, and in any case prior to implementation of the subproject.

40. PPMU will supervise local consulting firms to prepare necessary environmental assessment, management, and performance monitoring reports, including IEEs, EMPs, and construction specifications with clearly defined obligations vis-à-vis environmental mitigation measures to be put in place by contractors. These obligations will include (i) preparation of a detailed work site and construction management plan covering borrow and spoil management, health and safety, disposal of solid and liquid wastes, traffic management in accordance with the relevant national and local regulations; (ii) implementation of the IEE mitigation measures in each subproject during the construction period; (iii) reporting on environmental responsibilities described in the contract documents; (iv) participating in compliance monitoring inspections at various stages through to completion; and (viii) providing necessary environmental training to construction staff.

41. During construction, PPMU will report on implementation of the environmental assessment and mitigation measures.[13] CPMU will consolidate the provincial reports for submission to ADB at 6-monthly intervals during project implementation.

42. One international (3 person-months) and one national environment specialist (9 person-months) will be recruited as part of the review consultant team to assist the PPMUs screen potential subprojects for harmful environmental impacts and implement the EMPs.

4. Public Consultation and Information Disclosure

43. The damage and needs assessment mission did not provide for public consultation in relation to the project. Instead, extensive meetings and discussions were held with national and local government officials (including the PPMUs and PPCs) in each of the target provinces, and discussions were held with people's committees at district and commune levels. Interviews were carried out with selected communities on site during the field visits. Table 7 (attached) provides a summary of meetings and interviews carried out on site during the mission.

[13] To streamline the reporting, a single summary IEE (SIEE) may be included in each 6-monthly report to describe all IEEs for the next set of subprojects proposed for implementation.

44. The 2005 series of typhoons and storms caused devastating effects on rural infrastructure and the lives of the affected communities. The people who were interviewed during the field visits described their lost employment and income-earning opportunities, and their concerns relating to health and schooling and possible recurrence of damage in the next typhoon season. Across the spectrum of government officials and local communities there was strong support for rapid rehabilitation of damaged infrastructure as a means of restoring livelihoods and promoting general well-being in the communities.

45. During implementation, PPMU will initiate and lead public consultation as part of environmental screening and social assessments for each selected subproject. This will help identify any subproject-specific impacts for which environmental or social mitigation measures will be required. On the basis of the consultations, PPMU will ensure that the concerns of APs are taken into account in the subproject design arrangement, implementation, monitoring, and operation to the extent possible. All relevant project information, including IEEs, summary IEEs, EMPs, or specific actions prepared under the project will be made freely available to all APs and other interested parties, in both English and Vietnamese, and will be posted on ADB's website following ADB and MARD approval of the related subproject detailed design.[14]

G. Conclusion

46. The project involves rehabilitation and occasionally complete reconstruction of infrastructure that was damaged in the 2005 series of typhoons and storms. There are significant environmental and social benefits associated with the project such as reduced river bank and seashore erosion, reduced health risks, improved evacuation of floods, and reduced waterlogging of agricultural land.

47. The IEE found that there will be no significant adverse environmental impacts associated the proposed works, and the project will not finance any subprojects located in environmentally sensitive areas.[15] Hence, the project is classified overall as environmental category B. Individual subprojects will be assessed at feasibility study/detailed design stage to determine specific environmental categories. The generic mitigation measures described in this IEE will be reinforced by detailed mitigation measures formulated during implementation to minimize site-specific negative environmental impacts. The EARF will provide adequate guidance for PPMUs to screen subprojects, determine the appropriate mitigation measures for any identified negative impacts, and implement environmental management and monitoring during project implementation and beyond. Therefore, there is no need to carry out a full scale EIA.

[14] The relevant requirements for this are set out in ADB's Public Communications Policy (ADB. 2005. *Public Communications Policy: Disclosure and Exchange of Information*. Manila), Operations Manual (OM) (ADB. 2005. OM Section L/3 on public communications. Manila), Handbook on Resettlement (ADB. 1998. *Handbook on Resettlement: A Guide to Good Practice*. Manila), and Policy on Indigenous Peoples (ADB. 1998. *Policy on Indigenous Peoples*. Manila).

[15] According to the Environmental Protection Law (2004) of Viet Nam, environmentally sensitive areas are those areas officially designated as such by the relevant laws and regulations.

Table 6: Summary of Environmental Impacts, Mitigation Measures, and Environmental Management Plan

Project component	Potential Impacts	Proposed Mitigation Measure	Responsible Entity	Monitorable Output	Funding Source
Feasibility Study/Detailed Design Stage					
Flood Protection (sea dikes, flood control embankments, diversion channels, and spillways)	Resettlement • As a general rule, no land acquisition or relocation of houses will be involved. Some small areas of land and some non-land assets may need to be acquired where infrastructure cannot be reinstated within the boundaries of the original site (or "structure footprint").[16] • Temporary loss of access to or use of small areas of land adjacent to the works, minor damage to agricultural land or other assets caused by construction works and the movement of construction plant and materials to and from work sites, and permanent occupancy of some areas of land in isolated cases.	Resettlement • At the feasibility study/detailed design stage, integrated social and environmental assessments (including consultation with APs) will be done for each subproject to determine the need for temporary or permanent acquisition of land or non-land assets. IEEs will be prepared/updated and these will specify mitigation measures and compensation. Short resettlement plans will be prepared if necessary.	DARD/PPMU/national design consultants DARD/PPMU/national design consultants Contractor	Social analysis report incorporating both environmental and social aspects Specifications for environmental management of construction activities Detailed construction management plan to avoid harmful environmental impacts during implementation	Provincial counterpart funds
	Protected areas • No subprojects are located within or adjacent to the designated protected or conservation areas. • The Quynh Di dike subproject in Nghe An province is adjacent to 45 hectares of secondary mangrove forest which is not a	Protected areas • Environmental screening criteria included in the EARF will eliminate subprojects located in environmentally sensitive areas. • Environmental specialists to be recruited under the project will assist CPMU/PPMU to assess subprojects. • Any damaged areas will be	DARD/PPMU/national design consultants International consultants Contractor	Approved list of subprojects Approved contract specifications and EMP Certificate of satisfactory	Provincial counterpart funds Loan-financing for national and international consultants Replanting will

[16] This may occur if the site has been eroded or otherwise rendered unsuitable, an alternative nearby site offers greater security in terms of future flood events, or there are sound technical and financial reasons for selecting another site.

Project component	Potential Impacts	Proposed Mitigation Measure	Responsible Entity	Monitorable Output	Funding Source
	designated conservation area. Some damage may be caused during construction to parts of this forest. Morphology • Morphological impacts on the foreshore and river banks, manifesting itself as beach or river bank erosion and river course changes.	reinstated or compensated by planting an equivalent area of mangroves. Morphology • During the detailed design phase, analyses will be made of the potential morphological impacts and suitable mitigation measures will be included in the structures to minimize any negative long-term impacts.	DARD/PPMU/national design consultants International consultants	completion Approved design of hydraulic works in vulnerable areas	be included as project-financed civil works Corrective measures will be included as project-financed civil works
Road and Bridges	Resettlement • As a general rule, no land acquisition or relocation of houses will be involved. Some small areas of land and some non-land assets may need to be acquired where infrastructure cannot be reinstated within the boundaries of the structure footprint. • Temporary loss of access to or use of small areas of land adjacent to the works, minor damage to agricultural land or other assets caused by construction works and the movement of construction plant and materials to and from work sites, and permanent occupancy of some areas of land in isolated cases. Protected areas or cultural heritage sites • None of the potential road subprojects passes through or close to protected areas or their	Resettlement • At the feasibility study/detailed design stage, integrated social and environmental assessments (including consultation with APs) will be done for each subproject to determine the need for temporary or permanent acquisition of land or non-land assets. IEEs will be prepared/updated and these will specify mitigation measures and compensation. Short resettlement plans will be prepared if necessary. Protected areas or cultural heritage sites • Environmental screening criteria included in the EARF will eliminate subprojects located in	DARD/PPMU/national design consultants DARD/PPMU/national design consultants/ provincial department of transportation (DoT) Contractor DARD/PPMU/national design consultants/ DoT	Social analysis report incorporating both environmental and social aspects Specifications for environmental management of construction activities Detailed construction management plan to avoid harmful environmental impacts during implementation Absence of any subprojects with significant environmental or	Provincial counterpart funds Loan-financing for national and international consultants Corrective measures (including compensation to APs) will be project-financed Land acquisition will be financed from counterpart funds Loan-financing for national and international consultants

Project component	Potential Impacts	Proposed Mitigation Measure	Responsible Entity	Monitorable Output	Funding Source
	buffer zones. • None of the potential road subprojects would require relocation of any culturally or historically important monuments or structures. <u>Soil Erosion</u> • Some road subprojects pass through areas that are prone to land slides and erosion, particularly in mountainous areas. • Some sections of roads have been rendered vulnerable to land slides because of nearby river bank collapse and erosion.	environmentally sensitive areas. • Environmental specialists to be recruited under the project will assist CPMU/PPMU to screen subprojects. <u>Soil erosion</u> • During the detailed design phase, analyses will be made of the potential for land slides and erosion, and suitable mitigation measures will be included in the designs to counter such eventualities. • All road cuttings and embankment fills will incorporate soil and slope stabilization measures as well as adequate drainage provisions. • Implementation plans will avoid construction and major earthworks during the rainy season.	International consultants DARD/PPMU/national design consultants/ DoT International consultants	social impacts Approved list of subprojects Approved design of road works in vulnerable areas Detailed construction management plan to avoid risk of land slides and soil erosion during implementation	Corrective measures will be included as project-financed civil works
Irrigation	<u>Resettlement</u> • As a general rule, no land acquisition or relocation of houses will be involved. Some small areas of land and some non-land assets may need to be acquired where infrastructure cannot be reinstated within the boundaries of the structure footprint. • Temporary loss of access to or use of small areas of land adjacent to the works, minor damage to agricultural land or other assets caused by construction works and the movement of construction plant and materials to and from work	<u>Resettlement</u> • At the feasibility study/detailed design stage, integrated social and environmental assessments (including consultation with APs) will be done for each subproject to determine the need for temporary or permanent acquisition of land or non-land assets. IEEs will be prepared/updated and these will specify mitigation measures and compensation. Short resettlement plans will be prepared if necessary.	DARD/PPMU/national design consultants DARD/PPMU/national design consultants Contractor	Social analysis report incorporating both environmental and social aspects Specifications for environmental management of construction activities Detailed construction management plan to avoid harmful environmental impacts during implementation	Provincial counterpart funds Loan-financing for national and international consultants Corrective measures (including compensation to APs) will be project-financed Land acquisition will be financed from counterpart funds

Project component	Potential Impacts	Proposed Mitigation Measure	Responsible Entity	Monitorable Output	Funding Source
	sites, and permanent occupancy of some areas of land in isolated cases.				
Social Infrastructure (schools, water supply, and markets)	Resettlement • As a general rule, no land acquisition or relocation of houses will be involved. Some small areas of land and some non-land assets may need to be acquired where infrastructure cannot be reinstated within the boundaries of the structure footprint. • Temporary loss of access to or use of small areas of land adjacent to the works, minor damage to agricultural land or other assets caused by construction works and the movement of construction plant and materials to and from work sites, and permanent occupancy of some areas of land in isolated cases. Water quality • Some community and household wells are contaminated and people suffer from water related health problems such as skin and eye irritations, diarrhea, etc.	Resettlement • At the feasibility study/detailed design stage, integrated social and environmental assessments (including consultation with APs) will be done for each subproject to determine the need for temporary or permanent acquisition of land or non-land assets. IEEs will be prepared/updated and these will specify mitigation measures and compensation. Short resettlement plans will be prepared if necessary. Water quality • During the detailed design phase, analyses will be made of water quality in the wells and drinking water supplies to be rehabilitated, and suitable water treatment or alternative sources (e.g., deeper aquifers) will be developed if necessary.	DARD/PPMU/national design consultants DARD/PPMU/national design consultants Provincial department of construction (DoC) Contractor DARD/PPMU/national design consultants DoC	Social analysis report incorporating both environmental and social aspects Specifications for environmental management of construction activities Detailed construction management plan to avoid harmful environmental impacts during implementation Approved designs of wells, water supplies, and water treatment	Provincial counterpart funds Loan-financing for national and international consultants Corrective measures (including compensation to APs) will be project-financed Land acquisition will be financed from counterpart funds Provincial counterpart funds Loan-financing for national and international consultants Corrective measures will be project-financed
During Construction					
All components	Dust and noise • Temporary dust and noise	Dust and noise • Construction specifications will	DARD/PPMU	Approved contract	Provincial

Project component	Potential Impacts	Proposed Mitigation Measure	Responsible Entity	Monitorable Output	Funding Source
	hazards may be created by rock and aggregate crushers or other heavy machinery and construction plant moving in and around construction sites. • On large subprojects generation of dust and noise could create a hazard or nuisance for local communities.	require contractors to (i) water exposed earth surfaces to limit the generation of dust, (ii) provide covers on loose materials when being hauled close to settlements and on spoil heaps to prevent wind-blown soil loss, (iii) reinstate vegetative cover on all bare surfaces upon completion of the works, (iv) locate any potentially hazardous machinery or chemicals at sites remote from habitation, (v) maintain construction plant in good condition, (vi) limit working hours in populated areas, and (vii) enforce the use of ear protection and dust filtering masks for workers. • Contractors will avoid routing construction plant through populated areas, and will manage construction traffic with signals, flagmen, and appropriate signs.	National supervision consultants DoT Contractors	specifications and EMP Reports of DARD/PPMU on environmental management and monitoring Reports of review missions Reports of independent monitoring consultants	counterpart funds Loan-financing for national and international consultants Corrective measures will be project-financed
	<u>Soil and Land</u> • Damage to agricultural land, river banks, public spaces, and other nearby areas by (i) passage of construction plant; (ii) temporary storage of construction materials; (iii) disposal of excavated spoil; (iv) establishment of the contractor's camp and working areas for assembly of structural elements (e.g., pre-cast concrete components), aggregate crushing, or servicing of machinery; (v) disposal of liquid and solid wastes; and (vi) creation of borrow areas. • Excavation can render sites	<u>Soil and Land</u> • Construction specifications will require contractors to (i) use public roads for accessing work sites in agreement with local authorities, work within the right-of-way of the original structure or the boundaries of leased land; (ii) store construction materials in designated areas for which prior agreements have been negotiated; (iii) dispose of excess earthfill material in designated areas, reshape any such disposed material in such a way as to avoid subsequent erosion or collapse, and replace topsoil and vegetation on all exposed surfaces; (iv) establish working areas in designated sites remote from population clusters; (v)	DARD/PPMU National supervision consultants DoT DoC Contractors	Approved contract specifications and EMP Reports of DARD/PPMU on environmental management and monitoring Reports of review missions Reports of independent monitoring	Provincial counterpart funds Loan-financing for national and international consultants Corrective measures will be project-financed

Project component	Potential Impacts	Proposed Mitigation Measure	Responsible Entity	Monitorable Output	Funding Source
	susceptible to landslides and collapse	establish and maintain in good working order proper means of collecting and disposing of solid and liquid wastes; and (vi) extract all earthfill materials from licensed borrow areas or other environmentally non-sensitive areas, and reshape borrow areas to avoid subsequent erosion or collapse on completion, revegetating exposed surfaces. • Contractors will stabilize any exposed slopes that would be susceptible to collapse and will provide appropriate drainage.		consultants	
	Surface and groundwater • Short-term impacts on river beds and water quality from (i) extraction of construction materials from river beds and banks; (ii) increased soil erosion leading to deposition of sediment in rivers; (iii) inappropriate disposal of spoil, excavated materials, fuel, oil, grease, and other industrial products; and (iv) sewage effluents from work camp. • Longer-term impacts on water quality to the detriment of human settlements and aquatic life if contaminating products are buried inappropriately.	Surface and groundwater • Construction specifications will require contractors to (i) develop detailed construction plans setting out procedures to minimize such impacts; (ii) obtain approval from responsible authority for removal of any sand, gravel, and rock materials from river beds, and reinstate borrow areas to prevent erosion or collapse; (iii) establish and maintain in good working order proper means of collecting and disposing of solid and liquid wastes; and (iv) provide proper sanitation in work camps, ensuring that no untreated effluents reach surface or groundwater.	DARD/PPMU National supervision consultants DoT DoC Contractors	Approved contract specifications and EMP Approval for works to commence Reports of DARD/PPMU on environmental management and monitoring Reports of review missions Reports of independent monitoring consultants	Provincial counterpart funds Loan-financing for national and international consultants Corrective measures will be project-financed
	Health and safety • Injury to workers and local residents due to unsafe work practices (e.g., reckless vehicle and plant operation, unprotected handling of	Health and safety • Construction specifications will require contractors to (i) develop detailed work procedures to ensure the safety of workers and others at all times; (ii) store fuel, oil, other	DARD/PPMU National supervision consultants	Approved contract specifications and EMP Approval for works to commence	Provincial counterpart funds Loan-financing for national and

Project component	Potential Impacts	Proposed Mitigation Measure	Responsible Entity	Monitorable Output	Funding Source
	dangerous products, poor ventilation in work places allowing toxic fumes to accumulate, unsafe scaffolding or other temporary works, unprotected excavation and trenches). • Safety hazard to locals and traffic	flammable materials and all dangerous or toxic industrial products securely under lock and key; (iii) develop a traffic management plan and provide road signs, traffic signals, flagmen, and safety barriers to control plant operation and protect passers-by at dangerous sites; (iv) make available and ensure that workers use correct footwear, helmets, and protective clothing (gloves, face masks, ear protection, goggles, dust filters, etc.); (v) adequately ventilate all areas where toxic products are being handled and used; and (vi) provide training and awareness raising for plant operators, drivers, and workers likely to come into contact with toxic or dangerous products.	DoT DoC Contractors	Reports of DARD/PPMU on environmental management and monitoring Reports of review missions Reports of independent monitoring consultants	international consultants Safety equipment and training will be project-financed
<u>During Operation</u>					
All components	<u>River and foreshore morphology</u> • Increased erosion and/or deposition of sediments, together with possible morphological changes in rivers and seashore areas, due to the operation of bridges, diversion weirs, and sea dikes.	<u>River and foreshore morphology</u> • MARD/DARD to monitor the performance of all hydraulic works, weirs, barrages, river training and bank protection works, sea dikes, flood protection embankments and diversions, etc. as part of regular surveillance/maintenance programs.	MARD's Department of Dike Management, Flood and Storm Control (DDMFSC)	Periodic maintenance reports of DDMFSC and DARD	National and provincial regular budget for operation and maintenance (O&M)
	<u>Soil erosion</u> • Increased soil erosion in road cuttings and other excavated sites following rehabilitation of damaged infrastructure.	<u>Soil erosion</u> • Provincial agencies to monitor and correct soil erosion due to or impacting on the structures under their responsibility.	DARD DoT DoC	Periodic maintenance reports of provincial departments	National and provincial regular budget for O&M

Project component	Potential Impacts	Proposed Mitigation Measure	Responsible Entity	Monitorable Output	Funding Source
	Agricultural chemicals • Increased use of agricultural chemicals and consequent pollution of groundwater and rivers due to increased intensity of irrigation.	Agricultural chemicals • DoNRE to ensure compliance with the relevant regulations regarding agricultural chemicals.	DoNRE	Periodic reports of ongoing environmental monitoring programs	Provincial budget sources
	Air quality and noise • Increased dust, emission, and noise due to increased volume of traffic following improvement of roads.	Air quality and noise • No specific measure are proposed because the increase in emission, dust, and noise is not expected to be significant.	DoT		
	Water quality • Generation of larger volumes of waste water due to increased use of irrigation and urban water supplies and consequent pollution of surface and groundwater.	Water quality • No specific measure are proposed because the increase in pollution of surface and groundwater is not expected to be significant.	DoNRE	Periodic reports of ongoing environmental monitoring programs	
	General • Negative environmental impacts could occur if the new infrastructure is not maintained and operated correctly, leading to soil erosion, waterlogging of agricultural land, river bank collapse, loss of structural integrity of sea dikes and flood protection embankments, deterioration of drinking water quality, discharge of untreated effluent, and poor waste management.	General • DoNRE and DARD are to ensure compliance with the environmental management and monitoring plans as part of their ongoing monitoring programs. • Provincial department of health to ensure implementation of mitigation measures in case of any mishap in water supply or effluent treatment.	DoNRE DARD Provincial department of health	Periodic monitoring reports of DoNRE DARD's periodic maintenance reports Periodic reports of provincial department of health	National and provincial regular budget for O&M

Table 7: Summary of Meetings and Interviews Conducted On Site

Date	Provinces Represented	Official Meeting	On-Site Interviews					
		No. of Persons	Subproject	No. of Persons	Gender (M/F)	Age Range	Female Headed	Ethnic Minority
28 March	Yen Bai, Ha Giang, Phu Tho	24						
29 March	Yen Bai	-	Thac Hoa irrigation	3	M (3)	36-54	-	Yes (1)
		-	Hat Liu 2 road	3	M(1)/F(2)	21-60	Yes (1)	Yes (1)
		-	Nghia Lo town reservoir	1	F(1)	43	-	-
30 March	Ha Giang	-	Thuong Binh road	1	M(1)	45	-	-
		-	Thong Nguyen & San Sa Ho road	1	M(1)	23	-	Yes (1)
		-	Ving Quang primary school	1	F(1)	32	-	Yes (1)
31 March	Phu Tho	-	Dam Thi reservoir	3	F (3)	27-49	-	-
		-	Minh Thuan bridge	1	M(1)	56	-	-
4 April	Quang Tri, Nam Dinh, Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, Phu Yen	74						
5 April	Quang Tri	-	Tuong Van dike	1	M(1)	60	-	-
		-	O Vinh Khe road	1	M(1)	18	-	Yes (1)
		-	Quyen River embankment	1	F(1)	37	-	Yes (1)
		-	Huong Vinh bridge spillway	3	M(2)/F(1)	36-48	-	-
6 April	Nghe An	-	Bien Ganh bridge	1	F(1)	27	-	Yes (1)
		-	Trang Son embankment	1	M(1)	57	-	-
7 April	Thanh Hoa	-	Hai Thanh embankment	2	M(1)/F(1)	30-40	-	-
		-	Son Lam road	3	M(2)/F(1)	32-58	-	-
		-	Xuan Quy road	3	M(1)/F(2)	28-51	-	-
8 April		-	Hau Loc dike	6	M(3)/F(3)	31-60	-	-
	Nam Dinh	-	Hai Hau dike	2	M(1)/F(1)	70-71	Yes (1)	-