

QUANG NGAI PROVINCE PEOPLE'S COMMITTEE

**Quang Ngai Provincial Project Management Unit of Construction Works for Agriculture
& Rural Development**

**ENVIRONMENTAL AND SOCIAL
MANAGEMENT PLAN (ESMP)**

(Final draft)

**VIETNAM - EMERGENCY NATURAL DISASTER
RECONSTRUCTION PROJECT (ENDR)**

QUANG NGAI SUBPROJECT

(For the first 18 months)



Quang Ngai, June 2017

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PROJECT OWNER:

**Quang Ngai Provincial Project Management
Unit of Construction Works for Agriculture
& Rural Development**

CONSULTANT:

**Viet Nam Investment and Development
Consultant Limited Company**

TABLE OF CONTENTS

TABLE OF CONTENTS	1
LIST OF TABLES.....	4
LIST OF FIGURES	6
ABBREVIATION	7
EXECUTIVE SUMMARY	8
1. INTRODUCTION	14
1.1. Overview on ENDR Project	14
1.2. Quang Ngai Subproject.....	15
1.3. Legal and technical basis for ESMP	15
1.3.1. Legal and national technical basis	15
1.3.2. The World Bank (WB) safeguard policies	18
2. SUBPROJECT DESCRIPTION.....	21
2.1. Subproject Location	21
2.2. Scope of Works.....	22
2.3. Construction methods	28
2.4. Material demands and waste disposal.....	29
2.5. Total investment of the subproject.....	34
2.6. The subproject schedule.....	34
2.7. Orgnization for subproject implementation.....	34
3. NATURAL ENVIRONMENTAL AND SOCIO-ECONOMIC CONDITIONS .	35
3.1. Geological and topographical conditions	35
3.2. Climatic conditions	35
3.3. Hydrological conditions.....	36
3.4. Solid waste management system	36
3.5. Wastewater collection and treatment system.....	37
3.6. Power and water supply system.....	37
3.7. Road systems	37
3.8. Existing Environment Quality	37
3.9. Natural/biological resource.....	38
3.10. Socio-economic condition	40
3.11. Natural disasters in Quang Ngai province	41

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

3.12 Site-Specific Characters and Sensitive Receptors.....	42
4. ENVIRONMENTAL AND SOCIAL IMPACTS	50
4.1. Type and scope of impacts.....	50
4.2. Impacts and risks in pre-construction phase	54
4.3. Potential Impacts and Risks in construction phase.....	56
4.3.1. Generic Impacts	56
4.3.2. Site-specific impacts	62
4.4. Impacts on operation phase.....	70
5. MITIGATION MEASURES	71
5.1. Measures to be integrated into the detailed technical design	71
5.2. Mitigation measures during preparation phase.....	72
5.3. Mitigation measures during construction phase	73
5.3.1. Generic mitigation measures	73
5.3.2. Site specific mitigation measures	82
5.4. Mitigation measures during operation phase.....	99
6. ROLES AND RESPONSIBILITIES FOR ESMP IMPLEMENTATION.....	99
6.1. ESMP implementation arrangement.....	99
6.2. Responsibilities of Stakeholders.....	100
7. ENVIRONMENTAL COMPLIANCE FRAMEWORK.....	101
7.1. Environmental duties of the contractor.....	101
7.2. Contractor’s safety, social and environmental officer (SEO).....	102
7.3. Environmental and social supervision during construction (CSC)	102
7.4. Compliance with legal and contractual requirements.....	103
7.5. Reporting Arrangements.....	103
8. ENVIRONMENTAL MONITORING PROGRAM	104
8.1. Objectives of the environmental monitoring program.....	104
8.2. Review of contractor's documents	104
8.3. Environmental monitoring criteria.....	104
8.3.1. Environmental monitoring plan	104
8.3.2. Social monitoring plan.....	105
9. CAPACITY BUILDING PROGRAM	106
9.1. Technical Assistance support for the implementation of safeguards	106
9.2. Training programs proposed.....	106

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

10. ESMP COST ESTIMATION	108
10.1. Cost for mitigation measures by contractor.....	108
10.2. Costs for environmental monitoring program	108
10.3. Cost for training and capacity building	108
10.4. Total cost for the ESMP implementation	109
11. GRIEVANCE REDRESS MECHANISM (GRM)	110
12. PUBLIC CONSULTATION AND INFORMATION DISLCOSURE.....	112
12.1. Objectives of public consultation	112
12.2. Result of public consultation	112
12.3. Information disclosure	116

LIST OF TABLES

Table 1. Scope of works.....	23
Table 2. List of machines and equipment	30
Table 3. Volume of material for construction of work items	30
Table 4. Demolition, excavation and backfilling volume of work items.....	31
Table 5. Main transport roads for materials.....	31
Table 6. Main transport roads for disposals.....	32
Table 7. Details of the sub-component cost.....	34
Table 8. Geological condition at the plain subproject area.....	35
Table 9. Hydrological conditions of major rivers of Quang Ngai province	36
Table 10. Socio-economic condition of ward/commune	40
Table 11. Information on socio-economic condition of communes with ethnic minority.....	41
Table 12. Site-Specific Characters and Sensitive Receptors	42
Table 13. Level of negative impacts of Quang Ngai subproject.....	51
Table 14. Summary of Land Acquisition Impacts	54
Table 15. Number of affected households by the subproject's items	55
Table 16. Dust load from demolition, excavation, backfilling of work items	56
Table 17. List the receptors most sensitive to dust by the subprojects	56
Table 18. Pollution load from gas emissions generated during transportation of materials and wastes.....	57
Table 19. Resonant noise generated from active vehicles and machines	58
Table 20. List the receptors most sensitive to noise by the subprojects	58
Table 21. Site-specific impacts - sensitive receptors	65
Table 22. The estimated cost for the RAP of Quang Ngai subproject.....	72
Table 23. Generic mitigation measures	74
Table 24. Site-specific mitigation measures in the construction phase	84
Table 25. Impact mitigation measures on sensitive receptors at the construction site	87
Table 26. Specific impact mitigation measures description	99
Table 27. Environmental protection responsibilities	100
Table 28. Regular Reporting Requirements.....	103
Table 29. Location, parameters and frequency of air ambience monitoring during construction	105
Table 30. Social monitoring plan during construction.....	105
Table 31. Training programs for capacity building on environmental supervision and management	107
Table 32. Cost for samples and analysis during construction phase.....	108
Table 33. Cost for capacity building training	108

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Table 34. Cost for ESMP implementation.....109

Table 35. Community consultation process.....113

Table 36. Public consultation results and feedback of the Subproject Owner.....113

LIST OF FIGURES

Figure 1. Quang Ngai subproject location22
Figure 2. The current status of Dong Thanh temporary bridge accrossing Tra Bong river.....64
Figure 3. The current status of a business household on Ha Rieng road64
Figure 4. Hre and Co Peoples live in Ba Dien, Tra Lanh and Tra Phong communes65
Figure 5. ESMP implementation structure.....100
Figure 6. Consultancy meeting in the subproject.....116

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

ABBREVIATION

CSC	Construction Supervision Consultant
DONRE	Departments of Natural Resources and Environment
EA	Environmental Assessment
ECOP	Environmental Codes of Practices
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
PMU	Project Management Unit
PPE	Personal protective equipment
PPMU	Provincial Project Management Unit
QCVN	Vietnamese standard
TOR	Terms of Reference
VND	Vietnam Dong
WB	World Bank
WHO	World Health Organization

EXECUTIVE SUMMARY

Project Origin:

The Government of Vietnam received a loan from the World Bank for Vietnam Emergency Natural Disaster Reconstruction Project including Binh Dinh, Phu Yen, Ninh Thuan, Quang Ngai and Ha Tinh provinces (hereafter called the ENDR). The Project Development Objective (PDO) is to reconstruct and rehabilitate infrastructure assets in disaster-affected project provinces and strengthen the capacity of the Government to effectively respond to future disaster events. The PDO will be achieved by rebuilding key infrastructure assets based on a ‘build back better’ approach emphasizing all stages of infrastructure life cycle including design, construction, and maintenance and strengthening institutional capacities for climate and Disaster Risk Management (DRM). Achievement of efficacy will be assessed with 85 percent weight on reconstruction and rehabilitation of infrastructure assets and 15 percent weight on strengthening of the capacity of the government to effectively respond to future disaster events. Tentative time of the ENDR project implementation is 4 years, from 2017 and to 2021. The total project cost is US\$ 135.83 million.

The Quang Ngai subproject includes similar components with ENDR project: Component 1: Resilient Reconstruction of Damaged Public Use and Preventive Infrastructure at the Provincial Level: Sub-component 1.1- Irrigation: resilient solification of 20km of canal; Sub-component 1.2- Flood control: repair and construction of about 11 km of new dyke, embankment; Sub-component 1.3- Transport infrastructure: construction of 6 damaged bridges, repair and rehabilitation of 66km of road; Component 2: Disaster Recovery Capacity Enhancement: Training for capacity enhancement, public communication to promote efficiency of financed works; Cost for operation and maintenance (O&M); Component 3: Project Management Support. The total cost of the Quang Ngai subproject is 19.35 million USD.

Legal and Technical Basis for ESMP

The Quang Ngai subproject has been classified as Environmental Category B due to its moderate, site-specific, and reversible potential impacts and risks which can be mitigated with readily designed measures. The following World Bank safeguard policies have been triggered for Quang Ngai subproject: (1) Environmental Assessment (OP 4.01); (2) Natural Habitats (OP/BP 4.04); (3) Physical Cultural Resources (OP/BP 4.11); (4) Involuntary Resettlement (OP/BP 4.12); (5) Indigenous Peoples (OP/BP 4.10). A Social and Environmental Management Plan (ESMP, this document) has been prepared in accordance with OP 4.01. The ESMP cover the works proposed for the first 18 months of the Quang Ngai subproject.

Subproject Description

For Quang Ngai subproject, in the first 18 months, 8 works will be constructed or upgraded: (1) Newly embankment on 780m northern bank of Cay Bua river in Nghia Phuong commune, Structure’s reinforced concrete; (2) Newly embankment on 445m southern bank of Ve river in Duc Thang commune Structure’s stone; (3) Newly embankment on 542m northern bank of Ve river in Nghia Hiep commune, Structure’s stone; (4) Newly embankment on 1,030m northern bank of Tra Khuc river in Truong Quang Trong ward, Structure’s reinforced concrete; (5) reconstruction Va Ranh bridge (L= 37.48m; B=6m) in Ba Dien commune, Structure’s cement concrete; (6) Newly construction of Dam bridge (L=12m, B=6m) and upgrading approach road (L= 1000m, L=6m) in Tra Lanh commune, Structure’s cement concrete and (7) Newly construction of Dong Yen 3 bridge (L=158.15m, B=5.5m) in Binh Duong commune, Structure’s reinforced concrete and (8) Repairing Ha Rieng bridges (L=27m, B=6m) and upgrading approach road (L=1691.68m, B=6m) to resettlement area in Ha Rieng village, Structure’s

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

cement concrete. Each work item of the subcomponent will be constructed in 10-12 months (from 7/2017 - 7/2018).

Environmental and social baselines

Environmental baseline data measured at 8 subproject locations shown that the quality of air, surface water (in Ve, Cay Bua and Tra Bong Rivers, streams), soil is good with all parameters are lower than Viet Nam standards. Most parameters of groundwater are lower than Viet Nam standard, except Coliform of the sample taken near the embankment on the north bank of Cay Bay River in Nang Tay 1 Village, Nghia Phuong Commune exceeds the standard of 1.67 times.

Most of the subproject sites are far from residential areas and in sparsely populated or unpopulated areas, except for three areas: (i) embankment on the northern side of the Ve River (about 100 households living near the river bank, about 50-100 meters away), (ii) embankment on the southern bank of Ve river (about 50 households living near the riverside, distanced about 100m), (iii) Dong Yen 3 bridge (there are 2 crowded residential areas at two ends of the bridge, about 50 - 200m away). Some sensitive areas/receptors include: Pumping station of Nghia Phuong commune, Cultural house of Nang Tay 1 hamlet, Oriental medicine treatment association of Tu Nghia district, Fishery farming pond, Primary school of Duc Thang commune, plantations, Resettlement area in Ha Rieng hamlet. There is no PCR being affected in all eight subproject areas. 3/8 communes including Ba Dien, Tra Lanh and Tra Phong communes have 46 ethnic minority households who are Co and H're people being affected by the subproject.

Environmental and Social Impacts and Risks

The subproject's potential negative impacts and risks have been identified. These are mostly temporal, localized and reversible due to the medium sized construction works. The impacts can be mitigated by applying appropriate technologies and site-specific mitigation measures together with close supervision by the contractor and consultation with local community.

Generic construction impacts: dust, air emission, noise, vibration, wastewater and solid wastes are generated construction and worker's activities. These are considered from low to moderate for each works and can be mitigated.

Site-specific impacts

Risk of embankment subsidence and bank erosion during construction process of Rivers include (1) Embankment on 780m northern bank of Cay Bua river; (2) Embankment on 445m southern bank of Ve river; (3) Embankment on 542m northern bank of Ve river and (4) Embankment on 1,030m northern bank of Tra Khuc river. These impacts are localized (at the site position), short term (2-3 months in the wet season) and avoidable via appropriate design and good construction practices.

Impact on waterway traffic activities on Cay Bua, Ve, Tra Khuc and Tra Bong Rivers. These impacts might occur during construction of the following work items: (1) Embankment on 780m northern bank of Cay Bua river; (2) Embankment on 445m southern bank of Ve river; (3) Embankment on 542m northern bank of Ve river, (4) Embankment on 1,030m northern bank of Tra Khuc river and (7) construction of Dong Yen 3 bridge. The impacts on waterway can be ranked as low. The mitigation can be made through the collaboration with the local waterway management unit to provide necessitate information on alternative traffic routes for boats.

Impact on agriculture land along the northern of Ve river in Nghia Hiep commune (about 2 ha of more than 10 households in The Binh hamlet). Runoff from construction site if not properly managed could contaminate irrigation water and soil, affecting productivity of crops. The impact can be low as it is localized and will cease upon the completion of construction work.

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Subsidence risk in pier of bridge during construction phase of Va Ranh bridge (in Ba Dien commune), Dam bridge (in Tra Lanh commune) and Dong Yen 3 bridge (in Binh Duong commune). Subsidence or landslides can also incur fatal work accidents as well as bridge structure. These impacts are localized (at the site position), short term and avoidable via appropriate design and good construction practices.

Community disturbance and traffic concern on Dong Yen 3 village. There are 3 other temporary bridges so they will serve as temporary connectors for households' travel demand in the area. The impact will end right after completion of the work and this bridge is the desire of local people, getting high support from local people so the impact is considered to be low.

Construction of Ha Rieng bridges and road to resettlement area in Ha Rieng village will affect forestry land of 6 households in Ha Rieng hamlet, with total affected forestry land along two sides of the road of 2,420 m². These are less than 10% of the total available productive land area of affected households. The forest is planted with sparse density, small tree trunk and small canopy along the road, so impact on the forest is low.

Impacts on sensitive receptors: The construction of the different items of subproject will likely impact some sensitive receptors located in close proximity to the construction sites (3/8 work items), including (i) embankment of the northern Cay Bua river in Nghia Phuong commune; (ii) embankment of the southern Ve river in Duc Thang commune and (iii) construction of road and bridge leading to resettlement area in Ha Rieng village. The impact level is assessed to be from low to medium, temporary and possibly minimized.

Labor accidents, risks on community health and safety on construction sites are minor and can be mitigated by suitable solution such as training on occupational safety before and during the construction process as well as provision of sufficient protective equipment for workers.

Social impacts include arising social issues and impacts on Ethnic Minority. Living and earning activities of Hre and Co Peoples are affected by land acquisition for (i) construction of Dam bridge and road, (ii) Va Ranh bridge and (iii) Ha Rieng road land acquisition is needed and will affect living and earning activities of Hre and Co peoples. There are 46 Hre and Co Peoples households will be affected by land acquisition but there is no household must be relocated.

Mitigation measures

On the basis of assessment of adverse environmental impacts and risks, environmental incidents besides the process of considering the elements & the existing natural, socio-economic and environmental conditions to offer measures to minimize adverse impacts, prevent and respond to environmental problems. The mitigation measures are given specifically for each impact source mentioned above in each phase of the subproject including Generic impact mitigation measures (ECOPs), site-specific mitigation measures and impact mitigation measures on sensitive receptors, as well as social impact mitigation measures.

Specific mitigation measures during the construction phase for Quang Ngai subproject components including: (1) Erosion, soil subsidence such as before dredging, reinforcement of banks will be conducted, Use construction method to reduce vibration for construction activities of embankment, Construction of side slope is made in accordance with the design, Do not carry out dredging works in rainy season, Do not place heavy machineries and transportation vehicles near the canals banks; (2) Impact on waterway usage on Cay Bua, Ve, Tra Khuc and Tra Bong Rivers such as To inform local people of the construction plan prior to construction, Coordinate with management unit of waterway to flag the signal system on the inland waterway the transport will travel through, Place warning boards along the construction route, both on land and water surface (arrange the road and waterway traffic guide); (3) Falling into river/stream, drowning in the process of embankment and bridges construction such as Install lighting system,

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

warning sign of the construction site, especially at night, with a distance of 50m from the upstream and downstream, Ensure equipment and health conditions for workers, personnel at each construction site and time, avoid working in very sunny day and extreme weather, Closely control and assign management staff on safety and environment to be presented regularly and continuously on construction site; (4) Impact on agriculture land such as Informing the community of the construction schedule at least two week before the construction, Arrange drainage around the construction sites to prevent soil erosion and sedimentation into the rice fields and irrigation canals; (5) Impact on waterway transport during embankment upgrading/bridge construction such as Coordinate with the management unit of waterway to flag the signal system on the inland waterway the transport will travel through, Place warning boards along the construction route, both on land and water surface; (6) Community disturbance and traffic concern on Dong Yen 3 village such as Inform local residents in advance (at least one week), Put and maintain bulletin boards at the construction site, Contractors should provide lighting at all construction sites at night, Put road construction warning signs at the site and maintain them for the duration of the work; (7) Disruption of business such as Provide safe and easy access to the household businesses putting clean and strong thick wood panels or steel plates over the open ditches or mainholes, Do not gather materials and wastes within 20m from household businesses and shops, Spray sufficient water to suppress dust during dry and windy days at least three times a day at site that is near household businesses; Impacts on Living of Hre and Co Peoples such as Design for limiting land acquisition by social assessment survey, consultation with Co and H'Re peoples and reasonable compensation for affected households, Supply information about subproject components and summarize decisions of Co and H'Re peoples through confirmation of the subproject, Raise awareness of contractors, workers and Co and H'Re peoples of social problems and protection measures HIV/AIDs, drug use, infectious diseases, environmental pollution, violance increased due to conflicts of workers during construction.

Specific impact mitigation measures for sensitive receptors during the construction phase are presented as (i) Pumping station of Nghia Phuong commune such as Arrange drainage around the construction sites to prevent soil erosion and sedimentation into water collection points of Pumping station, Immediately rehabilitate water collection points if they are damaged by construction activities to ensure that water supply for the rice fields is maintained; (ii) Cultural house of Nang Tay 1 hamlet such as Construction area to be fenced and marked with warning signs to prevent unauthorized people from entering, Prohibit use of construction methods that cause noise during meeting hours, Spray sufficient water to suppress dust during dry and windy days at least three times a day at site, (iii) Fishery farming pond such as Informing the AH of the construction schedule at least two week before the construction, Immediately rehabilitate irrigation canals if they are damaged by construction activities to ensure that water supply for the rice fields is maintained; (iv) Primary school of Duc Thang commune such as Inform the school management of the construction activities, Install safety warning signs at around the school, Spray sufficient water to suppress dust during dry and windy days at least two times a day on the route, Limiting transporting on rush hours when pupils go to and leave the school (the school every weekday: 7h -7h30; 11h -11h30; 13h -13h30; 16h30 - 17h30); (v) Productive forest land such as Spray water every day to reduce dust, especially on dry and hot days, at least twice a day, Damage compensation due to the construction process, Do not allow cutting trees outside construction area for any purpose (such as piling or firewood), and so on.

And *specific impact mitigation measures during operation phase* are presented as (i) Incident of falling into rivers, streams: Design and erect fences or barrier gate at the up and down steps; Plug warning signs and install lighting system; Taking first aids for persons who get accidents and transporting them to the nearest hospitals; (ii) Road Safety during the operation of 4 embankments, 3 bridges and 2 roads; Improving knowledge of local people on road use

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

regulations and practices; Monitoring and enforcement of driver speed and behavior; (ii) Induced development: Improving people knowledge on socio-economic development opportunity and risks related to social issues.

Risks and incidents mitigation measures: During construction phase, risks and incidents mitigation measures referred as Compliance with existing regulations on labor safety, Training and compulsory compliance with working regulations at the site, Supplying of full labor protection equipment, Inspection and reminding staffs of their daily works, Taking care of health, Installation of warning signs and instruction signs, Taking first aids for persons who get accidents and transporting them to the nearest hospitals and health service units, Preparation of back-up plan, flooding and storm responding plans, Ensuring temporary ditches and channels for stormwater drainage, Ensure backup of pumps, generators when emergency pumps are needed, reinforcement for drainage, Erection of isolated fences and signs, instructions on gas materials, chemicals and wastes, Strict compliance with regulations on fire fighting, Install firefighting equipment and regulations and develop disaster response plans, Arrange pumps to enhance flood drainage on heavy rains, Strict weather monitoring... And risks and incidents mitigation measures during operation phase referred as follow: Frequent monitoring of the regional climate and weather conditions; Frequent and periodical inspection for items of the subprojects, Announcement of relevant units in case of incidents, Frequent and periodical maintenance and inspection, prompt settlement of damaged section before the rainy season...

Environmental and Social Management Plan (ESMP)

The ESMP of Quang Ngai subproject includes measures to reduce the negative impacts; roles and responsibilities for ESMP implementation, supervisors, environmental compliance framework, reporting arrangements, environmental monitoring program, capacity building program and the cost for ESMP implementation. Of which: the cost for environmental quality monitoring is about 3,789 USD and cost for capacity building is 7,048 USD.

ESMP during construction requires the involvement of several stakeholders and agencies, each with different roles and responsibilities including host, PPMU, DONRE (Quang Ngai Department of Natural Resources and Environment), the Contractors, the Construction Supervision Consultant (CSC), and local communities. PPMU will be responsible for monitoring the overall subproject implementation, including environmental compliance of the subproject and will assign Environmental Staff(s) (ES) to help with the environmental aspects of the subproject. The CSC will assign Environmental and Social Staff(s) and will be responsible for routine supervising and monitoring all construction activities and for ensuring that Contractors comply with the requirements of the contracts and the ECOPs and mitigation measures; The CSC will also assist the PPMU in reporting and maintaining close coordination with the local community. Based on the approved environmental specifications (ECOPs) in the bidding and contractual documents, the Contractor is responsible for establishing a Contractor ESMP (CESMP) for each construction site area, submit the plan to PPMU and CSC for review and approval before commencement of construction. Community has the right and responsibility to routinely monitor environmental performance during construction to ensure that their rights and safety are adequately protected and that the mitigation measures are effectively implemented by contractors and the PPMU. Oversee implementation of subproject under recommendations of DONRE and PPMU to ensure compliance of Government policy and regulations. DONRE is responsible for monitoring the compliance with the Government environmental requirements.

Public Consultation and Information Disclosure

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Public Consultation: Public consultations on the subproject's draft ESMP is implemented in 8 communes/wards of Quang Ngai province in March 2017. Meetings were held with the representatives of local authorities, mass organizations such as Veterans Association, Women's Union, Youth Union; households to be directly affected by the subproject. Local authorities and people of ward/commune in the subproject area totally agreed with the implementation of the subproject because it will bring many socio-economic and environmental benefits. However, all 8 affected communities required to ensure environmental sanitation during construction process, particularly prevention from dust, gas, damage of roads and construction needs to be fast to ensure scheduled progress.

Information Disclosure: The first draft ESMP in Vietnamese had been published at the offices of 8 communes/wards and the Quang Ngai PPMU in May 2017 for public hearings. The final draft ESMP in Vietnamese language was disclosed at the offices of 8 communes/ward and the Quang Ngai PPMU on June 12nd, 2017. The final draft ESMP in English will be disclosed at the World Bank's internal and external websites on June 20th, 2017.

1. INTRODUCTION

1.1. Overview on ENDR Project

The Government of Vietnam received a loan from the World Bank for the Vietnam Emergency Natural Disaster Reconstruction Project including Binh Dinh, Phu Yen, Ninh Thuan, Quang Ngai and Ha Tinh provinces (hereafter called the ENDR¹).

The Project Development Objective (PDO) is to reconstruct and rehabilitate infrastructure assets in disaster-affected project provinces and strengthen the capacity of the Government to effectively respond to future disaster events. The PDO will be achieved by rebuilding key infrastructure assets based on a ‘build back better’ approach emphasizing all stages of infrastructure life cycle including design, construction, and maintenance and strengthening institutional capacities for climate and DRM. Achievement of efficacy will be assessed with 85 percent weight on reconstruction and rehabilitation of infrastructure assets and 15 percent weight on strengthening of the capacity of the government to effectively respond to future disaster events.

The specific objectives of the project include: (i) Repairing, restoration and upgrading of infrastructure works for production (works of irrigation, dykes, embankment, sea embankment, irrigation canals, reservoirs and so on) aims to restore production, protect lives safety, property for local people, mitigate the disaster risks and (ii) Damage restoration of transport infrastructure works for travelling of local people, commodity exchange and production development. In order to achieve these objectives, the project consists of 3 components include: (1) Resilient Reconstruction of Damaged Public Use and Preventive Infrastructure at the Provincial Level; (2) Disaster recovery capacity enhancement; (3) Project Management Support. Tentative time of the ENDR project implementation is 4 years, from 2017 and to 2021. The total project cost is US\$ 135.83 million.

Component 1: Resilient Reconstruction of Damaged Public Use and Preventive Infrastructure at the Provincial Level (US\$121.08 million)

The objective of Component 1 is to strengthen resilience of flood-affected communities in five selected provinces through the reconstruction and rehabilitation of damaged critical provincial-scale infrastructure, especially irrigation, flood control, and road/bridge infrastructure. This Component comprises of five subcomponents, each of which will be implemented by the respective provinces:

- (a) Subcomponent 1: Resilient Reconstruction in Binh Dinh Province
- (b) Subcomponent 2: Resilient Reconstruction in Phu Yen Province
- (c) Subcomponent 3: Resilient Reconstruction in Quang Ngai Province
- (d) Subcomponent 4: Resilient Reconstruction in Ninh Thuan Province
- (e) Subcomponent 5: Resilient Reconstruction in Ha Tinh Province

Component 2: Disaster Recovery Capacity Enhancement (US\$2.43 million)

Component 2 will finance (a) evaluation of the effectiveness of the existing flood risk reduction efforts in the Central Region, using the 2016 floods as a case study; (b) building capacity of DRM agencies on the damage and loss assessment methodology; and (c) the development of emergency reconstruction and recovery procedures.

¹ Vietnam Emergency Natural Disaster Reconstruction Project (hereafter called ENDR)

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Component 3: Project Management Support (US\$12.32 million)

The objective of Component 3 is to support project management, safeguards, audits, and monitoring and evaluation (M&E). It will be implemented by the Binh Dinh Provincial People's Committee (PPC).

1.2. Quang Ngai Subproject

Quang Ngai subproject includes similar components with ENDR subproject, namely:

Component 1: Resilient Reconstruction of Damaged Public Use and Preventive Infrastructure at the Provincial Level (18.090 million USD)

- *Sub-component 1.1* - Irrigation: resilient solification of 20km of canal.
- *Sub-component 1.2* - Flood control: repair and construction of about 11 km of dyke, embankment.
- *Sub-component 1.3* - Transport infrastructure: reconstruction of 6 damaged bridges, repair and solification of 66km of road.

Component 2: Disaster recovery capacity enhancement (0.090 million USD)

- Training for capacity enhancement, public communication to promote efficiency of financed works
- Cost for operation and maintenance (O&M)

Component 3: Subproject management Support (1.170 million USD)

- Providing supports for subproject implementation including subproject audit, monitoring, mid-term and end-of-term evaluation; providing equipment and technical assistance for PMU during subproject implementation;
- Providing institutional support and capacity strengthening for subproject management; cooperating, reviewing and evaluating engineering, social and environmental safeguards, subproject monitoring and evaluation;
- Organizing workshops for raising awareness of subproject staffs and involved community about disasters.

The subproject's total investment is US\$19.35 million. The subproject implementation period is expected from 2017 to 2021.

1.3. Legal and technical basis for ESMP

1.3.1. Legal and national technical basis

*** Laws**

- Revised Environmental Protection Law (LEP) No. 55/2014/QH13 of the National Assembly of Vietnam dated June 23, 2014 and effective from July 2015. This law enacted policies and regulations on environmental safeguards, and rights and obligations of organizations, households and individuals related to environmental protection activities.
- Land Law No. 45/2013/QH13 of the National Assembly of Vietnam dated November 29, 2013 prescribes the regime of land ownership, powers and responsibilities of the State in representing the entire-people owner of land and uniformly managing land, the regime of land management and use, the rights and obligations of land users involving land in the territory of the Socialist Republic of Vietnam.

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

- Law on Natural Disaster Prevention and Control No. 33/2013/QH13 of the National Assembly of Vietnam dated on June 19, 2013 provides natural disaster prevention and control activities; specifies the rights and obligations of agencies, organizations, households and individuals engaged in natural disaster prevention and control activities; and details the state management of, and assurance of resources for, natural disaster prevention and control.
- Law on Water Resources No. 17/2012/QH13 of the National Assembly of Vietnam dated June 21, 2012 provides on management, protection, exploitation and use of water resources, as well as the prevention of, combat against and overcoming of harmful effects caused by water in the territory of the Socialist Republic of Vietnam.
- Law on Biodiversity No. 20/2008/QH12 of the National Assembly of Vietnam dated November 13, 2008 provides for the conservation and sustainable development of biodiversity; rights and obligations of organizations, households and individuals in the conservation and sustainable development of biodiversity.
- The Law on Construction No. 50/2014/QH13 approved on 18th June 2014 by 7th National Assembly of the Socialist Republic of Vietnam
- The Law on Road Transport No. 23/2008/QH12 dated on 13/11/2008
- The Law on Complaints 02/2011/QH13 dated 11 November 2011
- The Law on Culture Heritage No. 10/VBHN-VPQH dated on 23/7/2013
- The Law on Safety, Labor Sanitation No. 84/2015/QH13 dated June 25, 2015
- The Law on Dike No. 79/2006/QH11 dated on 29/11/2006
- The Law on Plant Protection and Quarantine No. 41/2013/QH13 dated on 25/11/2013

*** Decrees**

- Decree No. 38/2015/ND-CP of 24 April 2015 of the Government on management of waste and discarded materials.
- Decree No. 39/2015/ND-CP of the Government dated 27 April 2015 on assistance policy applied to ethnic minority and poor women who comply the population policy will take effect as from 15 June 2015.
- Decree No. 18/2015/ND-CP dated February 14, 2015 of the Government on environmental protection planning, strategic environmental assessment, environmental impact assessment, and environmental protection commitment.
- Decree No.19/2015/ND-CP of 14 February 2015 of the Government detailing the implementation of a number of articles of the Law on Environmental Protection.
- Decree No.43/2014/ND-CP dated May 15, 2014 of the Government providing guidance on detailed implementation of some articles from the Land Law 2013.
- Decree No.44/2014/ND-CP dated 15 May 2014 of the Government providing regulations on land prices.
- Decree No.47/2014/ND-CP dated 15 May 2014 of the Government on compensation, support, and resettlement when land acquisition is required by the State.
- Decree No. 155/2016/ND-CP dated 18 November 2016 of the Government prescribing administrative sanctions for environmental protection. Decree No. 25/2013/ND-CP of 29 March 2013 of the Government on environmental protection charges for wastewater.
- Decree No. 67/2012/ND-CP of the Government dated 10 September 2012 on the amendment of Decree No. 143/2003/ND-CP of the Government dated 28 November

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

2003 on detailing the implementation of a number of articles of the ordinance on exploitation and protection of irrigation works.

- Decree No. 113/2010/NĐ-CP dated 3 December 2010 of the Government on valuation of damages caused to the environment.
- Decree No. 174/2007/ND-CP of 29 November 2007 on environmental protection charges for solid waste.
- Decree No. 59/2007/NĐ-CP dated 09/4/2007 of the Government on the management of solid waste.

*** Circulars**

- Circular No. 27/2015/TT-BTNMT dated 19 May 2015 of the Ministry of Natural Resources and Environment on strategic environmental assessment, environmental impact assessment, and environmental protection plan.
- Circular No. 36/2014/TT-BTNMT dated 30 June 2014, specifying detailed methods of valuation of land prices, construction, adjustment of land prices; specific land prices valuation and land prices valuation consulting service.
- Circular No.37/2014/TT-BTNMT dated 30 June 2014, providing detailed regulation compensation, assistance, and resettlement when the State acquires land.
- Circular No. 30/2014/TT-BTNM, regulating the records for land allocation or land lease, the change of land use purposes, land acquisition
- Circular No. 36/2015/TT-BTNMT dated 30/6/2015 of Ministry of Natural Resources and Environment on hazardous waste management.
- Circular No. 22/2010/TT-BXD dated 03/12/2010 of Ministry of construction providing labor safety in construction.
- Circular No. 19/2011/TT - BYT of 06 June 2011 of the Minsitry of Health guiding labor hygiene, laborers' health and occupational diseases.
- Circular No 13/2007/TT-BXD of December 31st 2007. Providing guidance on a number of articles of decree no. 59/2007/nd-cp dated 09/4/2007 by the government on solid waste management.

*** Decisions**

- Decision No. 52/2012/QĐ-TTg, dated November 16, 2012 on the support policies on employment and vocational training to farmers whose agricultural land has been recovered by the State.
- Decision No.13/2015/QĐ-UBND dated 05 March 2015 of Quang Ngai PPC on compensation, assistance and resettlement when the State acquires land in Quang Ngai province.
- Decision No. 25/2014/QĐ-UBND dated 06 June 2014 of Quang Ngai PPC on compensation rates for housing, structures when the State acquires land in Quang Ngai province.
- Decision No. 64/2014/QĐ-UBND dated 17 December 2014 of Quang Ngai PPC on compensation rates for trees and crops when the State acquires land in Quang Ngai province.
- Decision No. 67/2014/QĐ-UBND dated 31 December 2014 on price list 2015 in Quang Ngai province in the 5-year period (2015 – 2019).

*** Applicable standards**

- QCVN 01:2009/BYT: National technical regulation on drinking water quality.

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

- QCVN 02:2009/BYT: National technical regulation on domestic water quality.
- QCVN 08-MT:2015/BTNMT– National technical regulation on surface water quality;
- QCVN 09-MT 2015/BTNMT– National technical regulation on ground water quality.
- QCVN 10:2008/BTNMT: National technical regulation on water quality in coastal areas.
- QCVN 14:2008/BTNMT: National technical regulation on domestic wastewater.
- QCVN 40:2011/BTNMT: National technical regulation on industrial wastewater.
- QCVN 39:2011/BTNMT: National technical regulation on Water Quality for irrigated agriculture.
- QCVN 38:2011/BTNMT: National technical regulation on Surface Water Quality for protection of aquatic lifes
- QCVN 03-MT:2015/BTNTM - National technical regulation on the allowable limits of heavy metals in the soils.
- QCVN 15:2008/BTNMT: National technical regulation on the pesticide residues in the soils.
- QCVN 43:2012/BTNMT - National technical regulation on sediment quality in fresh water areas.
- QCVN 05:2013/BTNMT: National technical regulation on ambient air quality.
- QCVN 06:2009/BTNMT: National technical regulation on hazardous substances in ambient air.
- TCVN 6438:2005 - Road vehicles - Maximum allowable limits of gas emission.
- QCVN 26:2010/BTNMT: National technical regulation on noise.
- QCVN 27:2010/BTNMT: National technical regulation on vibration.
- QCVN 07:2009/BTNM: National Technical Regulation on Hazardous Waste Thresholds
- QCVN 17:2011/BGTVT: National technical regulation on Rules for Pollution Prevention of inland waterway ships.
- Decision 3733/2002/-BYT October 10, 2002: Promulgating 21 labor hygiene standards, 05 principles and 07 labor hygiene measurements.
- QCVN 18:2014/BXD - National Technical regulation on safety in construction
- Other relevant sector technical regulation and standards.

1.3.2. The World Bank (WB) safeguard policies

(1) Project level

The following World Bank safeguard policies have been triggered: (a) Environmental Assessment (OP 4.01); (b) Natural Habitats (OP/BP 4.04); (c) Pest Management (OP 4.09); (d) Physical Cultural Resources (OP/BP 4.11); (e) Involuntary Resettlement (OP/BP 4.12); and (f) Indigenous Peoples (OP/BP 4.10). The project has been classified as Environmental Category B subproject due to most of the potential impacts and risks are expected to be at moderate level, site-specific and reversible which can be mitigated with readily known measures. In addition, the Bank's requirements on public consultation and information disclosure will also be followed.

(2) Subproject level

Environmental Assessment (OP/BP 4.01)²

²The full treatment of OP/BP 4.01 can be found at

<http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTSAFEPOL/0,,contentMDK:20543912~menuPK:1286357~pagePK:64168445~piPK:64168309~theSitePK:584435,00.html>

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Environmental Assessment (EA) is an umbrella policy for the Bank's safeguard policies. The overarching objective is to ensure that Bank-financed subprojects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental impacts. The EA process is intended to identify, avoid and mitigate potential impacts of Bank operations. EA takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources); and transboundary and global environmental aspects. EA considers natural and social aspects in an integrated way.

In the first 18 months, Quang Ngai subproject will upgrade, rehabilitate or newly construct 4 embankment sections for Cay Bua river, north and southern banks of Ve river and northern bank of Tra Khuc river; construct 4 bridges (Va Ranh, Dam, Dong Yen 3 and Ha Rieng bridges) and 01 road to resettlement area of Ha Rieng hamlet. Implementation of the subproject will generate potential negative impacts on environment and living condition of people around the subproject area, especially during the construction. According to OP 4.01 policy, Environmental and Social Management Plan (ESMP) covering these works was prepared. The official draft of ESMP of the subproject was disclosed at People's committee of subproject communes and Quang Ngai PPMU in June 2017.

The main contents of the ESMP include a summary of the impacts of the subproject, the mitigation measures, monitoring and implementation arrangements during the construction and operation stages of the subproject. The ESMP also specify the role of the relevant stakeholders, reporting procedures, capacity building, and implementation and budget. Relevant parts of the ESMP shall be included into the subproject bidding and contractual documents for implementation and supervision.

Physical Cultural Resources (PCR, OP/BP 4.11)

Subproject sites have been screened for PCR. As the subproject involves certain quantity of earth works, the ESMP included ECOPs which covers a chance find procedure to address issues related to PCRs encountered during construction.

Natural Habitats (OP/BP 4.04)³

This policy is intended to prohibit the Bank-financed subprojects that cause significant degradation or conversion of critical natural habitats. The Bank does not support subprojects involving the significant conversion of natural habitats unless there are no feasible alternatives for the subproject and its siting, and comprehensive analysis demonstrates that overall benefits from the subproject substantially outweigh the environmental costs. If the environmental assessment indicates that the subproject would significantly convert or degrade natural habitats, the subproject includes mitigation measures acceptable to the Bank.

The subproject interventions are not located near or within any critical natural habitats and mainly involve rehabilitation and reconstruction activities on the existing infrastructures. Therefore, it will neither affect any protected areas nor rare and endangered flora or fauna species or high biodiversity areas. However, pollution risks related to removal and disposal of substantial quantities of non-hazardous construction materials associated with the destroyed structures (embankment protection devices, bridges) consisting of concrete, scrap metal, stone, sand from irrigation canals and small streams for rehabilitation and reconstruction works could affect natural habitats such as rivers or streams. Therefore, this policy is triggered. Impacts on

³Full description of OP/BP 4.04 is available at

<http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTSAFEPOL/0,,contentMDK:20543920~menuPK:1286576~pagePK:64168445~piPK:64168309~theSitePK:584435,00.html>

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

natural habitats and associated mitigations measures will be addressed in the relevant subproject ESMPs.

*The Indigenous Peoples policy (OP/BP 4.10)*⁴

The Indigenous Peoples policy is designed to ensure that the development process fully respects the dignity, human rights, economies and cultures of Indigenous Peoples. The policy requires subprojects to identify impacts on indigenous peoples and develop a plan to address the impacts, both positive and adverse. Subprojects should be designed with benefits that reflect the cultural preferences of indigenous peoples. The borrower should carry out free, prior, and informed consultation and obtain broad community support for the subproject.

An initial screening conducted by the Bank specialist has confirmed that there are ethnic minority communities as per the Bank OP 4.10 definition, to be affected by and benefited from the subproject hence the World Bank policy on Indigenous Peoples OP/BP 4.10 will be triggered. There are 46 ethnic minority households affected in Quang Ngai subproject and the EM households are mainly Co and H'De Peoples. So that, an Ethnic Minority Development Plans (EMDP) will be prepared to identify ethnic minorities and potential subproject impacts on them in the subproject area.

*Involuntary Resettlement (OP/BP 4.12)*⁵

OP 4.12 seeks to prevent severe long-term hardship, impoverishment, and environmental damage to the affected peoples during involuntary resettlement. It applies whether or not affected persons must move to another location. The Bank describes all these processes and outcomes as “involuntary resettlement,” or simply resettlement, even when people are not forced to move. Resettlement is involuntary when the government has the right to expropriate land or other assets and when affected people do not have the option to retain the livelihood situation that they have.

Implementation of construction works of Quang Ngai province subproject in the first 18 months will affect 384 households, of which 323 households will be directly affected by land acquisition and 61 households will be indirectly affected in term of cultivation production under People's committee of wards/communes, with total affected land of 96,371 m². There is no households to be displaced.

The subproject RAP is prepared and submitted to the Bank for approval. The respective Provincial People's Committee (PPC) will then approve the RAPs and all compensation, assistance and resettlement activities should be completed prior to civil works commencement.

*World Bank Group Environmental, Health, and Safety Guidelines*⁶

World Bank-financed subprojects should also take into account the World Bank Group Environmental, Health, and Safety Guidelines (known as the "EHS Guidelines"). The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice.

The EHS Guidelines contain the performance levels and measures that are normally acceptable to the World Bank Group and are generally considered to be achievable in new facilities at reasonable costs by existing technology. The environmental assessment process may

⁴ Full treatment of OP/BP 4.10 can be consulted at

<http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTSAFEPOL/0,,contentMDK:20543990~menuPK:1286666~pagePK:64168445~piPK:64168309~theSitePK:584435,00.html>

⁵ Detail of OP/BP 4.12 is available at

<http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTSAFEPOL/0,,contentMDK:20543978~menuPK:1286647~pagePK:64168445~piPK:64168309~theSitePK:584435,00.html>

⁶The EHS Guidelines can be consulted at www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines.

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

recommend alternative (higher or lower) levels or measures, which, if acceptable to the World Bank, become subproject- or site-specific requirements. This subproject should conform to these Guidelines.

2. SUBPROJECT DESCRIPTION

2.1. Subproject Location

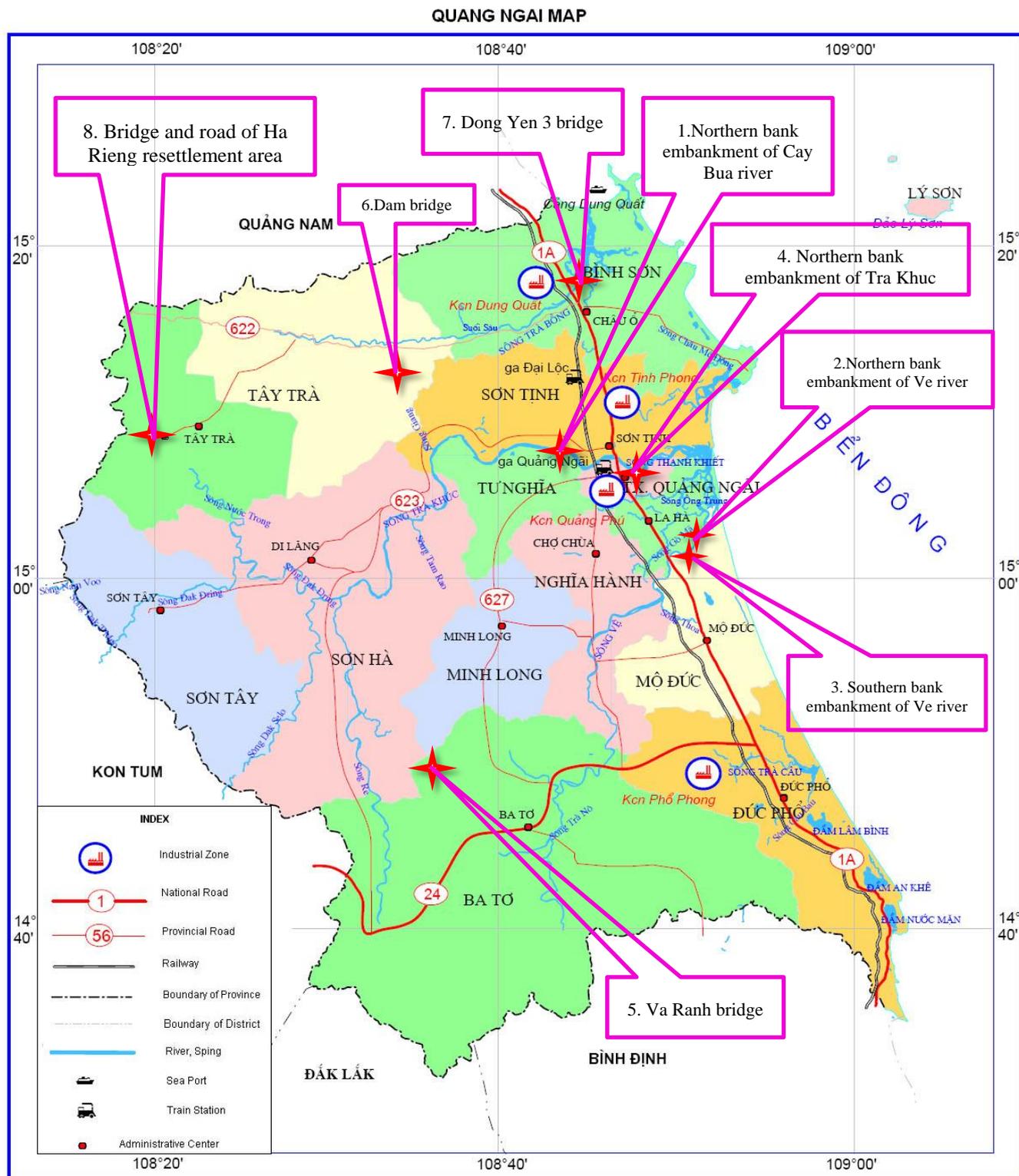
For Quang Ngai subproject, in the first 18 months, will be implemented in 8 communes/ward of 6 districts/city of Quang Ngai province, namely:

- Work item 1: Embankment on Northern bank of Cay Bua river (in Nghia Phuong commune, Tu Nghia district)
- Work item 2: Embankment on Southern bank of Ve river (in Duc Thang commune, Mo Duc district)
- Work item 3: Embankment on Northern bank of Ve river (in Nghia Hiep commune, Tu Nghia district)
- Work item 4: Embankment on Northern bank of Tra Khuc river (in Truong Quang Trong ward, Quang Ngai city)
- Work item 5: Construction of Va Ranh bridge (in Ba Dien commune, Ba To district)
- Work item 6: Construction of Dam bridge (in Tra Lanh commune, Tay Tra district)
- Work item 7: Construction of Dong Yen 3 bridge (Binh Duong commune, Binh Son district)
- Work item 8: Construction of Ha Rieng bridges and road to resettlement area in Ha Rieng village (Tra Phong commune, Tay Tra district)

The locations of the proposed works for the first 18 months are presented in Figure 1:

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject



2.2. Scope of Works

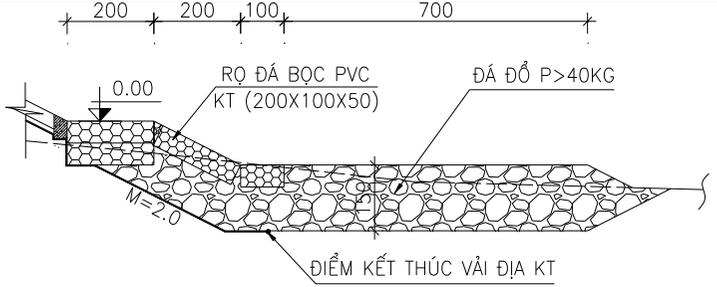
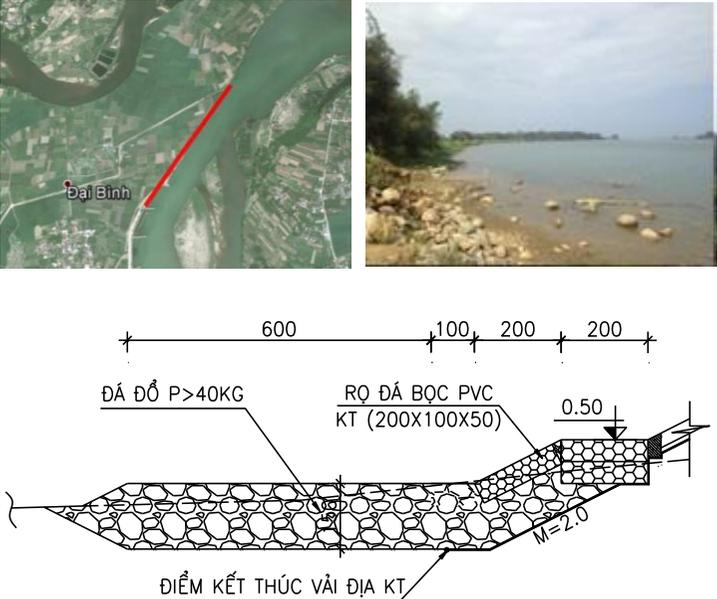
Work items of Quang Ngai subproject in the first 18 months are described briefly in Table 1 as follows:

Table 1. Scope of works

Work items	Description of current status of works	Investment scope	Photographs
<p>1. Newly construction of embankment on northern bank of Cay Bua river</p> <p>Location: Nang Tay 1 hamlet in Nghia Phuong commune, Tu Nghia district</p>	<ul style="list-style-type: none"> - The river bank has been landslide to the edge of the houses (about 30 houses) and close to the edge of provincial road 628, with the distance from 2 - 4 m to Cay Bua river. - There are mainly sparse shrubs, 1-3 year old trees such as bamboo, eucalyptus, acacia mangium wild, ... 	<ul style="list-style-type: none"> - Characteristic: <ul style="list-style-type: none"> - Length: L=780m, Height: H=4.0m - Slope embankment, m= 2.0 - Structure of slab in reinforced concrete frame M200. Embankment foot is reinforced with stone and outside is PVC, coated stone cages. - Auxiliary works: M200 reinforced concrete drainage along the embankment, size 0.3mx0.4m. 	
<p>2. Newly construction of embankment on southern bank of Ve river</p> <p>Location: Thanh Long hamlet in Duc Thang</p>	<ul style="list-style-type: none"> - The river bank has been landslide to the edge of provincial road 627B, with the distance from 3 - 5 m to Ve river - There are mainly sparse shrubs, banana trees, crops (corn, sweet potato ...) 	<ul style="list-style-type: none"> - Characteristic: <ul style="list-style-type: none"> - Length: L = 445 m - Slope embankment, m=2.0 - Crest elevation: (3.0 ÷ 2.0) m - Toe elevation: 0.5 m - Structure: made of stone (dry masonry from toe to top of the embankment). The foot's inside layer is lined with stone and outside is PVC coated stone cages. 	

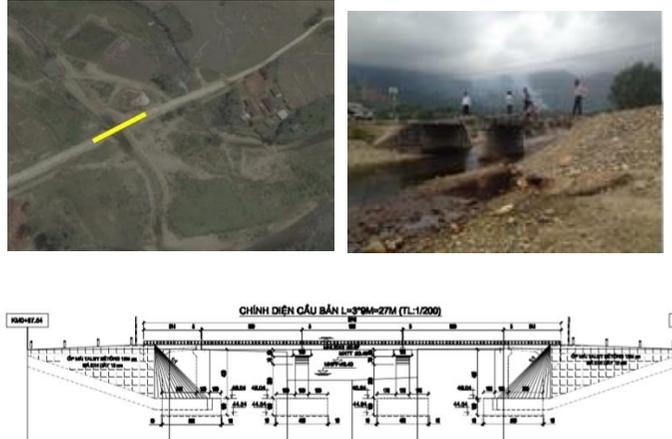
Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Work items	Description of current status of works	Investment scope	Photographs
<p>commune, Mo Duc district</p>		<ul style="list-style-type: none"> - Auxiliary works: 2 sewers, 5 staircases. 	
<p>3. Newly construction of embankment on northern bank of Ve river Location: The Binh hamlet in Nghia Hiep commune, Tu Nghia district</p>	<ul style="list-style-type: none"> - The river bank has been landslide and erosion. - There are mainly crops are chilli and some vegetables and rice. 	<ul style="list-style-type: none"> - Characteristic: <ul style="list-style-type: none"> - Length: L=541.8m - Slope embankment with m=2.0 - Crest elevation: 1.76÷1.4m - Toe elevation: 0.0m - Structure: made of stone (dry masonry from toe to top of the embankment). The foot's inside layer is lined with stone and outside is PVC coated stone cages. - Auxiliary works: 2 sewers, 3 staircases. 	

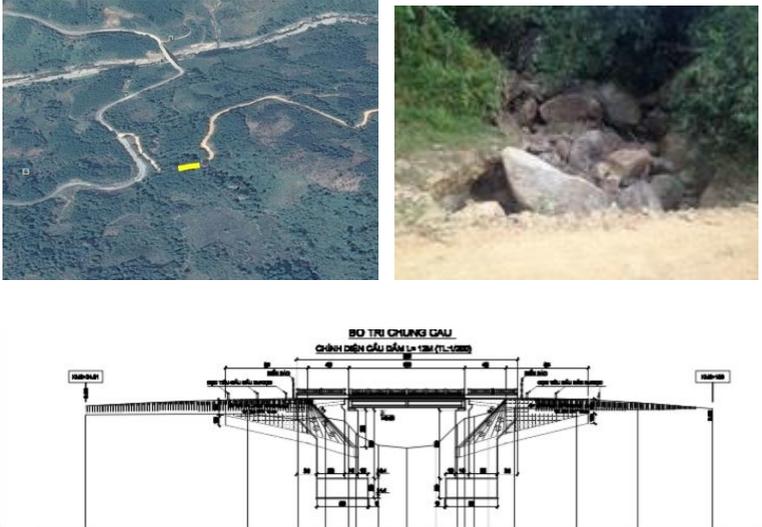
Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Work items	Description of current status of works	Investment scope	Photographs
<p>4. Newly construction of embankment on northern bank of Tra Khuc river</p> <p>Location: Truong Quang Trong ward, Quang Ngai city</p>	<ul style="list-style-type: none"> - The river bank has been landslide to the edge of the Song Tra road. - There are mainly sparse shrubs. 	<ul style="list-style-type: none"> - Characteristic: <ul style="list-style-type: none"> - Length: $L=1.030$ m - Slope embankment, $m=2.0$ - Crest elevation: $+8.0m$; - Embankment toe elevation: $-2.0m$ - Structure: the foundation is a row of reinforced concrete piles (0.35x0.35x8) m lined with reinforced concrete pallets. Revetment form is hexagonal reinforced concrete pallets. - Auxiliary works: longitudinal drainage pipeline of reinforced concrete, size 0.3mx0.4m. 	
<p>5. Re-construction of Va Ranh bridge.</p> <p>Location: Ba Dien commune, Ba To district.</p>	<ul style="list-style-type: none"> - Existing concrete bridges are heavily damaged after the flood of the end 2016. - There is mainly agricultural land for rice and cash crops in the subproject area. 	<ul style="list-style-type: none"> - Characteristic: <ul style="list-style-type: none"> - Length: $L= 37.48m$ - Width: $B= 5.5+2x0.25$ (footpath) = $6.0m$ - 3 spans, $L=9m$ made of reinforced concrete pallets casted in site. - Structure: U-shape reinforced concrete abutment. Reinforced concrete pillar. - Installation of picket, signboards. 	

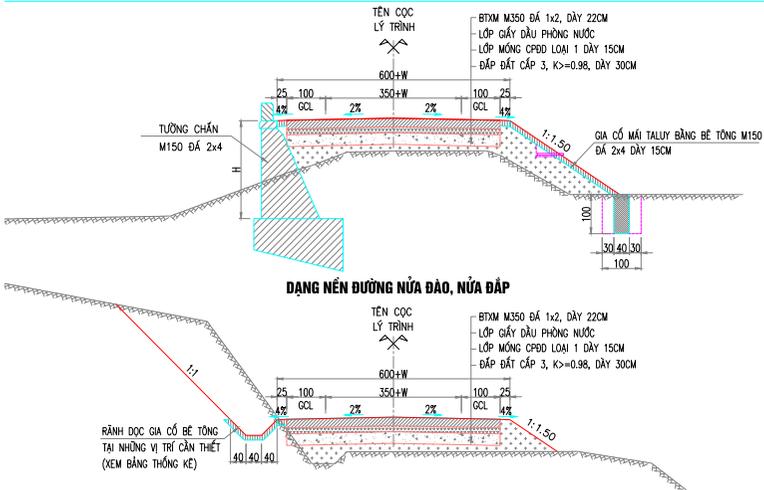
Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Work items	Description of current status of works	Investment scope	Photographs
<p>6. Upgrading road and newly construction of Dam bridge.</p> <p>Location: Tra Lanh commune, Tay Tra district</p>	<ul style="list-style-type: none"> - The current state of the route is a soil road about 3 - 5 m wide. There is no resident around 300 m radius. - There are mainly trees for fruit and other such as eucalyptus, bamboo, acacia mangium wild, ... 	<ul style="list-style-type: none"> - Newly construction of Dam bridge: <ul style="list-style-type: none"> - Length of 12m; Width of 6m; - Consisting of 1 span made of reinforced concrete; - Upgrading approach road with Length of 1,000m and wide of 6m; pavement B=3.5m - Auxiliary works: Staircase with zinc coated handrail, signboard. 	
<p>7. Newly construction of Dong Yen 3 bridge (to replace Dong Thanh temporary, wooden and bamboo bridge).</p> <p>Location: Binh Duong commune, Binh Son district</p>	<ul style="list-style-type: none"> - There is Dong Thanh temporary, wooden and bamboo bridge. - It is used only in the dry season. It is dismantled by local people and using the boat to travel across the river in the flood season. 	<ul style="list-style-type: none"> - Characteristic: <ul style="list-style-type: none"> - Length $L=158.15\text{m}$ - Width $B= 5.2+2\times 0.15 = 5.5\text{m}$ - Bridge consists of 6 spans on steel girder. - Structure: Reinforced concrete abutment, 5 T-shape pillars on foundation of 6-12 reinforced concrete piles 35x35cm, Length of each pile $L=20\text{m}$. - Auxiliary works: <ul style="list-style-type: none"> - Handrail of the bridge, drainage trenches along two sides of PVC D60 pipes and lighting system of LED bulb along 2 sides of the bridge. 	

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Work items	Description of current status of works	Investment scope	Photographs
<p>8. Upgrading road and repairing bridge to resettlement area in Ha Rieng hamlet</p> <p>Location: Tra Phong commune, Tay Tra district</p>	<ul style="list-style-type: none"> - The current route is cemented road of 5 - 7m in width which has been degraded after the disaster. - The existing bridge over the Ha Rieng stream has been completely eroded by abutments. - Along the two sides of the main route, acacia and perennial land. 	<ul style="list-style-type: none"> - Approach road has L =50m for each side, B= 5.5+2x2.5 = 10.5m - Upgrading road: <ul style="list-style-type: none"> - Length L=1691.68 m - Road base width: B=6m - Repairing bridge crossing Ha Rieng stream with length L = 3x9 = 27m. - Structure: cement concrete road and bridge. - Auxiliary works: Cross culvert, interchanges with local roads. 	 

Source: Techno-economic report of the Subproject, 2017

2.3. Construction methods

Work items focus on the construction of embankments and bridges/roads. Construction methods of these items are summarized below.

➤ ***Embankment construction method (for 4 embankments)***

As presented in Table 1, the embankment construction will include works as site preparation, excavation/dredging river banks, embankment and other works behind the dyke. The construction measures for these works are presented as follows:

- Positioning and localizing works;
- Preparing construction site and workers' camps and site office;
- Mobilizing machinery and equipment;
- Locating temporary area at site to gather dredged material.
- Use specialized equipment combined with manual labor to dry dredge canal to the designed elevation;
- Dredged material will be direct transported by truck to landfill (Dong Na landfill in Tinh Thien commune for work item 4 - Newly construction of embankment on northern bank of Tra Khuc river in Quang Ngai city). The excavated soil are used for ground levelling, or dumped at disposal sites for 3 remaining embankments because the rural landfills as these usually not exit.
- Construction of embankment as designed.
- Construction of embankment and auxiliary works

Notes: Dredging activities will not be conducted in flood season, during extreme weather events (heavy rains, floods, cyclones, etc).

➤ ***Road construction methods (for item 6 - Upgrading approach road to Dam bridge and item 8 - Upgrading road to resettlement area in Ha Rieng hamlet)***

The road construction measure includes the following steps:

1. Preparation

- Positioning and localizing works;
- Preparing construction site and workers camps;
- Mobilizing machineries and equipment.

2. Concrete road construction

- Step 1: Digging and dredging top soil. These excavated volume soil are used for ground levelling, or dumped at disposal sites in the local areas (in Tra Lanh and Tra Phong communes, Tay Tra district).
- Step 2: Cover ground to standard rigidity in each design layers
- Step 3: Digging the road mold following the width of each segment; placing formwork and pouring cement concrete under the mold.
- Step 4: Drawing formwork → completed.

3. Construction of asphalt concrete layer

- Step 1: Digging and dredging organic soil

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

- Step 2: Cover ground to standard rigidity in each design layers
- Step 3: Digging the road mold following the width of each segment
- Step 4: Spreading and compacting each soil layer, ballast type 2 and type 1 (within the road) to standard rigidity in design layers.
- Step 5: Drawing formwork → completed.

➤ **Bridge construction methods (For small bridge, concrete girder as Va Ranh, Dam and Dong Yen 3 bridges)**

- Step 1: Installing temporary bridges (such as wooden bridges or pontoon bridges) at convenient locations to ensure the accessibility of people and vehicles involved in traffic.
- Step 2: Demolition of existing damages bridges.
- Step 3: Drilling foundation (pile driving in accordance with scope and geological condition at the construction site)
- Step 4: Constructing abutment/pillar
- Step 5: Installing formwork for cement concrete girder or using crane to mobilizing precast concrete pallets.
- Step 6: Removing formwork → completing the construction

2.4. Material demands and waste disposal

a. List of machines and equipment

List of machineris and equipment tentatively used for the construction works is presented in following Table 2:

Table 2. List of machines and equipment

Machineries/equipment	Quantity (machine)					
	Excavator 1.6m ³	Bulldozer ≤ 140CV	Truck 10T	Electricity generator	Concrete mixer	Mobile crane
1. Embankment on northernbank of Cay Bua river	1	2	2	1	2	1
2. Embankment on the southern bank of Ve river	1	2	2	1	2	1
3. Embankment on the northern bank of Ve river	1	2	2	1	2	1
4. Embankment on northern bank of Tra Khuc river	2	2	4	2	4	1
5. Va Ranh bridge	2	2	4	2	4	1
6. Dam bridge	2	2	4	2	4	1
7. Dong Yen 3 bridge	2	2	4	2	4	1
8. Bridge and road to resettlement area in Ha Rieng hamlet	2	2	4	2	4	1

(Source: FS, 2017)

b. Demand on material and fuel

- Main materials for construction of work items of the subproject are: sand, stone, brick, cement, steel...
- Main materials for installation work of the subproject area: water pipe and water-sector auxiliaries, electric wire, lighting appliances, dustbins...
- In addition, to construct work items of the subproject as scheduled progress, prefabricated material with high quality and quick installation like precast concrete sewer, asphalt concrete... will be used.

Volume of material for construction of work items is presented in Table 3 as follows:

Table 3. Volume of material for construction of work items

Work item	Volume					
	Cement (ton)	Coarse sand	Stone	Asphalt	Dry mansonr y stone	Rocks for embankmen t toe
		(m ³)	(m ³)	(kg)	(m ³)	(m ³)
1. Embankment on northernbank of Cay Bua river	7.956	15	26	-	-	-
2. Embankment on the southern bank of Ve river	6.856	13	207	-	518	15,202
3. Embankment on the northern bank of Ve river	7.231	14	147	-	442	8,882
4. Embankment on northern bank of Tra Khuc river	1,617.000	3,968	6,589	3,727	9,555	-
5. Va Ranh bridge	234.477	600	599	126	-	-
6. Dam bridge	334.013	785	1,599	-	73	-
7. Dong Yen 3 bridge	212.303	524	700	72	21,34	-
8. Ha Rieng Bridge and road	1,222.820	1,249	2,555	-	-	-
Total	3,642.655	7,167	12,423	3,925	10,587	24,083

(Source: FS, 2017)

Excavation and backfilling volume of the work items is presented in Table 4 below:

Table 4. Demolition, excavation and backfilling volume of work items

No	Work item	Demolition volume (m ³)	Excavation volume (m ³)	Backfilling volume (m ³)	Total (m ³)
1	Embankment on northernbank of Cay Bua river	1,844	11,118	16,068	29,030
2	Embankment on the southern bank of Ve river	1,083	8,693	2,480	12,256
3	Embankment on the northern bank of Ve river	316	12,450	3,331	16,097
4	Embankment on northern bank of Tra Khuc river	245	5,154	3,711	9,110
5	Va Ranh bridge	32	4,819	1,957	6,808
6	Dam bridge	499	14,099	3,718	18,316
7	Dong Yen 3 bridge	572	1,700	1,100	3,372
8	Bridge and road to resettlement area in Ha Rieng hamlet	1,100	16,623	3,410	21,132

(Source: FS, 2017)

c. Construction material supply sources

The subproject will use materials with available supply sources in Quang Ngai province like:

+ Stone, crashed stone of all type: Purchased at My Trang, An Hoi quarry stocks in Nghia Ky commune, Binh Dong quarry stock in Binh Son district; Tra Thuy quarry stock in Tra Bong district.

+ Sand, gravel: Supplied by exploitation pits on Tra Khuc, Tra Bong rivers of Quang Ngai province.

+ Backfilling soil: Backfilling soil is taken from borrow pit at Vom mountain – Duc Hiep, Go Cao borrow pit in Binh Son district.

+ Cement, steel, iron, other materials: Purchased from suppliers in Quang Ngai city.

Mentioned material pits and stocks are available and granted with operation certificate in the province. The subproject will use 10-ton trucks to transport material toward subproject site. Main roads for material transport and distance from these roads to subproject's construction site as follows:

Table 5. Main transport roads for materials

Work item	Main transport road for materials	Distance to the subproject area (km)
1. Embankment on northernbank of Cay Bua river	National highway 1A or provincial road 628 → construction site	About 7 km
2. Embankment on the southern bank of Ve river	National highway 1A → Provincial road 627B → Duc Thang commune → construction site	About 10 km
3. Embankment on the northern bank of Ve river	La Ha - Nghia Hiep inter-communal road → Nghia Hiep commune road → construction site	About 10 km
4. Embankment on northern	National highway 24B or NH1A → road on	About 7 km

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Work item	Main transport road for materials	Distance to the subproject area (km)
bank of Tra Khuc river	northern bank of Tra river → construction site	
5. Va Ranh bridge	Provincial road 624 or provincial road 625 → Song Re – Doc Cop inter-communal road → construction site	About 20 km
6. Dam bridge	Provincial road 626 → communal, hamlet roads of Tra Linh → construction site	About 20 km
7. Dong Yen 3 bridge	National highway 1A → Binh Duong inter-communal road → Dong Yen 1, 2, 3 hamlet road → construction site	About 15 km
8. Bridge and road to resettlement area in Ha Rieng hamlet	Provincial road 622B → Tra Phong inter-communal road → Ha Rieng hamlet road → construction site	About 20 km

List the disposal sites/treatment options of the construction wastes, excavated/dreddged materials for each work item:

Table 6. Main transport roads for disposals

Work item	Main transport road for disposals	Distance from landfill/disposal site to the subproject area (km)	Information
1. Embankment on northern bank of Cay Bua river	Construction site → provincial road 628 → National highway 1A → Inter-commune roads → used for ground levelling, or dumped at disposal site in Nghia Phuong commune or transportation to Nghia Ky landfill - Tu Nghia district.	About 20 km	<ul style="list-style-type: none"> - Name: Nghia Ky landfill - Location: Nghia Ky commune, Tu Nghia district - S: 16 ha (until 2020) and 7 ha for extension. - Capacity: 85 - 170 tons/day - Start year: 2011
2. Embankment on the southern bank of Ve river	Construction site → Provincial road 627B → National highway 1A → Inter-commune roads → used for ground levelling, or dumped at disposal site in Duc Thang commune or transportation to Duc Lan landfill - Mo Duc district	About 25-30 km	<ul style="list-style-type: none"> - Name: Duc Lan landfill - Location: Tu Son 2 hamlet, Duc Lan commune, Mo Duc district - S: 2 ha (until 2020) and 5 ha for extension. - Capacity: 18 - 25 tons/day - Start year: 2008
3. Embankment on the northern bank of Ve river	Construction site → La Ha - Nghia Hiep inter-communal road → used for ground levelling, or dumped at disposal site in Nghia Hiep commune or transportation to Nghia Ky landfill - Tu Nghia district	About 25 - 30 km	<ul style="list-style-type: none"> - Location: Nghia Ky commune, Tu Nghia district. - S: 16 ha (until 2020) and 7 ha for extension. - Capacity: 85 tons/day - Start year: 2011
4. Embankment on northern bank of Tra Khuc river	Construction site → road on northern bank of Tra river → National highway 1A → transportation to Dong Na landfill in Tinh Thien commune,	About 7 - 10 km	<ul style="list-style-type: none"> - Name: Dong Na landfill - Location: Khanh Lam hamlet, Tinh Thien

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Work item	Main transport road for disposals	Distance from landfill/disposal site to the subproject area (km)	Information
	Son Tinh district.		<ul style="list-style-type: none">- commune, Son Tinh district- S: 5 ha (until 2020) and 20 ha for extension.- Capacity: 100 tons/day (phase 1) and 200 tons/day (phase 2).- Start year: 2009
5. Va Ranh bridge	Construction site → Song Re – Doc Cop inter-communal road → Provincial road 624 or provincial road 625 → used for ground levelling, or dumped at disposal site in Ba Dien commune or Ba Cung landfill in Ba To district.	About 5 - 10 km (for disposal site in Ba Bien commune); About 25-30km (for Ba Cung landfill)	<ul style="list-style-type: none">- Name: Ba Cung landfill- Location: Ba Cung commune, Ba Dien district- S: 2 ha (until 2020)- Capacity: 15 - 20 tons/day- Start year: 2010
6. Dam bridge	Construction site → communal, hamlet roads of Tra Linh → Provincial road 626 → used for ground levelling, or dumped at disposal site in Tra Lanh commune or Go Ro landfill in Tay Tra district	About 5 - 10 km (for disposal site in Tra Lanh commune); About 30km for Go Ro landfill	<ul style="list-style-type: none">- Name: Go Ro landfill- Location: Go Ro commune, Tay Tra district- S: 1.5 ha (until 2020) and 1 ha for extension.- Capacity: 15 tons/day- Start year: 2012
7. Dong Yen 3 bridge	Construction site → Dong Yen 1, 2, 3 hamlet road → Binh Duong inter-communal road → National highway 1A → used for ground levelling, or dumped at disposal site in Binh Duong commune or transportation to Co Hue landfill - Binh Son district.	About 20 - 25 km	<ul style="list-style-type: none">- Name: Co Hue landfill- Location: Co Hue commune, Binh Son district- S: 2.2 ha (until 2020)- Capacity: 30 tons/day- Start year: 2010
8. Bridge and road to resettlement area in Ha Rieng hamlet	Construction site → Ha Rieng hamlet road → Tra Phong inter-communal road → Provincial road 622B → used for ground levelling, or dumped at Go Ro disposal site in Tra Phong commune.	About 3 - 5 km	<ul style="list-style-type: none">- Name: Go Ro landfill- Location: Go Ro commune, Tay Tra district- S: 1.5 ha (until 2020) and 1 ha for extension.- Capacity: 15 tons/day- Start year: 2012

d. Labour demand and worker camp

Demand for workers for construction of each item is about 30 people. Due to small to moderate construction scales and simple infrastructures, most workers will be recruited locally. It is not expected that big worker camps will be required.

Most of the subproject sites are at locations convenient for gathering materials as well as worker camps. However, the construction is carried out at many places of Quang Ngai province, with limited supply of water and electricity, the number of workers is not high (about 20-30 people)

and constructing in short time (10 - 12 months). So that, it is expected to use local people and rent resident houses in each subproject area to make camps for workers.

e. Power and water supply system

- Use electricity from national power grid for lighting system in commune/township in the subproject area.
- Use ground water from bored wells of residents in the area for domestic purpose.
- Use selectively surface water from Cay Bua, Ve, Tra Khuc, Tra Bong rivers and streams for construction purpose.

2.5. Total investment of the subproject

Estimated total investment of the subproject is shown as follows:

Table 7. Details of the sub-component cost

No	Work item	Total investment (billion VND)	Total investment (million USD)
II	Flood control subcomponent		
1	Emergency resilient reconstruction of northern bank of Cay Bua river	25.45	1.14
2	Embankment on southern bank of Ve river	12.58	0.56
3	Embankment on northern bank of Ve river	12.60	0.56
4	Embankment on northern bank of Tra Khuc river	53.08	2.37
III	Transport subcomponent		
1	Va Ranh bridge	8.54	0.38
2	Dam bridge L=12m (Tra Lanh)	10.63	0.48
3	Dong Yen 3 bridge	24.18	1.08
4	Ha Rieng river bridge and road to the resettlement area in Ha Rieng village	3.16	0.14

Note: Exchange rate 1 USD = 22,700 VND

2.6. The subproject schedule

Each work item of the subcomponent will be constructed in 10-12 months (from 7/2017 - 7/2018)

2.7. Orgnization for subproject implementation

- Subproject employer: Quang Ngai provincial Subproject Management Unit of Construction works for Agriculture and Rural Development.
- Compensation and site clearance: Signing contract with Land Fund Development Centre of Quang Ngai province – district/city branch to prepare plan and carry out the payment of compensation for each work item.
- Appraisal and approval: Quang Ngai Provincial People’s Committee is the competent authority to appraise and approve.
- Operation and management agency: The subproject is small scope and as decentralization, subproject district People’s committee will assign ward/commune People’s committee to establish the agency for operation and management of the works.

3. NATURAL ENVIRONMENTAL AND SOCIO-ECONOMIC CONDITIONS**3.1. Geological and topographical conditions**➤ *Topographical condition*

Embankment upgrading works and the Dong Yen 3 bridge are located in relative flat plain areas, including Quang Ngai city, Tu Nghia district, Mo Duc district, Binh Son district). Three bridges (Dam, Va Ranh and the one on the road to Ha Rieng hamlet) and approach roads will be built/rebuilt or upgraded in mountainous areas (Ba To district, Tay Tra district).

The plain area is adjacent to the sea, at high risk of being affected by freak wave, localised erosion and landslide.

The mountainous area has rather complex terrain with abrupt mountain range, steep slopes, . There are some geological disturbances at some areas causing localised landslide and erosion risks.

➤ *Geological condition:*

According to result of geological survey at subproject areas, the plain generally consists of 6 layers:

Table 8. Geological condition at the plain subproject area

Layer	Characteristic	Thickness (m)
Layer 1	Alluvial soil: Brown, dark yellow sandy soil, hard plastic alluvial deposit (aQ), loose structure, soil level I-III/XII.	1.0 ÷ 2.5
Layer 2	Coarse granular sand of light yellow, pale gray, alluvial deposit (aQ), water saturated state, medium compact, soil level I-III/XII.	2.0 ÷ 5.5
Layer 3	Blue grey, black and blue grey clay, originated from alluvial deposit (aQ) at loose and plastic state, level I-III/XII.	0.5 ÷ 2.8
Layer 4	Layer 4: Coarse sand mixed with small white grey gravel originated from alluvial deposit, water saturated, medium constitution, soil level I-III/XII.	3.1 ÷ 6.5
Layer 5	Light grey clay, pale yellow, originated from alluvial deposit (aQ) of hard plastic and medium compact, soil level I-III/XII.	1.5
Layer 6	Clay mixed with gravel, reddish brown, dark red, hard plastic, originated from alluvial deposit (aQ), moderately compact, soil level I-III/XII	0.7 ÷ 5.7

According to the results of geological survey in the subproject location, landslide happens locally at some sections. Geological structure of the surveyed area is classified into 2 main types:

+ Deluvial deposit (edQ): including semi-clay and grits, debris of native rock. This layer develops on the native rock layer, thickness varies from 2-10m, distributed mostly on hilly area and mountain foot area.

+ Alluvial deposit layer (eQ): including sand and gravel layer developed on the native rock, mainly present at stream area.

3.2. Climatic conditions

The subproject areas all share climatic condition of Quang Ngai province which is tropical monsoon with high heat. The climate is divided into two distinct seasons, including rainy season and dry season. Quang Ngai has average annual rainfall of 2,685mm, mainly concentrated in the last four months of the year, and the province is suffer from drought in the remaining months. The average annual rainy day is 129 days, most in the months from September to December. Southeast wind prevails in Quang Ngai, and northeast winds also blows sometimes because of its terrain and mountain range. Average temperature in the year is 25°C, the highest is 41.5°C and the lowest is 8°C. Temperature varies widely between day and night and months of the year.

The hottest month (May) has an average temperature of 34.7°C, the coolest month (January) has an average temperature of 18.8°C. There is difference between temperature of the mountainous area compared to temperature in the plain: mountainous area's average temperature is lower, but the maximum temperature is higher and the minimum temperature is lower. The annual average humidity is 84%, the monthly humidity is 90% to be maximum and 60% to be minimum.

3.3. Hydrological conditions

The subproject has 4 work items of river embankment on 3 rivers (among the 4 major rivers) of Quang Ngai province, including Tra Bong, Tra Khuc and Ve rivers. These rivers all run latitudinally or semi-latitudinally and rather evenly distributed all over the plain of Quang Ngai province. Hydrological conditions of the main rivers are presented in following Table 9:

Table 9. Hydrological conditions of major rivers of Quang Ngai province

River name	Length of river (km)	Length of basin (km)	Width of basin (km)	Area of basin (km ²)
Tra Bong	45	56	12.4	697
Tra Khuc	135	123	26.3	3,240
Ve	90	70	18.0	1,260
Tra Cau	32	19	14.0	442

(Source: <http://www.quangngai.gov.vn>)

Besides, there are 3 streams at the site of bridge construction such as Va Ranh stream, Ha Rieng stream. Some of the hydrological features of these streams are as follows:

Va Ranh Stream is a medium basin, a basin flowing from small streams and flows into a large area. This is one of the large streams in Ba Dien commune, the stream about 15 - 20 m wide, flow and velocity during the flood season is very large.

Ha Rieng stream with 10 - 15 m wide is one of the water supply sources in Tay Tra District, providing water irrigation for almost all rice and vegetable land in Tra Phong commune. Currently, it is divided into "dry" and "wet" sections. The upstream section of the hydroelectric dams with large water reserves. The downstream of the dam is depleted with cobblestones, bottomless in the dry season. The repairing bridge area has been carried out in the exhausted section of Ha Rieng stream.

3.4. Solid waste management system

Most of the subproject areas have not a sanitated solid waste collection and treatment system, except in Quang Ngai City (the area for construction of embankment on the northern side of the Tra Khuc River). Quang Ngai Urban Environmental joint stock company (URENCO) is collecting and transporting daily garbage to disposal at Dong Na landfill in Tinh Thien commune, Son Tinh district (about 7 - 10 km far from the site). In the remaining subproject areas, there is no collection and treatment system, solid waste is dumped into vacant land or low-lying areas (usually in abandoned fields, dykes, hillsides, etc.) far from residential areas in the communes. However, there are some landfills in the central areas of the subproject districts, which are more than 20 km far from the sites (see Table 6) such as Nghia Ky landfill in Tu Nghia district (16 ha); Duc Lan landfill in Mo Duc district (2 ha); and Cu Hue landfill in Binh Son district (5 ha). These areas can be a source of waste for construction sites wherever there is no demand to use excavated soil, dredged material, demolition material, etc. for the purpose of leveling or planting trees at the local sites.

3.5. Wastewater collection and treatment system

Currently, drainage at 8 subproject areas is natural, runoff follows existing ditches to streams and rivers inside and outside the area; There is no wastewater collection and treatment system in the subproject areas.

3.6. Power and water supply system

All 8 subproject areas have access to national power grid supplying electricity to hamlets/communes. However, some sites in mountainous communes (area for construction of Dam bridge, Ha Rieng bridge of Tay Tra district) may be too far from existing power sources (> 100km) thus the construction contractors may need to use generators to supply electricity for construction.

The area on the northern bank of Tra Khuc river have access to clean water supply system of Quang Ngai city. The remaining subproject areas do not have access to piped water supply system, people mostly use water from bored well/surface water/rainwater for daily use.

3.7. Road systems

For 8 work items of the subproject which will be constructed at different areas of Quang Ngai subproject, the transport system leading to construction sites is mainly roadways, including national highway, provincial road, inter-communal road, hamlet road as follows:

- National highway 1A: The section running through the province is 98km long, 40m wide, road pavement of asphalt concrete with good quality, convenient for vehicle movement. National highway 1A runs through the start point of the subproject embankment sites on northern bank of Cay Bua river and northern bank of Tra Khuc river.
- National highway 24: connecting NH 1A (the section running through Thach Tru, Mo Duc district of Quang Ngai province) with Kon Tum province, with length of 69km. NH 24B has length of 108km and NH 24C is 118km long.
- Provincial road: Including 18 routes with total length of 520.5km, road pavement of asphalt concrete, rather good quality, except for some sections running through mountainous area (near the subproject area in Tay Tra district and Ba To district) which had been seriously damaged due to natural disaster event in 12/2016.
- Inter-communal and hamlet roads: mainly cement concrete road, width of 5 - 12 m, rather good quality. Some roads at mountainous communes are soil road or aggregate, different for movement...

The subproject expects to use 10-ton truck to transport material and to dispose waste. With mentioned existing status of the road system, it is viable that 10-ton truck can approach construction sites of the subproject.

3.8. Existing Environment Quality

To assess the environmental quality at the subproject sites, 10 air samples, 8 surface water samples, 6 ground water samples and 5 soil samples were taken on 10th to 18th March 2017 at 8 subproject areas. The results showed that 100% of the parameters in air and surface water samples is smaller than the limits of the national standards (QCVN 05:2013/BTNMT; QCVN 26:2010/BTNMT); and QCVN 08-MT:2015/BTNMT). This parameters show that the quality of air environment has not yet polluted in the subproject areas; surface environmental quality in the Ve River, Cay Bay River, Tra Khuc River and Tra Bong River have no signs of pollution.

Most parameters of groundwater quality in subproject area are lower than the standard by QCVN 09-MT:2015/BTNMT, except for Coliform N6 (well water in Ho Ngoc Anh household

near the embankment on the north bank of Cay Bay River in Nang Tay 1 Village, Nghia Phuong Commune) exceeds the standard of 1.67 times. So that, there have been signs of pollution due to domestic wastewater that higher than the standards in the crowded resident areas.

The subproject shall drill/dredge soil or sediment from river-banks to construct embankment, bridge piers/ abutments at 4 m - 20 m deep. In order to determine if such soil/sediment is contaminated with toxics substances such as heavy metals, 5 samples was taken in the subproject sites to inspect the quality. The analysis results unveiled that Cu, Pb, Zn, Cd, As, Hg are within the allowable limits of QCVN 03-MT:2015/BTNMT. Therefore, the excavated soil/sediment of embankments, bridge piers/ abutments may be used for ground levelling, or dumped at disposal site in subproject communes.

3.9. Natural/biological resource

➤ *Plain area*

5 work items located on plain are, including (1) embankment on the northern bank of Cay Bua river, (2) Embankment on southern bank of Ve river- Mo Duc district, (3) Embankment on northern bank of Ve river - Tu Nghia district, (4) Embankment on northern bank of Tra Khuc river - Quang Ngai city and (7) construction of Dong Yen 3 bridge - Binh Son district. These areas have agricultural ecosystem, with no precious animal and plant resources but mainly manmade biological and ecological resources so their stability and sustainability are not high, and with little ecological value, including:

- Vegetation system in the subproject's plain area: characterized by plain's ecosystem with major crops of rice, corn and sweet potatoes... and fruit tree or timber tree like eucalyptus, longan, litchi, D. duperreanum tree... and grasses. There iare no rare and precious plant species.
- Animal: not diverse, only having dicaeidae, sturnidae, mice, lizard, frog... There are no rare and precious animal species.
- Aquatic biological system mainly consists of perch fish, small fish, snails, shellfish, shrimp, crab... and plants of water hyacinth, duckweed, water morning glory, jussiaea repens, axonopus compressus, ...



Plant along the northern Cay Bua river bank.



Banana tree and crops along the southern Ve river bank.



Plants along the northern Ve river bank



Plants along the northern Tra Khuc river bank

➤ *Mountainous area*

3 work items including (5) Construction of the Va Ranh bridge – Ba To district; (6) Construction of Dam bridge and (8) construction of road and bridge to the resettlement area in Ha Rieng - Tay Tra district are located in mountainous area. All subproject areas are 15-30 km away from the nearest nature reserve/forest (Kon Chu Rang nature reserve in Ba To district, Quang Ngai province andrain forest in south of Truong Son mountain is in Tay Tra district).

There is no appearance of animals or plants in the Red Book of Vietnam. The forest scatteredly distributed near the subproject area is productive forest with mainly plants of eucalyptus, acacia mangium, *A.auriculiformis* which are harvested periodically. In particular, the construction of the road and bridge to the resettlement area in Ha Rieng hamlet - Tay Tra district will acquire about 2,420 m² of forest production land from 6 households. This area is mainly planted with *Acacia mangium* for periodic timber harvesting with sparse density, small canopy and small trunk size.

In addition, there are also terrestrial and aquatic ecosystems in the subproject area like:

- Horticultural ecosystem: This ecosystem mainly consists of industrial trees like longan, litchi, eucalyptus, acacia mangium, bamboo trees...
- Agricultural ecosystem: Main plants are rice, crops or sweet potato, sugarcane and elephant grass (*Pennisetum purpureum*).
- Animal system: mainly domestic animals such as dogs, cats, pigs, chickens, ducks, buffalos, cows, goats... Reptiles and frogs like lizards, snakes, and frogs... live in fields or rivers. Some species are found at home gardens and around residential areas such as geckos, toads and bullfrogs. Viable birds in the area such as *Fringilla coelebs*, *Passeriformes*, *Spilopelia chinensis*.
- The aquatic fauna and flora are mainly fish, snails, crustaceans (shrimps, crabs...) living in streams...



Plants at the construction area of Va Ranh bridge



Plants at the construction area of Dam bridge and road



Plants at the construction area of Ha Rieng road



Plants at the construction area of Ha Rieng bridge

3.10. Socio-economic condition

The work items are implemented on the territory of 8 communes/wards of Tay Tra, Ba To, Tu Nghia, Binh Son, Mo Duc districts and Quang Ngai city. The socio-economic information of the subproject communes/wards is shown in Table 10.

Table 10. Socio-economic condition of ward/commune

No	Ward/commune	District/city	Area (ha)	Population (people)	Household (HHs)	Natural population growth rate (%)	Percentage of poor household (%)	Percentage of near poor household (%)
1	Nghia Phuong	Tu Nghia	675	8,681	2,102	1.24	3.95	3.44
2	Nghia Hiep	Tu Nghia	1,181	14,207	3,191	0.93	3.51	10.7
3	Duc Thang	Mo Duc	1,181	8,825	1,765		15.6	
4	Ba Dien	Ba To	4,443				34.05	
5	Tra Lanh	Tay Tra	2,897	2,060	482		79.05	12.5
6	Tra Phong	Tay Tra	4,032	4,288	1,033	1.87	79.08	
7	Binh Duong	Binh Son	886.4	8,406	2,297			
8	Truong Quang Trong	Quang Ngai city	926.4	12,157	2,476			

(Source: Socio-economic development report 2016 of wards/communes)

Besides, 3/8 communes including Ba Dien, Tra Lanh and Tra Phong communes have 46 ethnic minority households who are Co and H're people being affected by the subproject. Information on socio-economic condition of communes with affected ethnic minority households is presented in Table 11 below:

Table 11. Information on socio-economic condition of communes with ethnic minority

Commune	Number of household (HHs)		Population (people)		Percentage of poor household (%)	Percentage of near poor household (%)
	Total HHs	Ethnic minority HHs	Total	Ethnic minority people		
Ba Dien commune	417	397	1,626	1,541	34.1	3.8
Tra Phong commune	1,008	961	4,192	3,997	77.98	7.64
Tra Lanh commune	478	467	2,020	1,975	83.47	7.74

(Source: Results of socio-economic survey, April 2017)

3.11. Natural disasters in Quang Ngai province

Quang Ngai province is the most vulnerable area suffering from impacts of most of natural disaster: storm, tropical depression, flood, landslide, thunderstorm, typhoon, lightning, northeast monsoon, flash flood... which tends to have more complicated occurrence and increase in quantity and intensity. According to the statical data of Quang Ngai Department of Agriculture and Rural Development:

Storm and tropical depression. Average occurrence frequency: 0.28 times/year; time for popular occurrence: from May to December; and the popular intensity of the storms from 9 to 12 times.

Flood and inundation: Average occurrence frequency: 5-7 floods/year; Time of occurrence: (i) Periodic flood (May-rain flood): Usually occurs in May or June; (ii) Early flood: Usually occurs at the end of August and in early September; (iii) Major floods: Occurring in October and early November; (iv) Late floods: Most often occurring in late December and early January of the following year. Flood peak appeared from 3 to 3 +1m warning level.

Flash flood: The mountainous districts of the province including Tay Tra, Tra Bong, Son Ha, Son Tay, Minh Long, Ba To... are at high risk of flash floods. Flash floods often occur suddenly, within narrow space but with great intensity causing serious damage to life and property. At present, flash flood is the type of natural disaster that is unpredictable and the prevention is extremely difficult.

Erosion of river bank, coastal line: Erosion occurs most at all rivers, streams and coastal lines. The average erosion speed is from 5÷10m/year, or even 30m/year at some areas (mainly at coastal districts and areas around 4 major rivers of the province like Tra Bong, Tra Khuc, Tra Cau and Ve rivers). In 2015, total length of eroded sections was: 139.49 km of river bank; 29.38 km of coastline.

Mountain landslide: At present, there are 75 points at the risk of mountain landslide among which 18 locations are at high risk distributed in the districts of Ba To, Tra Bong, Tay Tra, Minh Long, Son Ha, Son Tay.

Northeast Monsoon (cold air) from October to March of the coming year. Annually, there are 14-15 cold air periods on average. The northeast monsoon comes generally together with tropical disturbances in the south of the East Sea such as typhoons, tropical depression, tropical convergence... leading to prolonged heavy rains causing floods and serious inundation.

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Thunderstorm, hurricane, lightning: On average, there are 85-110 days with thunderstorms in the province. Mountainous area is where the thunderstorms occur the most, whereas the islands only have about 35 days of thunderstorm. In 2008, there were 10 big thunderstorms, including tornado that occurred in March, May, June, July, October and November.

In addition, there are also other types of natural disasters occurring in the province such as: drought, salinity intrusion, sea level rise, hail, fog, hoar, southwest wind, prolonged cold and severe cold together with strong winds in the sea... and risk of earthquake and tsunami.

The situation of natural disaster events in 2016 in Quang Ngai province is summarized as follows:

- People’s life: 14 dead; 04 missing and 34 injuries;
- Housing condition: 53 totally damaged houses (accounting for over 70%); 47 houses damaged 50-70%; 155 houses damaged 30-50%; and 388 houses damaged less than 30%. Besides, 17 houses were damaged by landslide requiring emergency relocation.
- Regarding irrigation, the total irrigation works being damaged included 49 dams (mainly weir); 177.950m of canal, 63 sewers, 8 embankments with total length L=687m; 05 dykes with total eroded length L=4,395m; river bank with landslide of L= 23,380m;
- Regarding transport system: Statistical data on damaged transport system included (i) 04 national highways like NH24, 24B, 24C, Truong Son Dong road, with length L=17,573m; 11 provincial roads with damage road pavement area of 477,900m²; (iii) local roads (ward/commune road) with eroded length L=369,387m; 6 collapsed bridges (Duc Pho: 4 and Mo Duc: 2); (iv) 28 damaged bridges...
- Regarding health and education: 4 schools were severely damaged by mountain landslide in districts of Ba To, Tay Tra, Son Tay. In addition, most of schools in Nghia Hanh, Mo Duc, Tu Nghia, Duc Pho districts were flooded, interrupting learning activities of pupils. Regarding health, 8 medical stations in Nghia Hanh, Mo Duc, Tu Nghia districts, Quang Ngai city and Son Tay district were flooded.

3.12 Site-Specific Characters and Sensitive Receptors

The existing conditions at around each construction sites are showed as follow:

Table 12. Site-Specific Characters and Sensitive Receptors

Item	Location	Photo	Outstanding Feature
1. Cay Bua River – southern Embankment, 780 m	Beginning point (Km 0+00)		- Location of the river section adjacent to provincial road 628. - Navigation density on the river is low, about 3-5 small fishing boats (netting) daily.
	From Km 0+200 to Km 0+600		- About 100 households in Nang Tay 1 hamlet living near the river bank, about 50-100 meters away. - Trees such as acacia, eucalyptus, bamboo... are planted by local people for soil conservation and protection of river bank.

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Item	Location	Photo	Outstanding Feature
	Pumping station of Nghia Phuong commune		<ul style="list-style-type: none"> - This is the river pumping station of Nghia Phuong commune, taking surface water from Cay Bua river for agricultural irrigation (about 20 ha). - It is 30 m far from the site of the northern bank of Cay Bua river.
	Culture house of Nang Tay 1 hamlet		<ul style="list-style-type: none"> - This structure belongs to Nghia Phuong commune and is the place for cultural activities and community meeting of people in Nang Tay hamlet (more than 200 households). - It is 30 m far from the site of the southern bank of Ve river.
	Oriental medicine treatment association of Tu Nghia district		<ul style="list-style-type: none"> - This association is 150m far from the embankment of Cay Bua river toward Cay Bua bridge. - There are 28 private treatment rooms and 1 room for collective treatment. - There are not many patients (more than 10 times/day).
	Ending point (Km 0+780)		Cay Bua bridge on NH.1A
	Disposal site in Nghia Phuong commune or transportation to Nghia Ky landfill - Tu Nghia district	 <i>Nghia Ky landfill</i>	<ul style="list-style-type: none"> Construction site → provincial road 628 → National highway 1A → Inter-commune roads → used for ground levelling, or dumped at disposal site in Nghia Phuong commune or transportation to Nghia Ky landfill - Tu Nghia district. About 20 km from landfill to the site.
2. Ve River – southern Embankment, 445 m	Beginning point (Km 0+00)		<ul style="list-style-type: none"> - Beginning point is next to the current embankment in Thanh Long hamlet. - Navigation density on the river is low, about 3-5 small fishing boats (netting) daily.

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Item	Location	Photo	Outstanding Feature
	Fishery farming pond		<ul style="list-style-type: none"> - It is affected by construction of the southern embankment of Ve river. This is fish pond mixed with feeding area of poultry (ducks, goose) as a small farm of a household in Duc Thang commune, 2 harvests/year. - It is 30 m far from the site of the southern bank of Ve river.
	From Km 0+00 to Km 0+445		<ul style="list-style-type: none"> - There is one residential area along the river bank (about 150 households) of Thanh Long hamlet. Nearest distance to construction site is 50 - 200m
	Ending point (Km 0+445)		<ul style="list-style-type: none"> - Ending point is at the river groyne No.2, adjacent to residential areas in Thanh Long hamlet. - River section with dense vegetation cover and trees such as Banana, Bamboo, Eucalyptus ... are planted by local people for soil conservation and protection of river bank.
	Primary school of Duc Thang commune		<ul style="list-style-type: none"> - On the construction materials and waste transportation roads for embankment on southern bank of Ve river. It is 10 m far from the route. - The school has 40 teachers and over 1,000 pupils. - Pupils' time to and from the school every weekday: 7h-7h30; 11h-11h30; 13h-13h30; 16h30 - 17h30.
	Disposal site in Duc Thang commune or transportation to Duc Lan landfill - Mo Duc district	 <i>Duc Lan landfill</i>	<ul style="list-style-type: none"> - Construction site → Provincial road 627B → National highway 1A → Inter-commune roads → used for ground levelling, or dumped at disposal site in Duc Thang commune or transportation to Duc Lan landfill - Mo Duc district. - About 30 km from landfill to the site.

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Item	Location	Photo	Outstanding Feature
3. Ve River – Northern Embankment, 542 m	Beginning point (Km 0+00)		- Beginning point is next to the current embankment in The Binh hamlet.
	From Km 0+00 to Km 0+ 542		- There is no resident living along the embankment. The embankment is far from the nearest residential area of The Binh hamlet around 300-500m. - There is agricultural land along the route (about 2 ha of more than 10 households in The Binh hamlet) for rice and vegetation crops. - There is no sensitive area.
	Waterway traffic		- Navigation density on the river is rather low, there are daily 3-5 small fishing boats operating on the river.
	Ending point (Km 0+542)		Ending point is in Alley A, An Mo hamlet, Duc Loi commune
	Disposal site in Nghia Hiep commune or transportation to Nghia Ky landfill - Tu Nghia district	 <i>Nghia Ky landfill</i>	Construction site → La Ha - Nghia Hiep inter-communal road → used for ground levelling, or dumped at disposal site in Nghia Hiep commune or transportation to Nghia Ky landfill - Tu Nghia district About 30 km from landfill to the site.
4. Tra Khuc River – northern embankment, 1030 m	Beginning point (Km 0+00)		Beginning point is at Tra Khuc bridge

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Item	Location	Photo	Outstanding Feature
	Residential area in Truong Quang Trong ward		- There is one road along the northern bank of Tra Khu river. Along the road, no resident lives at the river side but at the roadside there is crowded residential area belonging to Truong Quang Trong ward.
	Km 0+100		- Agricultural land: Maize, sweet potato and cassava are planted in riverside alluvial grounds. - There is no sensitive area.
	Km 0+ 500		- Navigation density on the river is not high, everyday around 10-20 small fishing boats and material-carrying barges (sand, gravel) navigate on the river
	Ending point (Km 1+ 030)		Ending point is the section of Tra Khuc River next to the Bo Bac Song Tra road.
	Disposal site	 Dong Na landfill	Construction site → road on Northern bank of Tra river → National highway 1A → transportation to Dong Na landfill in Tinh Thien commune, Son Tinh district. About 7 - 10 km from landfill to the site.
5. Reconstruction of Va Ranh Bridge, L=38 m, B= 6 m	Existing bridge		- Located in mountainous commune with disadvantageous terrain. - There is no resident living within 500m around the area. - Existing Va Ranh bridge had been damaged seriously by the flash flood event in 2016.

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Item	Location	Photo	Outstanding Feature
	Va Ranh stream is dried in dry season		<ul style="list-style-type: none"> - In mountainous areas, subjected to flush flood. Meanwhile there is no water in the stream in dry season - There is no sensitive area and no waterway activities on Va Ranh stream.
	Disposal site	About 5 - 10 km from disposal site to the subproject area.	Construction site → Song Re – Doc Cop inter-communal road → Provincial road 624 or provincial road 625 → used for ground levelling, or dumped at disposal site in Ba Dien commune.
6. Dam bridge and access road (Tra Lanh - Tra Nham inter-communal road)	Beginning point (Km 0+00)		The beginning point is intersection with provincial road 262
	From Km 0+00 to Km 0+900		<ul style="list-style-type: none"> - Located in mountainous commune with disadvantageous terrain. - There is no resident living within 500m around the construction bridge area. - Perennial crops along the sides of road such as Bamboo, Eucalyptus,... - There is no sensitive area
	Dam bridge area (Km 0+160)		The Dam bridge crosses the small stream with L = 12m. In the flood season, water level is higher causing flood to the road, disrupting the travelling of local people.
	Ending point (Km 1+ 030)		Ending point is intersection with small village in Tra Lanh commune.
	Disposal site	About 5 - 10 km from disposal site to the	Construction site → communal, hamlet roads of Tra Linh →

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Item	Location	Photo	Outstanding Feature
		subproject area	Provincial road 626 → used for ground levelling, or dumped at disposal site in Tra Lanh commune
7. Dong Yen 3 bridge	Dong Thanh existing bridge		- At the location for construction, there is bamboo/wooden brige via Tra Bong river. It is used only in the dry season. It is dismantled by local people and using the boat to travel across the river in the flood season.
	Residential area		- There are residential areas at two terminals of the bridge like Dong Yen 3 and Dong Yen 1 with rather high population density, 50-200m to the bridge as the nearest distance. - There is no sensitive area
	Waterway traffic		- Navigation density on the river is not high, everyday around 10-20 small fishing boats and material-carrying barges (sand, gravel) navigate on the river.
	Disposal site		Construction site → Dong Yen 1, 2, 3 hamlet road → Binh Duong inter-communal road → National highway 1A → used for ground levelling, or dumped at disposal site in Binh Duong commune or transportation to Co Hue landfill - Binh Son district. About 20 - 25 km from the landfill to the site.
8. Ha Rieng bridge and access road	Beginning point Km0+0.00		- The beginning point is intersection with provincial road 622B at Km60+200. - Located in mountainous commune with disadvantageous terrain.
	Productive forest land		- Productive forest is present along the road to the resettlement area in Ha Rieng hamlet. It is 10 m far from the site. - This is forest for periodically timber exploitation (mostly acacia mangium tree) with small size

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Item	Location	Photo	Outstanding Feature
			(diameter 5-10 cm), small canopy and low-density.
	From Km0+354 to Km1+00		- This section passes the Ha Rieng Bridge - The abutments is damaged, there is acacia plantation along the sides of this section.
	Km1+00		- There is no resident living along the beginning and middle sections of the road. - At the end section of the road, there is residential group belonging to the resettlement area in Ha Rieng hamlet, including 127 households with the nearest distance of 50m.
	Ending point Km1+692		Ending point is at the end of Ha Rieng hamlet.
	Disposal site	About 3 - 5 km from from disposal site to the subproject area.	Construction site → Ha Rieng hamlet road → Tra Phong inter-communal road → Provincial road 622B → used for ground levelling, or dumped at Go Ro disposal site in Tra Phong commune.

Note:

- There is no PCR being affected in all eight subproject areas.
- There is no resettlement household in all 8 subproject work items. There are 46 ethnic minority households in Tra Lanh, Tra Phong Communes of Tay Tra District and Ba Dien commune of Ba To district affected by the subproject implementation. There is 1 household being directly affected in business activities for land acquisition serving the construction of bridge and road to resettlement area in Ha Rieng hamlet, Tra Phong commune.
- Most of the subproject areas are far from residential areas and in sparsely populated or unpopulated areas, except for three areas: (i) embankment of the northern Cay Bua River (about 100 households living near the river bank, about 50-100 meters away), (ii) embankment on the southern bank of Ve river (about 50 households living near the riverside, distanced about 100m), (iii) construction of Dong Yen 3 bridge (there are 2 crowded residential areas at two terminals of the bridge, the nearest distance is about 50 - 200m).

4. ENVIRONMENTAL AND SOCIAL IMPACTS

4.1. Type and scope of impacts

The affected areas will benefit from restored access to public services/facilities, thereby increasing the economic growth and access to social services. The reconstructed critical flood prevention structures and the restored roads and bridges will also increase the safety of people and assets and serve as supply and rescue lines in the event of a disaster.

However, the subproject will be some negative environmental and social impacts in the subproject areas during the implementation. The potential social and environmental impacts are screened in Table 13.

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Table 13. Level of negative impacts of Quang Ngai subproject

Component	Physical aspects			Biological aspects		Soci aspects				Others	
	<i>Air, noise, vibration</i>	<i>Soil, water</i>	<i>Solid waste, dredged material</i>	<i>Forest, natural ecosystem</i>	<i>Fish, aquatic species</i>	<i>Land acquisition and resettlement</i>	<i>Native alethnic group</i>	<i>Physical cultural resources</i>	<i>Livelihood, community disturbance</i>	<i>Local flooding, traffic, safety</i>	<i>Off-site impacts</i>
<p>(1) Embankment on northern bank of Cay Bua river, including: (i) Scope of work: embankment with total length of 780 m; (ii) Resettlement: 102 partially affected households, 0 relocated households; Land acquisition: 18,996 m² of which agricultural land area is 10,000 m² and resident land area is 216 m²; (iii) Sensitive locations: Cultural House of Nang Tay 1 village, the pumping station in Nghia Phuong commune.</p> <p>(2) Embankment on southern bank of Ve river (Duc Thang commune), including: (i) Scope of work: embankment with total length of 445m; (ii) Resettlement: 89 partly affected households; 0 relocated households; Land Acquisition: 17,480 m² of which residential land is 230 m²; agricultural land is 6,530 m² and aquaculture land là 1,200 m²; (iii) Sensitive locations: aquaculture area.</p> <p>(3) Embankment on northern bank of Ve river (Nghia Hiep commune), including: (i) Scope of work: embankment with total length of 542 m; (ii) Resettlement: 50 affected households, 0 relocated households; Acquisition of 7,750 m² agriculture land; There is no sensitive location.</p> <p>(4) Embankment on northern bank of Tra Khuc river, including: (i) Scope of work: embankment with total length of 1 km, (ii) Resettlement: 85 affected households; total 03 relocated households; 0 relocated households; Acquisition of 7,050 agriculture land. There is no sensitive location.</p>											
Pre-construction	N	N	N	N	N	M	N	N	L	N	L
Construction	M	M	M	N	L	N	N	N	M	L	L
Operation	N	N	L	N	N	N	N	N	N	L	L
Remark	<ul style="list-style-type: none"> - Small and medium-scale impacts can be addressed through ECOPs - Impacts to sensitive receptors. - Impacts on water environment and aquatic communities - Risk of embankment subsidence and bank erosion - Impact on waterway traffic activities on Rivers. - Impact on agriculture land. 										
<p>(5) Construction of Va Ranh bridge (in Tra Lanh commune), including: (i) Scope of work: construction of bridge acrossing Va Ranh stream with length of 38m and width of 6m by reinforced concrete, paths and signboards; (ii) Resettlement: 2 affected households are Ethnic Minority; 0 displaced households; Acquisition of 455 m² agriculture land; There is no sensitive location.</p> <p>(6) Construction of Dam bridge, including: (i) Scope of work: construction of bridge and road with length of 1 km and width of 6m by cement concrete and signboards; (ii) Resettlement: 22 affected households are Ethnic Minority, 0 relocated households; Land acquisition: 1,800 agriculture land; (iii) There is no sensitive location.</p>											

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Component	Physical aspects			Biological aspects		Soci aspects				Others	
	<i>Air, noise, vibration</i>	<i>Soil, water</i>	<i>Solid waste, dredged material</i>	<i>Forest, natural ecosystem</i>	<i>Fish, aquatic species</i>	<i>Land acquisition and resettlement</i>	<i>Native alethnic group</i>	<i>Physical cultural resources</i>	<i>Livelihood, community disturbance</i>	<i>Local flooding, traffic, safety</i>	<i>Off-site impacts</i>
<p>(7) Construction of Dong Yen 3 bridge, including: (i) Scope of work: construction of bridge accrossing Tra Bong river with length of 158 m and width of 5.5 m by reinforced concrete, drainages, paths and signboards; (ii) Resettlement: 11 affected households; 0 relocated households; Land acquisition 900 m² residential area and 560m² agriculture land; (iii) There is no sensitive location.</p>											
Pre-construction	N	N	N	N	N	L	L	N	N	N	N
Construction	L	L	M	N	L	N	L	N	L	L	L
Operation	L	N	L	N	N	N	N	N	L	L	L
Remark	<ul style="list-style-type: none"> - Small and medium impacts can be addressed through ECOPs - Impacts on water environment and aquatic communities on Va Ranh stream and Tra Bong river - Subsidence risk in pier of bridge during construction phase - Impact on waterway traffic activities on Tra Bong river - Community disturbance and traffic concern on Dong Yen 3 village; - Impact on groundwater quality during the drilling process; - Disposal of dredged soils and sediment - Impact on agriculture land and - Impact on Ethnic Minority 										
<p>(8) Construction of Ha Rieng road and bridge to resettlement area in Ha Rieng village, including:</p> <p>(i) Scope of work: construction of road with length of 1.7 km and width of 6m by cement concrete and signboards, upgrading Ha Rieng bridge. (ii) Resettlement: 23 affected households (of which 22 households are Ethnic Minority), 0 relocated households; Land acquisition: 1,560 agricultural land and 2,420 m² of plant forest; (iii) Sensitive location: plant forest area.</p>											
Pre-construction	N	N	N	N	N	L	N	N	L	N	L
Construction	M	M	M	N	L	N	M	N	M	L	L
Operation	L	N	N	N	N	N	L	N	L	L	L
Remark	<ul style="list-style-type: none"> - Small and medium impacts can be addressed through ECOPs 										

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Component	Physical aspects			Biological aspects		Soci aspects				Others	
	<i>Air, noise, vibration</i>	<i>Soil, water</i>	<i>Solid waste, dredged material</i>	<i>Forest, natural ecosystem</i>	<i>Fish, aquatic species</i>	<i>Land acquisition and resettlement</i>	<i>Native alethnic group</i>	<i>Physical cultural resources</i>	<i>Livelihood, community disturbance</i>	<i>Local flooding, traffic, safety</i>	<i>Off-site impacts</i>
	<ul style="list-style-type: none"> - Impacts on plantation; - Impact on Ethnic Minority - Disruption of business activities - Road safety concerns. 										

Note:

(1) The following criteria are used to assess the level of impacts: None (N) – No impacts; Low (L) – Small work, small impacts, localized, reversible, temporary; Medium (M) – Small works in sensitive/urban areas, medium-scale with medium impacts, reversible, able to be mitigated and managed, localized, temporary; High (H) – Medium-scale works in small sensitive/urban areas, large-scale works with significant impacts (social and/or environmental), many of which are irreversible and require compensation. Both M and H require monitoring and implementation of mitigation measures as well as an appropriate institutional capacity in terms of safety.

(2) Most impacts of small and medium scale works are localized and temporary and can be mitigated through the application of technical solutions and good construction management practice with strict supervision, inspection and consultation with the local community.

4.2. Impacts and risks in pre-construction phase

Pre-construction impacts include (1) land acquisition and (2) Safety risks related to unexploded ordnances (UXO). Arising impacts from demolition and site clearance for preparation of subproject area will be assessed during the construction process.

➤ **Land acquisition**

Although technical options and designs have been selected based on one of the principles of minimizing resettlement, the subproject will acquire **96,371m²** of land in which residential land area: **1,346m²**; agricultural land: **35,705m²**; aquaculture land: **1,200m²**; forestry land (plantation): **2,420m²**; Land managed by organization (Nghia Phuong commune pump station, Nang Tay hamlet culture house of Nghia Phuong commune and QNA Safe High Tech Agriculture Company Ltd): **1,680m²**; Public land: **54,020m²** (managed by commune/ward PCs, including specialized land, stream, river land, transport land and so on). The land area to be acquired under each work item are summarised in the Table 15 below:

Table 14. Summary of Land Acquisition Impacts

N o.	Items	Affected Land Area (m2)						Total affected land area (m ²)
		Resident ial land (m ²)	Agri. land (m ²)	Forestry land (plantation) (m ²)	Aquacul ture land (m ²)	Land manag ed by authori ties	Land managed by PCs (m ²)	
1	Northern Cay Bua river landslide emergency response	216	10,000	-	-	480	8,300	18,996
2	Southern Ve river embankment	230	6,530	-	1,200	-	9,520	17,480
3	Northern Ve river embankment	-	7,750	-	-	1,200	8,750	17,700
4	Northern Tra Khuc river embankment	-	7,050	-	-	-	21,500	28,550
5	Va Ranh bridge	-	455	-	-	-	1,560	2,015
6	Dam bridge L = 12m (Tra Lanh)	-	1,800	-	-	-	1,320	3,120
7	Dong Yen 3 bridge	900	560	-	-	-	1,270	2,730
8	Ha Rieng river bridge and access road	-	1,560	2,420	-	-	1,800	5,780
Total		1,346	35,705	2,420	1,200	1,680	54,020	96,371

(Source: RAP, May 2017)

In total, 384 households will be affected by land acquisition, in which 323 households are directly affected by physically taking of land and 61 households are indirectly affected by economically losses of cultivations (tree, crop on the land area managed by Commune People's Committee). Many AHs will lose more than one type of assets/ structures such as residential land, annual and perennial agricultural land, structures, trees and crops. Out of total 19 AHs affected by loss of partial portion of residential land, none of households is totally affected with houses and require physical relocation. The survey results show that out of 384 affected households, there are 46 ethnic minority (including: 44 Co People households and 02 H re

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

People households) in Tra Lanh, Tra Phong communes of Tay Tra district and Ba Dien commune of Ba To district affected by the subproject implementation.

In addition, the subproject also affects the road and irrigation land of the 8 commune/ward PCs and 3 organizations (Nghia Phuong commune pumping station, Nang Tay hamlet culture house of Nghia Phuong commune and High Tech Agriculture QNA Safe Company Ltd.)

Table 15. Number of affected households by the subproject's items

No	Items	Location	No. of directly AHs	No. of indirectly AHs	No. of affected offices	No. of affected organizations
1	Northern Cay Bua river landslide emergency response	Nghia Phuong commune, Tu Nghia district	78	24	1	2
2	Southern Ve river embankment	Duc Thang commune, Mo Duc district	68	21	1	
3	Northern Ve river embankment	Nghia Hiep commune, Tu Nghia district	50	-	1	1
4	Northern Tra Khuc river embankment	Truong Quang Trong ward, Quang Ngai city	69	16	1	
5	Va Ranh bridge	Ba Dien commune, Ba To district	2	-	1	
6	Dam bridge L = 12m (Tra Lanh)	Tra Lanh commune, Tay Tra district	22	-	1	
7	Dong Yen 3 bridge	Binh Duong commune, Binh Son district	11	-	1	
8	Ha Rieng river bridge and access road to Ha Rieng hamlet resettlement site	Tra Phong commune, Tay Tra district	23	-	1	
Total			323	61	8	3

(Source: RAP, May 2017)

In general, land acquisition impacts from the subproject are relative small because no household is displaced and resettlement is not required. However, 44 households among 384 households would be severely affected by acquisition with over 20% of agricultural land and are vulnerable households (poor household, ethnic minority, social policy, single elderly household, female-headed household). On the other hand, these affected households will be benefited when the embankment, bridge and road are completed and put into use. Land acquisition impacts are permanent but can be mitigated by efficient implementation of the resettlement action plan.

➤ *Safety risks related to Unexploded ordnance (UXO)*

UXO left from the war still found in many parts of Viet Nam, these can cause casualties, accidents. Mortar shells, aerial bombs, and other unexploded ordnance may exist in the ground in the subproject areas, causing safety risk for the workers and properties of the subproject. Therefore, UXO detection and clearance must be carried out before commencement of any construction work.

4.3. Potential Impacts and Risks in construction phase

4.3.1. Generic Impacts

a. Air quality impacts

➤ *Dust*

Sources of dust generation during the construction process include (i) demolition of works (existing works damaged by natural disaster like bridge, embankment, road and clearance of trees, bushes), excavation, earthwork, leveling, (ii) transportation of construction material and waste disposal. Dust generation can affect air quality, workers and local people in neighboring area of the subproject in a short time. Details can be seen in following table:

Table 16. Dust load from demolition, excavation, backfilling of work items

Work items	Dust concentrations (mg/m ³)		QCVN 05:2013/BTNMT (mg/m ³)
	Demolition, excavation, backfilling	Transportation of materials and wastes	
1. Embankment on northern bank of Cay Bua river	0.05	0.28	<p style="text-align: center;">0.3 (Standard of EHS Guidelines is 0.25)</p>
2. Embankment on the southern bank of Ve river	0.03	0.13	
3. Embankment on the northern bank of Ve river	0.03	0.16	
4. Embankment on northern bank of Tra Khuc river	0.01	0.09	
5. Va Ranh bridge	0.57	0.07	
6. Dam bridge	0.13	0.18	
7. Dong Yen 3 bridge	0.08	0.01	
8. Ha Rieng hamlet Bridge and road.	0.04	0.21	

Thus, (i) dusts generated from demolition, earthwork of work items is within the acceptable limits in QCVN 05:2013/BTNMT. At the construction area of Va Ranh bridge, dust content exceeds allowable limit 1.9 times due to great volume of earthwork and demolition on a small site but this area is far from residential area (about 300 - 500m) so the impact is negligible. Overall, dust impact on the subproject area is minor and only affects construction workers in a short term (10-12 months at each construction site), and this can be mitigated by suitable methods.

(ii) Dust emission from transportation of materials and wastes: the dust concentration in the emitted gas by distance (x = 10m, 20m) and elevation (z = 1.5m, 2m, 3m), the results show that: emitted dust concentration from transportation activity is within acceptable limits stipulated in QCVN 05:2013/BTNMT - National Technical Regulation for ambient air quality. Dust impact will last during construction time of work items, from 10-12 months. However, most of the construction sites are far from the residential areas and the inter-commune roads are in rural or mountainous areas with sparse population density, small scope at open space so the impact level is low and can be mitigated.

Table 17. List the receptors most sensitive to dust by the subprojects

No.	Items	Sensitive receptors are affected by the dust

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Items	Sensitive receptors are affected by the dust
1	Northern Cay Bua river landslide emergency response	- Construction workers - Cultural house in Nang Tay hamlet (far from 30m) - Oriental Medicine Association in Tu Nghia district (far from 150m) - Nang Tay residential area (about 100 households living along the northern bank of Cay Bua river, 50-100m far from construction site)
2	Southern Ve river embankment	- Construction workers - One household working in fish farming pond (far from 30m) - Thanh Long residential area (about 50 households living along the southern bank of the Ve river, 100m away from the construction site) - The Duc Thang primary school which is located 10 m from materials transportation route
3	Northern Ve river embankment	- Construction workers
4	Northern Tra Khuc river embankment	- Construction workers
5	Va Ranh bridge	- Construction workers
6	Dam bridge L = 12m (Tra Lanh)	- Construction workers
7	Dong Yen 3 bridge	- Construction workers - Dong Yen 1 residential area, Dong Yen 3 hamlet (about 200 households, 50-100m away from construction site)
8	Ha Rieng river bridge and access road to Ha Rieng hamlet resettlement site	- Construction workers - Ha Rieng resettlement area (about 200 households, 50-100m from the construction site) - Planted forest along the road to the resettlement site in Ha Rieng hamlet (far from about 10 - 50m)

➤ **Air emission**

Air emission generated from using diesel of trucks, excavators, electricity generators, concrete mixers to build embankments, bridges, road. On average, from 2 to 17 turns of vehicles to enter into the sites per day with the distance of 20km per each trip. The fuel consumption norm of 10-ton truck is about 0.002 tons of diesel/10km; therefore, the fuel consumption is approximately: 0.12 tons of diesel/day. The calculated pollutant load from the construction material and waste transportation is showed in Table 18.

Table 18. Pollution load from gas emissions generated during transportation of materials and wastes

No	Parameter	Pollution load (kg/day)	Pollution load (mg/m.s)
1	Dust	0.43	0.02
2	SO ₂	0.51	0.02
3	NO _x	5.66	0.2
4	CO	2.88	0.1
5	VOC	1.25	0.04

To calculate pollutant concentration (includes SO₂, NO₂, CO) in the gas emission by distance (x=10m, 20m) and elevation (z=1.5m, 2m, 3m), concentration of gas emissions from construction machinery and vehicles are within allowable limits of the technical regulation

QCVN 05:2013/BTNMT – National technical regulation for ambient air quality. Equipment operating in a certain period of time and infrequently, the pollution parameters are local, dispersed, and inconstant; thus, these impacts on workers, are low and minimized if appropriate measures are applied.

➤ **Noise**

Noise is mainly generated from demolition, excavators, electricity generators, concrete mixers, bulldozers, compactors, pile driving machines, trucks to transport construction materials and construction activities. Noise generated by the construction machines and trucks shall adversely affect the field workers and persons along the road, especially, the field workers working near the construction machines and pile driving.

Table 19. Resonant noise generated from active vehicles and machines

No.	Transport and equipment	Noise 1 m away from the source		Noise 20 m away from the source	Noise 50 m away from the source
		Range	Average		
1	Watering vehicles	82.0 - 94.0	88	62	54
2	Trucks	82.0 - 94.0	88	62	54
3	Dredging machines	72.0 - 84.0	78	52	44
4	Scrapers, levelers	80.0 - 93.0	86.5	60.5	52.5
5	Rollers	72.0 - 74.0	73	47	39
6	Bulldozer		93	67	59
7	Excavator	72.0 - 84.0	78	52	44
8	Drilling machine	76.0 - 99.0	94	72	65
9	Pile driving machine	72.0 - 85.0	79	67	59
10	Concrete mixer	74.0 - 88.0	77	71	62
	Resonant noise		95.8	69.8	61.8
QCVN 26/2010/BTNMT: 6:00 to 21:00 is 70 dBA; from 21:00 to 6:00 is 55 dBA;					
Standard of Health Ministry: noise in the production area: contact time in 8 hours is 85 dBA					
Standard of EHS Guidelines is 55 dBA from 6:00 to 21:00 and 45 dBA from 21:00 to 6:00 for resident area, school, office.					

The noise level is considered from low to moderate for each works. The construction sites are all 30 m - 100m far away from the current works. Table 19, for the areas is far more than 20m, the noise is within the allowable limit of QCVN 26:2010/BTNMT. Therefore, impacts of noise due to the construction machines and equipment in the construction phase are marginal and insignificant. The workers are affected by noise during construction phase. However, the noise impact is not great and frequent, only intermittent at certain period during operation of machinery and equipment. This noise impact can be mitigable by suitable methods.

Table 20. List the receptors most sensitive to noise by the subprojects

No.	Items	Sensitive receptors are affected by the noise
1	Northern Cay Bua river landslide emergency response	<ul style="list-style-type: none"> - Construction workers - Cultural house in Nang Tay hamlet (far from 30m) - Oriental Medicine Association in Tu Nghia district (far from 150m) - Nang Tay residential area (about 100 households living along the northern bank of Cay Bua river, 50-100m far from construction site)
2	Southern Ve river embankment	<ul style="list-style-type: none"> - Construction workers - One household working in fish farming pond (far from 30m) - Thanh Long residential area (about 50 households living along the southern bank of the Ve river, 100m away from the construction site)

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Items	Sensitive receptors are affected by the noise
		- The Duc Thang primary school which is located 10 m from materials transportation route
3	Northern Ve river embankment	- Construction workers
4	Northern Tra Khuc river embankment	- Construction workers
5	Va Ranh bridge	- Construction workers
6	Dam bridge L = 12m (Tra Lanh)	- Construction workers
7	Dong Yen 3 bridge	- Construction workers - Dong Yen 1 residential area, Dong Yen 3 hamlet (about 200 households, 50-100m away from construction site)
8	Ha Rieng bridge and access road to Ha Rieng hamlet resettlement site	- Construction workers - Ha Rieng resettlement area (about 200 households, 50-100m from the construction site)

➤ **Vibration**

The vibration caused by machinery and vehicles like trucks, bulldozers, compactor, driller, vibrator... during the excavation of earthwork, transportation, leveling, compaction and construction can affect neighboring works, workers and local people. The vibration happens in a short time, with vibration level of 63-99 dBA at distance of 10m from the source at the construction site of embankment, irrigation dam, road and bridge. As calculated, the vibration caused by bulldozers, air compressors, compactors, pile-drivers...at the distance of 30m is still higher than allowable limit in QCVN 27:2010/BTNMT.

Besides, the embankment of rivers and bridges will adopt pile pilling (embankments) and pile drilling (bridges) to the depth of 8 to 12 m for embankment and 20m for bridges into the river or stream bed. The vibration impacts due to pile pilling and pile drilling might cause collapse to the nearby structures within a radius of 3 - 7 m. All listed sensitive receptors are situated at least 30m away from the construction sites. Beyond this distance from the vibration source, the vibration is within allowable limit.

Construction workers (particularly workers operating the machinery and vehicles) will be affected by the vibration. The subproject areas which are at risk of vibration impact include: construction site of Cay Bua river northern embankment (residential area in Nang Tay 1 hamlet, 50-200m from the construction site, Nang Tay 1 culture house with distance of 30m, Nghia Phuong commune's pumping station, with distance of 30m); the construction site of Ve river southern embankment (residential area in Thanh Long hamlet, distance of 50-200m from the construction site); the construction site of Dong Yen 3 (the residential areas in Dong Yen 1 and Dong Yen 3 hamlets, distance of 50-200m); the construction site of the road to Ha Rieng hamlet (resettlement area in Ha Rieng hamlet, distance of 50-100m from the construction site). However, the vibration impact only happens during the operation of the machinery and equipment, this vibration impact is low and can be mitigable by suitable methods.

b. Water quality degradation

- **Construction wastewater:** generated from concrete curing; machine repair and facility,

dredging activities, drilling activities and material washing. The wastewater volume is approximately 2 m³/day for each work item, equivalent to about 20-24m³ out of total construction period at each location. This wastewater contains a large amount of sediment, suspended solids and may cause negative impacts on the receiving waterbody if it is discharged directly into the environment. However, in fact, this wastewater is re-used for curing concrete and watering the haul road and construction site. Therefore, the impacts caused by this wastewater source will be insignificant.

- **Domestic wastewater:** generated from 30 workers for each work item. As calculated by the water supply 80 lit/person/day, the average volume of wastewater discharged is 2.4 m³/day for each work item, equivalent to about 24.0 - 28.8 m³ out of total construction period at each location. Ingredients of wastewater include suspended sediment, oil, grease, organic content, soluble organic matters (like BOD₅, COD), nutrients (Nitrogen, Phosphorous) and bacteria. Pollutant concentration of domestic wastewater exceeds allowable level in the QCVN 14:2008/BTNMT, column B. If there is no system for collecting and treating daily wastewater, there will be a source of pollutant being discharged into the environment. This will be a considerable pollution source, directly affecting living condition of workers and people around the subproject area. Besides, river water quality may also be affected by bentonite used during drilling at bridge construction site. This impact is considered minor and moderate depending on each subproject area.

- **Runoff:** Surface runoff from heavy rains can sweep soil, sand, other materials and wastes... toward water bodies, causing increased suspended solids in surface water source. Large surface run-off usually occur in September and October (rainy season). Pollutants from surface runoff can affect living aquatic organisms in surface water ecosystem at Cay Bua, Ve, Tra Khuc and Tra Bong rivers and at Va Ranh, Ha Rieng streams when turbidity is increased, affecting quality on these rivers/streams. Aquatic species can be affected by polluted water, for example cause difficulties to their respirations, photosynthesis. Ecological system in the region is simple ecological system, impact is insignificant... The impact levels are low, short-term, local, but it is necessary to apply mitigable measures.

c. Solid wastes and hazardous wastes generation

- **Domestic solid wastes:** There are 30 people working at each construction site. As calculated by 0.5 kg/person/day, the total volume of domestic solid waste is 15 kg/day for each work item. Domestic solid waste generated from construction of each work item is small volume but is the main pollution source due to the decaying of organic matters causing stinky smell, wastewater and infectious bacteria. However, construction sites of the subproject are at different and scattered areas and mostly far from residential areas the impact is considered to be low and can be mitigated.

- **Construction solid wastes:** Construction solid waste is mainly debris from demolition of old works, cleared plants, excavated soil, dredged materials, packaging materials, pieces of irons, steels... at the site. The volume of excavated/dredged materials generated during construction is from 2.272 m³ to 17.722 m³ for each work item, accounting for 89.2% of the total volume of solid waste. As presented in section 3.8, the contents of heavy metals in such materials are within allowable limits. Disposal of these materials require some land area, however, the public consultation meeting show that construction waste can be used by local people/organization for planting trees or for leveling low-lying areas at the plain or mountain's slope, particularly at areas with landslide due to the flash flood in 12/2016. This impact is considered minor.

- **Hazardous wastes:** Hazardous wastes generated are mainly originated from maintenance, oil replacement and repair of construction machines at the site. Oil replacement, repair are carried out in workshop/garage, not at the site. Only urgent minor repair is carried out on site so the

amount of hazardous waste should be small. The total amount of hazardous waste generated in this phase is calculated about 0.5 kg/day and total of 90 - 108 kg for during construction phase for each work item. This volume is very small but waste oil may cause pollution water and soil environment. However, this type of waste will be collected, managed and processed in accordance with regulation for collection and management of hazardous wastes. This impact can be assessed as minor.

d. Impacts on Physical Cultural Resources

Implementation of the subproject at some phases will require soil excavation at different depths: (i) pile driving for embankment foot, with pile depth from 8 - 12m; (ii) pile driving or precast pile boring for construction of bridge pillar/abutment with depth approximately 20m; (iii) excavation of organic soil layer for construction of road base, with depth of 0.5m from the ground. When performing these activities, there will be chances that remains or antiques may be exposed. Possibility of discovering valuable antiques is moderate. When the antiques are discovered, the chance find procedures (ECOPs) shall be applied.

e. Health and Safety Risks

➤ *Workers health and safety risks*

In general, labor accidents may happen at any stage during construction phase, the causes include:

- Workers working on the river (constructing embankment, constructing river-cross bridge) are at risk of being drowned due to their carelessness or tiredness or not following regulations on occupational safety when performing their construction activities at these areas.
- Outdoor workers exposed to hot weather (in summer, temperature can reach 39⁰C - 40⁰C).
- Environmental pollution may cause fatigue, dizziness or fainting for workers during their work.
- Operations of machines and equipments used for loading/unloading materials and equipment, dredging, excavation, construction and transport of materials
- Land slide at deep excavation sites
- Injuries due to insect bites, broken grass when working in the bush during site clearance,
- Extreme weather events such as heavy rain, storms, flush flood, or extreme hot weather
- Dismantling of the existing bridges: accidents may happen if people travel on the bridge being dismantled

Generally, the risk of labor accident on construction sites is minor and can be mitigated by suitable solution such as training on occupational safety before and during the construction process and provision of sufficient protective equipment for workers.

➤ *Fire, explosion and leakage of fuel risks*

Fire and explosion may occur in the case of transport and storage of fuel, or lack of safety of the temporary power supply system, causing the loss of life and damage to property during the construction process. The specific causes are identified as follows:

- The temporary fuel and material warehouse (gas, DO oil, FO oil, welding gas, etc.) are the source of fire and explosion. The occurrence of such incidents can cause serious damage to people, society, economy and the environment.
- Fire risk may happen when operating construction machineries, welding and vehicles using gasoline and diesel without compliance with fire regulations.
- The subproject owner will implement the fire prevention and strictly comply with

measures to prevent leakage, fire or explosion. The fire prevention shall be done regularly to minimize the possibility of inc

- idents and the levels of impact.

In general, for the subproject, the fire and explosion risk is low because construction sites mainly on river, at open space and far from residential areas (50 - 500m). If there is any fire and explosion incidence, it will only affect workers but this impact is at low level, in small scale and can be mitigable by suitable methods.

➤ ***Community health and safety risk***

Construction activities may result in a significant increase in movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents and injuries to local communities. Since there are households living along the transportation route in the proximity of construction site, traffic accident may happen. The incidence of road accidents involving subproject vehicles during construction should be minimized through a combination of education and awareness-raising. However, in fact, this subproject only uses small trucks (10-ton truck) with low frequency (2-17 trips per day) and the dust, noise, gas emission and vibration are mostly lower than allowable limits. In addition, except for 3 areas like (i) Cay Bua river northern embankment, (ii) Ve river southern embankment and (iii) Dong Yen 3 bridges where there are residents living along the embankment and at the 2 ends of the bridge and can be at safety risk during construction process, most of subproject areas have low population density. Therefore, the impact on community health and safety during the construction phase can be considered to be minor or moderate depending on subproject area and this impact is intermittent and can be mitigable by suitable methods.

➤ ***Social issues***

Social impacts may be caused mainly related to mobilization of workers from other localities to the subproject area. Community disturbance caused by increased level of dust and noise, traffic disruption and increased safety risks.

Construction of work items will mobilize up to 30 employees working per location. Mobilization of workers from other localities may lead to conflicts between the workers and local people living in the subproject area due to differences in behavior and customs, jobs and income, traditions, or if the workers get involved in gambling, drug use, drinking and prostitution. So that, level of social impacts medium and can be mitigated.

4.3.2. Site-specific impacts

➤ ***Erosion, soil subsidence***

The current status river banks are natural earth banks. The heavy rain can cause big flood although the likelihood of occurrence might be low. It however can pose a severe risk on land subsidence and river bank erosion. These impacts are localized (at the site position), short term (2-3 months in the wet season) and avoidable via appropriate design and good construction practices.

Besides, the embankment process of Rivers involves the pile pilling of concrete piles to the depth of 8 - 12 m. It is calculated that the risks on infrastructure cracking and collapse are within the radius of 3 - 7 m from the embankment. However, the land acquisition for the construction of the embankment will be carried out beyond the area of influence (about 10 m distant from the embankment). Thus, the risk on cracking and collapse of infrastructure along the river is not likely to occur.

➤ ***Impact on waterway usage on Cay Bua, Ve, Tra Khuc and Tra Bong Rivers***

For embankments upgrading, sheet piles shall be installed at 5 m from existing embankment and along each 50 m segment to keep the construction area dry to make. Currently, there are some waterway traffic means travelling on the Cay Bua, Ve, Tra Khuc and Tra Bong Rivers at frequency of 10 to 12 units per day. The coffer dams or sheet piles may affect waterway traffic, causing increased waterway traffic safety risks. However, the impacts would be low as traffic density is low, and the water surface area affected is very small. These potential impacts can be minimized by warning signs and collaboration with the local waterway management unit who give directions to waterway traffic means.

Dong Yen 3 bridge has five pier-shaped T (6 - 12 piers of reinforced concrete, size 35x35cm, 20m depth). The construction process includes installation of cofferdam, pile driving operation, completion of bridge structures.

➤ ***Falling into river, drowning at drainage culvert in the process of embankment construction***

Construction of Cay Bua, Ve and Tra Khuc river embankments and bridges acrossing Va Ranh stream and Tra Bong river can lead incidents of falling into river, drowning at drainage culverts in case embankment construction, affecting lives and property of workers during the construction phase. Labor accidents may take place at any time or during the construction of the embankment. Particularly, in hot days of May and June, the highest temperature (above 40⁰C) at the site may make workers fainting and fall into the river in the area of Cay Bua, Ve and Tra Khuc river embankments and bridges acrossing Va Ranh stream and Tra Bong river. This cause impacts on people's life, assets and construction quality and schedule. These impacts are medium but mitigable by appropriate measures.

➤ ***Impact on agriculture land along the northern of Ve river in Nghia Hiep commune***

Along the northern of Ve river in Nghia Hiep commune, there are still agriculture lands (about 2 ha of more than 10 households in The Binh hamlet) that local people cultivate rice and cash crops on. Construction activities, although conducted in a sequential manner can affect agriculture activities at different stage of seedlings, growing and harvesting. Runoff from construction site if not properly managed could contaminate irrigation water and soil, affecting productivity of crops. The impact can be small as it is localized and will cease upon the completion of construction work.

➤ ***Subsidence risk in pier of bridge during construction phase***

As construction of the bridges is crossing the river or stream such as Va Ranh bridge (on Va Ranh stream in Ba Dien commune), Dam bridge (on local stream in Tra Lanh commune) and Dong Yen 3 bridge (on Tra Bong river in Binh Duong commune), the pier construction process without conducting thorough surveys regional geological background or designing process that does not comply with the technical regulations or the construction process, the risk of subsidence and slope collapse can easily occur.

Subsidence or landslides can also incur fatal work accidents as well as bridge structure. These impacts are localized (at the site position), short term and avoidable via appropriate design and good construction practices.

➤ ***Community disturbance and traffic concern on Dong Yen 3 village***

Currently, there is a Dong Thanh temporary bridge which is made of bamboo and wood. This is a main route connecting Dong Yen 3 hamlet with Dong Yen 1 hamlet and it will be removed for

construction of the new bridge. Thus, travel of local people (around 240 households in Dong Yen 3 and Dong Yen 1 hamlets) will be temporarily disturbed during approximately 10 months of construction.



Figure 2. The current status of Dong Thanh temporary bridge acrossing Tra Bong river

As there is an existing concrete Bau Dan bridge 500m away from the construction site and 3 other temporary bridges, local people can use these bridges as alternative access during construction phase. The impact will end right after completion of the work, the impact is considered to be low.

➤ ***Disruption of business***

One household involved in the business activities will be directly affected due to the acquisition of part of the land area. This household will also be affected by dust, noise and emission during construction phase of Ha Rieng bridges and road leading to resettlement area in Ha Rieng village. This is a household trading grocery store in Tra Phong commune. Besides safety risk, noise and dust from road construction activities and equipment operations, the household's business might be disturbed or even temporarily disrupted in about 3 construction months at the section.

Besides negative impacts, there will be positive impact because this affected household can sell goods to construction workers (about 30 workers), promoting goods consumption. When the road to Ha Rieng hamlet is completed, this household will be direct beneficiary. Therefore, the impact on this trading household is minor, local, short-term and mitigable.



Figure 3. The current status of a business household on Ha Rieng road

➤ ***Impact on Ethnic Minority***

For construction work, a number of workers (about 30 workers) will be present at the construction site during the construction process. This will cause certain disturbance to socio-

economic and cultural life of local people. There can be conflicts between workers' daily demand (entertainment, cultural activities) and daily demand of local community, leading to certain influence on daily activities of ethnic minority community (Co and Hre people) in Ba Dien, Tra Phong and Tra Linh communes.

The main potential social problems associated with worker influx could be: (i) potential impact of spreading infectious disease from employees to local communities and vice versa; (ii) potential impact of prostitution, drugs and gambling; (iii) potential conflict between workers and local communities because of differences of culture, behavior; and iv) sexual abuse and assault of girls due to influx of workers employed by the construction company in the area.

Construction process can generate negative environmental impacts like dust, noise.... Concentration of workers from other localities in the area can lead to increased risk related to social evils like prostitution which closely related to HIV/AIDS and other and sexually transmitted diseases. The construction will last in short period (8-10 months) so this risk will be considered to be minor. The risk can be managed by training the workers on occupational safety and health, including HIV/AIDS awareness raising.



Hre People



Co People

Figure 4. Hre and Co Peoples live in Ba Dien, Tra Lanh and Tra Phong communes

Site-specific impacts - sensitive receptors

The construction of the different items of subproject will likely impact some sensitive receptors located in close proximity to the construction sites (3/8 work items), including (i) embankment of the northern Cay Bua river in Nghia Phuong commune; (ii) embankment of the southern Ve river in Duc Thang commune and (iii) construction of road and bridge leading to the Resettlement Area in Ha Rieng hamlet. The impact level is assessed to be from low to medium, temporary and possibly minimized. Details of subjects within radius of 300m surrounding the subproject site is described as follows:

Table 21. Site-specific impacts - sensitive receptors

No.	Receptors	Location/ Description	Impacts
1	Northern Embankment of Cau Bua river		
1.1	Residential Area in Nang Tay 1 hamlet 	About 100 households in Nang Tay 1 hamlet living near the river bank, about 50-100 meters away.	<ul style="list-style-type: none"> - Public health related to dust - Traffic disturbance - Safety risks related to truck movements

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Receptors	Location/ Description	Impacts
1.2	<p>Cay Bua River section with dense vegetation cover and trees</p> 	<p>Trees such as Acacia, Eucalyptus, Bamboo ... are planted by local people for soil conservation and protection of river bank.</p>	<ul style="list-style-type: none"> - Loss of trees and vegetation cover, landscape change
1.3	<p>Pumping station of Nghia Phuong commune</p> 	<ul style="list-style-type: none"> - This is the river pumping station of Nghia Phuong commune, taking surface water from Cay Bua river for agricultural irrigation (about 20 ha). - It is 30 m far from the site of the northern bank of Cay Bua river. 	<ul style="list-style-type: none"> - Temporarily block the canal and water flow; - Contaminate irrigation water due to the spill of construction materials into the canal; - Physically damage to the pumping station, especially at water collection points - Loss 200 m2 of land covered with grasses,
1.4	<p>Culture house of Nang Tay 1 hamlet</p> 	<ul style="list-style-type: none"> - This structure belongs to Nghia Phuong commune and is the place for cultural activities and community meeting of people in Nang Tay hamlet (more than 200 households). - It is 30 m far from the site of the southern bank of Ve river. 	<ul style="list-style-type: none"> - Obstruct people's approach to the culture house; - Cause dangers to people; - Increase dust, noise, vibration level and waste; - Disturb community meeting/activities. - Loss 280 m2 of land covered with bushes and grass
1.5	<p>Oriental medicine treatment association of Tu Nghia district</p> 	<ul style="list-style-type: none"> - This association is 150m far from the embankment of Cay Bua river toward Cay Bua bridge. - There are 28 private treatment rooms and 1 room for collective treatment. - There are not many patients (more than 10 times/day). 	<ul style="list-style-type: none"> - Increased dust, emissions and noise. - Potential risk of traffic accidents - Obstructing access to unit for patients - Obstructing activities to visit and work in the Association.
2.	Ve river – southern embankment, 445 m		
2.1	<p>Fishery farming pond</p>	<ul style="list-style-type: none"> - It is affected by construction of the southern embankment of Ve river. This is fish pond mixed with feeding area 	<ul style="list-style-type: none"> - Wastewater can overflow into the fish pond affecting water quality. It impacts on growth of fishes. - Solid wastes can fall into the

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Receptors	Location/ Description	Impacts
		<p>of poultry (ducks, goose) as a small farm of a household in Duc Thang commune, 2 harvests/year.</p> <ul style="list-style-type: none"> - It is 30 m far from the site of the southern bank of Ve river. 	<p>ponds affecting water quality. It impacts on growth of fishes.</p>
2.2	<p>Primary school of Duc Thang commune</p> 	<ul style="list-style-type: none"> - On the construction materials and waste transportation roads for embankment on southern bank of Ve river. It is 10 m far from the route. - The school has 40 teachers and over 1,000 pupils. - Pupils' time to and from the school every weekday: 7h-7h30; 11h-11h30; 13h-13h30; 16h30 - 17h30. 	<ul style="list-style-type: none"> - Dust, noise and emissions by trucks - Impact on living activities officers and students - Traffic safety risk
2.3	<p>Fishing boats, Small landing stage</p> 	<ul style="list-style-type: none"> - Navigation density on the river is low, about 3-5 small fishing boats (netting) daily. 	<ul style="list-style-type: none"> - Interrupt accessibility of local fishing boats.
2.4	<p>Residential area in Thanh Long hamlet</p> 	<ul style="list-style-type: none"> - There is one residential area along the river bank (about 150 households) of Thanh Long hamlet. Nearest distance to construction site is 50 - 200m 	<ul style="list-style-type: none"> - Public health related to dust - Traffic disturbance - Safety risks related to truck movements
2.5	<p>River section with dense vegetation cover and trees</p> 	<ul style="list-style-type: none"> - Trees such as Banana, Bamboo, Eucalyptus ... are planted by local people for soil conservation and protection of river bank. 	<ul style="list-style-type: none"> - Loss of trees and vegetation cover, landscape change
3.	<p>Ve river – northern embankment, 542 m</p>		

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Receptors	Location/ Description	Impacts
3.1	<p>Agricultural land</p> 	<p>There is agricultural land along the route (about 2 ha of more than 10 households in The Binh hamlet) for rice and vegetation crops.</p>	<p>Runoff from construction site could contaminate irrigation water and soil, affecting productivity of crops</p>
3.2	<p>Waterway traffic</p> 	<p>- Navigation density on the river is rather low, there are daily 3-5 small fishing boats operating on the river.</p>	<p>Interrupt accessibility of local fishing boats.</p>
4.	Northern bank, Tra Khuc river, 1030 m		
4.1	<p>Residential area in Truong Quang Trong ward</p> 	<p>Along the road, no resident lives at the river side but at the roadside there is crowded residential area belonging to Truong Quang Trong ward.</p>	<ul style="list-style-type: none"> - Public health related to dust - Traffic disturbance - Safety risks related to truck movements
4.2	<p>Waterway traffic</p> 	<p>- Navigation density on the river is not high, everyday around 10-20 small fishing boats and material-carrying barges (sand, gravel) navigate on the river</p>	<p>Interrupt accessibility of local fishing boats.</p>
4.3	<p>Agricultural land</p> 	<p>Maize, sweet potato and cassava are planted in riverside alluvial grounds</p>	<p>Loss of a part of land and crops by households.</p>
5.	Va Ranh Bridge and approach road		
5.1	<p>Va Ranh stream is dried in dry season</p>	<p>In mountainous areas, subjected to flush flood. Meanwhile there is no water in the stream in dry season</p>	<p>Accidental risk in rainy/flood season</p>

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Receptors	Location/ Description	Impacts
			
5.2	Existing bridge 	Existing bridge was damaged by a flash flood	Access through existing bridge will be interrupted during construction phase
6	Dam Bridge; Approach road 1000 m		
6.1	Perennial crops 	Perennial crops along the sides of road such as Bamboo, Eucalyptus,...	<ul style="list-style-type: none"> - Loss of trees and vegetation cover. - Dust and emissions impact on the growth and development of plants. - Increased forest fire risk - Insects, snake may attack the workers
7	Dong Yen 3 bridge, 158 m and approach road, 50 m for each side.		
7.1	Dong Thanh existing bridge 	At the location for construction, there is bamboo/wooden bridge via Tra Bong river. It is dismantled by local people and using the boat to travel across the river in the flood season.	Interrupt access through the existing bridge
7.2	Residential area 	There are residential areas at two terminals of the bridge like Dong Yen 3 and Dong Yen 1 with rather high population density, 50-200m to the bridge as the nearest distance.	<ul style="list-style-type: none"> - Public health related to dust - Traffic disturbance - Safety risks related to truck movements
7.3	Waterway traffic	- Navigation density on the river is not high, everyday around 10-20 small fishing boats and material-carrying barges (sand, gravel)	Interrupt accessibility of local fishing boats.

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Receptors	Location/ Description	Impacts
		navigate on the river	
8.	Road to Resettlement site in Ha Rieng Hamlet, 1691 m		
8.1	Productive forest land 	<ul style="list-style-type: none"> - Productive forest is present along the road to the resettlement area in Ha Rieng hamlet. It is 10 m far from the site. - This is forest for periodically timber exploitation (mostly acacia mangium tree) with small size (diameter 5-10 cm), small canopy and low-density. 	<ul style="list-style-type: none"> - Loss of trees (with total affected plantation along two sides of the road of 2,420 m² by 6 AHs).; - Dust and emissions impact on the growth and development of plants. - Increased forest fire risk - Insects, snake may attack the workers
8.2	Resettlement area in Ha Rieng hamlet 	<ul style="list-style-type: none"> - The resettlement area in Ha Rieng hamlet, Tra Phong commune has over 127 households. - It is 50 m far from the site of the road leading to Ha Rieng hamlet. 	<ul style="list-style-type: none"> - Dust, noise and emissions - Impact on living activities residents - Traffic safety risk - Interrupted access to the resident area. - Risk on social issues
9	Disposal sites	<ul style="list-style-type: none"> - Nang Tay 1 hamlet in Nghia Phuong commune - Dong Yen 3 hamlet in Binh Duong commune - Thanh Long hamlet in Duc Thang commune - The Binh hamlet in Nghia Hiep commune - Go Ro disposal site in Tra Phong commune. 	<ul style="list-style-type: none"> - The risk of erosion and subsidence due to non-compliance with the height regulation (2-3m) - Drainage of waste dumps with a design area of 1-2 ha

4.4. Impacts on operation phase

The construction of road and embankment will contribute to the consolidation of river bank, facilitate the flood protection and prevention from erosion, protect people's life, assets and infrastructures, transportation on the embankment top, promote trade and service exchange and connection to regions within the city and surrounding areas. However, some impacts should be taken into consideration as follows:

➤ ***Falling into rivers, stream and drowning on embankment:***

These cases are warned in the up and down steps to the walking paths under the embankment or at drainage culverts along the embankment. Because of absence of handrail, barrier gate, the risk, especially for children and the elderly in design document, incident risk of falling into rivers, streams, drowning is high. Specific and additional measures for research, design should be taken to prevent the threats for the community when using the works.

➤ ***Road Safety during the operation of Va Ranh, Dam and Dong Yen 3 bridges and Ha Rieng road***

Road safety is likely to be the key impacts during operation of *Va Ranh, Dam and Dong Yen 3 Bridges and Ha Rieng road* during the first few years when transportation of rural population (bicycles, carts, etc.) are mixed with motor vehicle operations (cars, motorcycles, trucks, etc.) and levels of traffic accident could increase. Experience in the country suggested that this can be managed by improving knowledge of local people on road use regulations and practices as well as monitoring and enforcement of driver speed and behavior. In the longer term when traffic volume is high, generation of dust, exhausted gases, noise, and vibration could be an additional issue but this could be mitigated through long term planning.

➤ ***Induced development***

There are various social impacts that may occur due to land use changes and/or induced development (increase solid waste, illegal use of right of ways, etc.); however, this is likely to be a long-term issue. During the first few years, these impacts will be minor however improving people knowledge on socio-economic development opportunity and risks related to social issues could help reducing potential negative impacts to local population.

➤ ***Health and Safety Risks***

Natural disasters, storm wind, flooding

Incidents caused by natural disaster, storms and floods during the phase of using roads, embankments, bridges, dams, have possibility of landslides, earthquakes and so on. That causes damage to works and property of the people. Design has calculated climate weather's the abnormalities in the past, thus the impact of this situation is low.

Erosion, subsidence of work, blocking of the water flow

In the process of putting the works into operation, there is the possibility of embankment landslide, the edge of the road due to floods, earthquakes, sea waves, smashing, poor construction works, unensured design. This can cause damage of works if works are not solid and design is not guaranteed. This causes damage to works and property of local people.

5. MITIGATION MEASURES

5.1. Measures to be integrated into the detailed technical design

The embankment of Cay Bua, Ve and Tra Khuc rivers is along the river to both prevent site clearance of local resident's permanent houses and ensure the form of straight embankment. Consider the followings: (i) Stair cases and handrails are included in the design of the embankments to maintain safe access to water fronts for local communities; (ii) Trees would be planted along riverbanks to improve the landscape and stabilize the riverbank.

The design period for 04 embankments, 3 bridges and 2 roads are based on hydrological regime survey (flood level, flow regime, etc), geological and topographical conditions of the location to ensure safety and effective performance of the works.

The detailed design for the works must be clear at all aspects relating to excavated and backfilling, dredged material management, transportation of dredged material by trucks with cover and anti-leaking equipment; residual dredged material must be disposed at suitable places which is prepared in advance.

Roads: the roads are designed with surface drainage system, kerb inlet along roads, traffic signposts to ensure traffic safety pursuant to the standards, slope stabilisation along the approach road, if required and green trees along to the road. In the detailed design, the PPMU will ensure requirements in respect with full drainage system to avoid flooding in the construction and operation courses and energy-saving lighting systems ensuring aesthetic beauty.

5.2. Mitigation measures during preparation phase

➤ *Mitigation measures for land acquisition*

During the subproject preparation, the Resettlement Consultant, Technical Consultant and PMU have worked together, considering technical requirements and construction method, to reduce resettlement on the principle of (i) mitigating impacts from land acquisition for households in the subproject area; and (ii) prioritizing the construction option which requires the smallest land acquisition area.

Total cost for compensation, support and resettlement of the 8 work items is 9,737,295,000 VND, equivalent to 428,956 USD. Of which:

Table 22. The estimated cost for the RAP of Quang Ngai subproject

No.	Work items	Total	
		1000 VND	USD
1	Embankment on northern bank of Cay Bua river	2,058,036	90,662.38
2	Embankment on southern bank of Ve river	1,605,347	70,720.13
3	Embankment on northern bank of Ve river	1,668,000	73,480.18
4	Embankment on northern bank of Tra Khuc river	1,629,860	71,800.00
5	Construction of Va Ranh bridge	83,520	3,679.30
6	Construction of Dam bridge	361,840	15,940.09
7	Construction of Dong Yen 3 bridge	757,796	33,383.08
8	Construction of Ha Rieng bridges and road	429,860	18,936.0

(Source: RP report. April 2017)

The estimated cost for land clearance and resettlement is calculated based on provisions set by People Committee of Quang Ngai province and the policies determined by the World Bank. This amount includes costs for compensation/supports for land, structures and assets affected by the subproject, income restoration program, transition support, evaluation monitoring, implementation management and contingencies. The detailed mitigation measures for land acquisition are provided in the RP of the subproject.

➤ *Mitigation of UXO Risks*

The subproject owner (PMU) will sign a contract with the military civil engineering agency or Quang Ngai Provincial Military Base for UXO detection and clearance at the construction sites. UXO clearance will be executed right after the completion of site compensation and before the implementation of demolition and ground leveling. The estimated cost is approximately 50 - 60 million VND/ha. No construction activity will be allowed until the UXO clearance is completed.

5.3. Mitigation measures during construction phase

5.3.1. Generic mitigation measures

As part of the Environmental and Social Management Plan (ESMP) for the subproject these general measures have been translated into a standard environmental specification to be incorporated into bidding and contract documents. These are referred to as Environmental Codes of Practice (ECOPs), and will be applied to mitigate typical impacts of the subproject's civil works during the pre-construction and construction phase.

The ECOPs describe typical requirements to be undertaken by contractors and supervised by the construction supervision consultant during construction. The ECOPs will be incorporated into the bidding and contract documents (BD/CD) annexes. The measures identify typical mitigation measures for the following aspects: (1) Impacts of dust; (2) Air pollution; (3) Noise and vibration; (4) Water pollution; (5) Solid waste; (6) Hazardous wastes; (7) Traffic management; (8) Worker and public Safety; (9) Communication with local communities about subproject environmental issues; (10) Health and Safety for workers and the public; (11) Chance finding procedures, (12) Fire hazard due to accident.

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Table 23. Generic mitigation measures

Environmental and social issues	Mitigation measures	Applicable National Regulations, Standards	Responsibility	
			Implementation	Supervision
1. Impacts of dust	<ul style="list-style-type: none"> - The Contractor is responsible for ensuring compliance with relevant Vietnamese legislation and EHS Guidelines with respect to ambient air quality. - The Contractor must ensure that dust generation is mitigated and will not annoy local people and implement measures to control dust concentration in order to maintain safe working place and minimize disturbance to surrounding residences/houses. - Material loads must be suitably secured during transportation to prevent the scattering of soil, sand, materials or dust. - Exposed soil and material stockpiles must be protected against wind erosion and the location of stockpiles shall take into consideration the prevailing wind directions and locations of sensitive receptors - Dust masks must be used where dust levels are excessive. 	<ul style="list-style-type: none"> - Decision No. 35/2005/QD-BGTVT on inspection of quality, technical safety and environmental protection - QCVN 05: 2013/MONRE: <i>National technical regulation on ambient air quality</i> - EHS Guidelines 	Contractor	PMU, CSC
2. Air pollution	<ul style="list-style-type: none"> - All vehicles must comply with Vietnamese regulations and EHS Guidelines controlling allowable emission limits of exhaust gases. - Vehicles in Vietnam must undergo a regular emissions check and get certified named: "Certificate of conformity from inspection of quality, technical safety and environmental protection" following Decision No. 35/2005/QD-BGTVT; - There must be no burning of waste or construction materials (for example: asphalt, etc.) on site. 	<ul style="list-style-type: none"> - Decision No. 35/2005/QD-BGTVT on inspection of quality, technical safety and environmental protection - QCVN 05: 2013/MONRE: <i>National technical regulation on ambient air quality</i> - EHS Guidelines 	Contractor	PMU, CSC
3. Noise and vibration	<ul style="list-style-type: none"> - The contractor is responsible for compliance with the relevant Vietnamese legislation and EHS Guidelines with respect to noise and vibration. - All vehicles must have appropriate "Certificate of conformity from inspection of quality, technical safety and environmental protection" following Decision No. 35/2005/QD-BGTVT; to avoid exceeding noise emission from poorly maintained machines. When needed, measures to reduce noise to acceptable levels must be implemented and could include silencers, mufflers, acoustically dampened panels or placement of noisy machines in acoustically protected 	<ul style="list-style-type: none"> - QCVN 26:2010/BTNMT: <i>National technical regulation on noise</i> - QCVN 27:2010/BTNMT: <i>National technical regulation on vibration</i> - EHS Guidelines 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Environmental and social issues	Mitigation measures	Applicable National Regulations, Standards	Responsibility	
			Implementation	Supervision
	<p>areas.</p> <ul style="list-style-type: none"> - Avoiding or minimizing transportation through or processing material in community areas (like concrete mixing). 			
4. Water pollution	<ul style="list-style-type: none"> - The Contractor must be responsible for compliance with the relevant Vietnamese legislation and EHS Guidelines relevant to wastewater discharges into watercourses. - Portable or constructed hygienic toilets must be provided on site for construction workers. Wastewater from toilets as well as kitchens, showers, sinks, etc. must be discharged into a conservancy tank for removal from the site or discharged into local sewerage systems; there must be no direct discharges to any water body. - Wastewater over standards set by relevant Vietnam technical standards/regulations must be collected in a conservancy tank and removed from site by licensed waste collectors. - Implement measure to collect, redirect or block municipal wastewater disposed from surrounding houses to properly dispose and ensure that local blocking or flooding are minimized. - Before construction, all necessary wastewater disposal permits/licenses and/or wastewater disposal contract have been obtained. - At completion of construction works, wastewater collection tanks and septic tanks must be safely disposed or effectively sealed off. 	<ul style="list-style-type: none"> - 14:2008/BTNMT: <i>National technical regulation on domestic wastewater</i>; - EHS Guidelines 	Contractor	PMU, CSC
5. Solid waste	<ul style="list-style-type: none"> - Before construction, a solid waste control procedure (storage, provision of bins, site clean-up schedule, bin clean-out schedule, etc.) must be prepared by Contractors and it must be carefully followed during construction activities. - Before construction, all necessary waste disposal permits or licenses must be obtained. - Measures shall be taken to reduce the potential for litter and negligent behavior with regard to the disposal of all refuse. At all places of work, the Contractor must provide litter bins, containers and refuse collection facilities. - Solid waste may be temporarily stored on site in a designated area approved by the Construction Supervision Consultant and relevant local authorities prior to collection and disposal through a licensed waste collector, for example, local 	<ul style="list-style-type: none"> - Decree No. 38/2015/ND-CP on solid waste management; - EHS Guidelines 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Environmental and social issues	Mitigation measures	Applicable National Regulations, Standards	Responsibility	
			Implementation	Supervision
	<p>environment and sanitation companies.</p> <ul style="list-style-type: none"> - Waste storage containers must be covered, tip-proof, weatherproof and scavenger proof. - No burning, on-site burying or dumping of solid waste must occur. - Recyclable materials such as wooden plates for trench works, steel, scaffolding material, site holding, packaging material, etc must be collected and separated on-site from other waste sources for reuse, for use as fill, or for sale. - If not removed off site, solid waste or construction debris must be disposed of only at sites identified and approved by the Construction Supervision Consultant and included in the solid waste plan. 			
6. Hazardous wastes	<ul style="list-style-type: none"> - The removal of asbestos-containing materials or other toxic substances must be performed and disposed of by specially trained and certified workers. - Used oil and grease must be removed from site and sold to an approved used oil recycling company. - Used oil, lubricants, cleaning materials, etc. from the maintenance of vehicles and machinery must be collected in holding tanks and removed from site by a specialized oil recycling company for disposal at an approved hazardous waste site. - Unused or rejected tar or bituminous products must be returned to the supplier's production plant. - Relevant agencies must be promptly informed of any accidental spill or incident. - Appropriate communication and training programs must be put in place to prepare workers to recognize and respond to workplace chemical hazards. - Prepare and initiate a remedial action following any spill or incident. In this case, the contractor must provide a report explaining the reasons for the spill or incident, remedial action taken, consequences/damage from the spill, and proposed corrective actions. 	<ul style="list-style-type: none"> - Decree No. 38/2015/NĐ-CP dated 24/04/2015 on waste and scrap management - Circular No. 36/2015/TT-BTNMT on management of hazardous substance - EHS Guidelines 	Contractor	PMU, CSC
7. Traffic management	<ul style="list-style-type: none"> - Before construction, carry out consultations with local government and community. - Significant increases in number of vehicle trips must be included in a 	<ul style="list-style-type: none"> - Law on traffic and transport No. 23/2008/QH12; 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Environmental and social issues	Mitigation measures	Applicable National Regulations, Standards	Responsibility	
			Implementation	Supervision
	<p>construction plan before approved. Routings, especially of heavy vehicles, need to take into account sensitive sites such as schools, hospitals, and markets.</p> <ul style="list-style-type: none"> - Installation of lighting at night must be done if this is necessary to ensure safe traffic circulation. - Place signs around the construction areas to facilitate traffic movement, provide directions to various components of the works, and provide safety advice and warning. - Employing safe traffic control measures, including road signs and flag persons to warn of dangerous conditions - It is strictly forbidden to transport materials for construction during rush hour. - Passageways for pedestrians and vehicles within and outside construction areas must be segregated and provide for easy, safe, and appropriate access. Signpost must be installed appropriately in both water-ways and roads where necessary. 	<ul style="list-style-type: none"> - Decree 46/2016/ND-CP on administrative penalty for traffic safety violation - Law on construction No. 50/2014/QH13; - Circular No. 22/2010/TT-BXD on regulation on labour safety in construction - EHS Guidelines 		
8. Worker and public Safety	<ul style="list-style-type: none"> - Contractor must comply with all Vietnamese regulations and EHS Guidelines regarding worker safety. - Prepare and implement action plan to cope with risk and emergency. - Preparation of emergency aid service at construction site. - Training workers on occupational safety regulations - If blasting is to be used, additional mitigation measures and safety precautions must be outlined in the ESMP. - Ensure that ear pieces are provided to and used by workers who must use noisy machines such as piling, explosion, mixing, etc., for noise control and workers protection. - During demolition of existing infrastructure, workers and the general public must be protected from falling debris by measures such as chutes, traffic control, and use of restricted access zones; - Install fences, barriers, dangerous warning/prohibition site around the construction area which showing potential danger to public people; - The contractor must provide safety measures as installation of fences, barriers 	<ul style="list-style-type: none"> - Decree No. 167/2013/ND-CP on administrative penalty for violations related to social security, order and safety issues - EHS Guidelines 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Environmental and social issues	Mitigation measures	Applicable National Regulations, Standards	Responsibility	
			Implementation	Supervision
	warning signs, lighting system against traffic accidents as well as other risk to people and sensitive areas			
9. Communication with local communities about subproject environmental issues	<ul style="list-style-type: none"> - Maintain open communications with the local government and concerned communities; the contractor must coordinate with local authorities (leaders of local wards or communes) for agreed schedules of construction activities at areas nearby sensitive places. - Copies in Vietnamese of these ECOPs and of WB's environmental safeguard documents must be made available to local communities and to workers at the site. - Disseminate subproject information (capital, purpose, project items, construction site, affected area, environmental and social impacts, community and environmental impacts, mitigation measures, time, construction schedule ...) to affected parties (for example local authority) through community meetings before construction commencement; - Provide a community relations contact from whom interested parties can receive information on site activities, subproject status and subproject implementation results; - Provide all information, especially technical findings, in a language that is understandable to the general public and in a form of useful to interested citizens and elected officials through the preparation of fact sheets and disclosure, when major findings become available during subproject phase; - Monitor community concerns and information requirements as the subproject progresses; - Respond to telephone inquiries and written correspondence in a timely and accurate manner; - Provide technical documents and drawings to PC's community, especially a sketch of the construction area and the ESMP of the construction site; - Notification boards must be erected at all construction sites providing information about the subproject, as well as contact information about the site managers, environmental staff, health and safety staff, telephone numbers and other contact information so that any affected people can have the channel to voice their concerns and suggestions. 	<ul style="list-style-type: none"> - Decree No. 167/2013/ND-CP on administrative penalty for violations related to social security, order and safety issues - EHS Guidelines 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Environmental and social issues	Mitigation measures	Applicable National Regulations, Standards	Responsibility	
			Implementation	Supervision
<p>10. Health and Safety for workers and the public</p>	<ul style="list-style-type: none"> - HIV/AIDS within 2 weeks prior to the commencement of packages for construction items lasting at least 6 months. - Provide training in first-aid skill and first-aid kit to workers and site engineer - Regularly exam worker's health to ensure occupational health - Provide workers with PPE such as masks, gloves, helmets, shoes/boots, goggles, safety belt, etc. and enforce wearing during working especially working at heights and in dangerous areas. - Limit working in extreme weather conditions, e.g. too hot, heavy rain, strong wind, and dense fog. - Provision of proper eye protection such as welder goggles and/or a full-face eye shield for all personnel involved in, or assisting, welding operations. Additional methods may include the use of welding barrier screens around the specific work station (a solid piece of light metal, canvas, or plywood designed to block welding light from others). Devices to extract and remove noxious fumes at the source may also be required. - Special hot work and fire prevention precautions and Standard Operating Procedures (SOPs) should be implemented if welding or hot cutting is undertaken outside established welding work stations, including 'Hot Work Permits, stand-by fire extinguishers, stand-by fire watch, and maintaining the fire watch for up to one hour after welding or hot cutting has terminated. Special procedures are required for hotwork on tanks or vessels that have contained flammable materials. - Safely install power lines at offices and in construction sites and do not lay connectors on the ground or water surface. Electric wires must be with plugs. Place outdoor electric panels in protection cabinets. - Install fences, barriers for dangerous warning/prohibition sites around the construction area which show potential danger to the public. - Provide safety measures as installation of fences, barriers warning signs, lighting system against traffic accidents as well as other risk to people and sensitive areas. - Provide sufficient lighting when carrying out construction activities at night. - Locate noise-generating sources and concrete mixing plants far enough from 	<ul style="list-style-type: none"> - Directive No. 02 /2008/CT-BXD on labour safety and sanitation in construction agencies; - Circular No. 22/2010/TT-BXD on regulation on labour safety in construction - QCVN 18:2014/BXD: Technical regulation on safety in construction - EHS Guidelines 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Environmental and social issues	Mitigation measures	Applicable National Regulations, Standards	Responsibility	
			Implementation	Supervision
	<p>and downwind of residential areas and camps.</p> <ul style="list-style-type: none"> - Store fuels and chemicals in areas with impermeable ground, roofs, surrounding banks, and warning signs at least 50 m far from and downwind of residential areas and the camps. - Provide training in fire-fighting to workers and fire-extinguishers for the camps. - Prepare an emergency plan for chemical/fuel spill incident risk before construction begins. - Provide the camps with sufficient supplies of clean water, power, and sanitary facilities. There must be at least one toilet compartment for every 30 workers, with separate toilets for males and females. Workers' beds must be provided with mosquito nets so as to prevent dengue fever. Temporary tents will be unacceptable. - Clean camps, kitchens, baths, and toilets and sanitize regularly, and keep good sanitation. Provide dustbins and collect wastes daily from the camps. Clear drainage ditches around the camps periodically. - Stop all construction activities during rains and storms, or upon accidents or serious incidents. 			
<p>11. Chance finding procedures in case of finding objects with historical or cultural values</p>	<ul style="list-style-type: none"> - If the Contractor discovers archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, the Contractor shall: - Stop the construction activities in the area of the chance find; - Delineate the discovered site or area; - Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the Department of Culture and Information takes over; - Notify the Construction Supervision Consultant who in turn will notify responsible local or national authorities in charge of the Cultural Property of Viet Nam (within 24 hours or less); - Relevant local or national authorities would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This 	<ul style="list-style-type: none"> - Law on cultural heritage No. 28/2001/QH10; - Amended and supplemented Law on cultural heritage No. 32/2009/QH12; - Decree No 98/2010/ND-CP dated 21/09/2010 on guideline to implement Cultural Heritage Law. 	<p>Contractor, supervising consultant cooperates to implement</p> <p>Cultural Information Department</p> <p>Contractor, Owner and local Authority</p>	<p>PMU, CSC</p>

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Environmental and social issues	Mitigation measures	Applicable National Regulations, Standards	Responsibility	
			Implementation	Supervision
	<p>would require a preliminary evaluation of the findings to be performed. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values;</p> <ul style="list-style-type: none"> - Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration and salvage; - If the cultural sites and/or relics are of high value and site preservation is recommended by the professionals and required by the cultural relics authority, the Project's Owner will need to make necessary design changes to accommodate the request and preserve the site; - Decisions concerning the management of the finding shall be communicated in writing by relevant authorities; - Construction works could resume only after permission is granted from the responsible local authorities concerning safeguard of the heritage. 			
12. Fire hazard due to accident	<ul style="list-style-type: none"> - Comply with the national law and regulation on fire prevention and fight extinguishing and EHS Guidelines. - Prepare an emergency preparedness plan for fire hazard control. - Equip the substation with enough number of fire extinguishers. - Frequently examine equipment to detect and repair fire hazard. - Train operation staff on fire prevention and fire control. 	<ul style="list-style-type: none"> - Decree 46/2012/ND-CP - EHS Guidelines 	-	-

5.3.2. Site specific mitigation measures

Table 24 presents site-specific impacts and mitigation measures for each work item of Quang Ngai subproject that are not addressed through the general measures in the ECOPs, because the severity or site-specific nature of the impacts and mitigation measures required.

In addition to ECOPs, the following type-specific mitigation measures shall be applied:

For embankment upgrading, the following mitigation measures shall be applied:

- Avoid dredging in the rainy season, from September to December, in order to maintain drainage function of the river;
- The Contractor shall prepare a Contractor's Dredging Management Plan (CDMP) and submit to the Supervision Consultant and PMU for review and approval before carrying out the works. The dredging plan shall indicate clearly:
 - The Scope of Works in the Contract package, dredging method and schedule,
 - Water users that may be affected by the dredging and embankment lining
 - The dredging volume, water quality and the characteristics of dredged materials; particularly water should be tested for pH, DO, TSS, BOD, salinity etc. ; heavy metals including pH, Hg, As, Cd, Cu, Pb, Zn and Cr, Organic Materials and Mineral Oils must be tested for sediment. one sample of water and one sample of sediment sample must be taken and tested for each contract package
 - Process for temporary storage of dredged materials and plan for pollution control on-site
 - Materials uploading and transportation method to the final disposal site: indicate proposed route of the transport from the dredged site to the disposal area, time of operation, type of vehicles/trucks
 - Schedule to inform the nearby communities about the subproject, disclosure of name and contact number for possible complaints.
 - Potential social and environmental impacts, including the site-specific impacts and risks of dredging
 - Mitigation measures to address the potential impacts and risks.
 - Final disposal plan;
 - Environmental monitoring plan.
- In addition to relevant mitigation measures for common construction impacts, the dredging plan shall meet the following requirements:
 - Cofferdams are built before dredging to separate the construction site from the surrounding waterbodies in order to minimise the potential impacts on river/stream water quality;
 - Disturbance to the ground and on riverbed is kept at minimal; Monitoring is carried out regularly ensure dredged materials at temporary disposal sites would not cause pollution or flooding to the surrounding; sedimentation trap is installed surrounding these temporary disposal sites;
 - Wastewater leaked from dredging materials will be led to flow back into the river;
 - When storm is forecasted, dredging or embankment lining activities will be limited, site protection measures are implemented; all construction activities will be halted in stormy weather;

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

- Provide warning signs at dangerous areas, for example, underflows, erosion points, or deep excavation;
- Specified safety equipment such as lifebuoys is provided to the workers and force the use when working in the water. Assign observers throughout work shifts for timely rescue in case of emergency;

For bridge construction, the following mitigation measures shall be applied

- The bridge works shall be scheduled to avoid the high river flow season;
- The Contractor shall be required to prepare specific Environmental, Health and Safety Plan (EHSP) before the demolition of the existing bridge and construction of the new bridge. At minimum, the EHSP shall satisfy the following requirements;
 - Descriptions on measures for spill prevention, and sedimentation control, surface water flow diversion, reinstatement, etc;
 - Local people shall be informed about the block off and demolition of the existing bridge with at least two weeks notice;
 - Signboards and fences shall be placed and maintained to safely block off access to the two ends of the existing bridge. Allocate staff to guard the site 24 hours per day. Ensure adequate lighting at night time;
 - Signboard directing traffic diversion shall be installed at the two ends of each existing bridges before demolition;
 - Life vests and protective equipment are provided to the workers and enforce the use when working in or above water surface, especially during construction of bridge abutments if there is 2-3 m water in the stream;
 - The waste shall be controlled strictly to restrict discharge or dumping of any wastewater, slurry, waste, fuels and waste oil into the water. All these materials must be collected and disposed of on land at the banks. The slurry and sediment shall also pump to the banks for disposal and shall not be allowed to discharge to the rivers directly;
 - Reinstatement of watercourse crossings;
 - After bridge construction, the works area shall be reinstated;
 - Concrete mixing directly on the ground shall not be allowed and shall take place on impermeable surfaces;
 - All runoff from batching areas shall be strictly controlled, and cement-contaminated water shall be collected, stored and disposed of at the approved site;
 - Unused cement bags shall be stored out of the rain where runoff won't affect it; Used (empty) cement bags shall be collected and stored in weatherproof containers to prevent windblown cement dust and water contamination.;
 - All excess concrete shall be removed from site on completion of concrete works and disposed of. Washing of the excess into the ground is not allowed. All excess aggregate shall also be removed;

Specific mitigation measures are presented in the table below:

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Table 24. Site-specific mitigation measures in the construction phase

Site-specific impacts	Specific mitigation measures	Responsibility	Supervised
<p>Erosion, soil subsidence:</p> <ul style="list-style-type: none"> - 780m northern bank of Cay Bua river in Nghia Phuong commune; - 445m southern bank of Ve river in Duc Thang commune - 542m northern bank of Ve river in Nghia Hiep commune - 1,030m northern bank of Tra Khuc river in Truong Quang Trong ward. 	<ul style="list-style-type: none"> - Before dredging, reinforcement of banks will be conducted. This construction method must be proposed and submitted to the authorities concerned for approval by the construction contractors. - Use construction method to reduce vibration for construction activities of embankment i.e. pipe jacking instead of pile driving; closely monitoring the vibration level; - Construction of side slope is made in accordance with the design - Do not carry out dredging works in rainy season. - Do not place heavy machineries and transportation vehicles near the canals banks. Inspection and supervision on land subsidence risks must be taken regularly in order to prepare the appropriate reinforcement plans. 	Contractor	PMU, CSC
<p>Impact on waterway usage on Cay Bua, Ve, Tra Khuc and Tra Bong Rivers:</p> <ul style="list-style-type: none"> - 780m northern bank of Cay Bua river in Nghia Phuong commune; - 445m southern bank of Ve river in Duc Thang commune - 542m northern bank of Ve river in Nghia Hiep commune - 1,030m northern bank of Tra Khuc river in Truong Quang Trong ward. - Tra Bong river in Binh Duong commune 	<ul style="list-style-type: none"> - Coordinate with the local authority to inform local people of the construction plan prior to construction; - Coordinate with management unit of waterway to flag the signal system on the inland waterway the transport will travel through; - Place warning boards along the construction route, both on land and water surface (arrange the road and waterway traffic guide). 	Contractor	PMU, CSC
<p>Falling into river/stream, drowning in the process of embankment and bridges construction</p>	<ul style="list-style-type: none"> - Install lighting system, warning sign of the construction site, especially at night, with a distance of 50m from the upstream and downstream. - Ensure equipment and health conditions for workers, personnel at each construction site and time, avoid working in very sunny day and extreme weather. - Closely control and assign management staff on safety and environment to be presented regularly and continuously on construction site. 	Contractor	PMU, CSC
<p>Impact on agriculture land along the northrn of Ve river in Nghia Hiep</p>	<ul style="list-style-type: none"> - Informing the community of the construction schedule at least two week before the construction. - Arrange drainage around the construction sites to prevent soil erosion and sedimentation into the 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Site-specific impacts	Specific mitigation measures	Responsibility	Supervised
<p>commune (about 2 ha of more than 10 households in The Binh hamlet)</p>	<p>rice fields and irrigation canals.</p> <ul style="list-style-type: none"> - Regularly check the affected on-field irrigation canals to ensure they are not blocked by construction spoil or waste and if they are affected, provide alternative irrigation water from canals to the locations the local people request. - Immediately rehabilitate irrigation canals if they are damaged by construction activities to ensure that water supply for the rice fields is maintained. - Closely consult with the local community to ensure that suitable solutions to problems are taken and communities' concerns related to construction activities are addressed. 		
<p>Subsidence risk in pier of bridge during construction phase <i>Va Ranh bridge; Dam bridge and Dong Yen 3 bridge</i></p>	<ul style="list-style-type: none"> - Construction plans should seek to minimize flow interruptions to the river; - Restrict works in the rainy season to reduce risk to water pollution accordingly; - Ensure heavy equipment and loaded vehicles are parked a safe distance from all river banks; - Ensure the constant presence of supervision consultants and contractors during construction to monitor the potential risk of erosion and landslides and if necessary take the appropriate action. 	Contractor	PMU, CSC
<p>Impact on waterway transport during embankment upgrading/bridge construction</p>	<ul style="list-style-type: none"> - Coordinate with the local authority to inform local people of the construction plan prior to construction; - Coordinate with the management unit of waterway to flag the signal system on the inland waterway the transport will travel through; - Place warning boards along the construction route, both on land and water surface (arrange the road and waterway traffic guide). 	Contractor	PMU, CSC
<p>Community disturbance and traffic concern on Dong Yen 3 village</p>	<ul style="list-style-type: none"> - Ensure that the contract requires the contractor, before commencing work, to provide a construction plan with a detailed health, safety, environment and traffic management plan, which has to be provided to the local authorities and approved by CSC. - Inform local residents in advance (at least one week) of construction and work schedules, interruption of services, traffic routes. Inform the community of the planned night construction at least 2 days in advance. - Put and maintain bulletin boards at the construction site, containing the following information: full name and phone number of the Contractor, Site Manager, Supervision Consultants and Subproject Owner, duration and scope of work. - Contractors should provide lighting at all construction sites at night; security guard staff at construction sites to moderate vehicles entering and exiting the construction site; - Put road construction warning signs at the site and maintain them for the duration of the work. - Sediment shall be transported out of construction site or transfer site within the day. Do not 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Site-specific impacts	Specific mitigation measures	Responsibility	Supervised
	<p>transport sediment during rush hours;</p> <ul style="list-style-type: none"> - Limit the construction area to that within the designated site boundary. - Assign staff to control traffic during transportation, loading and unloading, at construction sites and sediment transfer site. 		
<p>Disruption of business activities <i>One household on Ha Rieng road to resettlement area in Ha Rieng village</i></p>	<ul style="list-style-type: none"> - Inform the street household businesses of the construction activities and their potential impacts such, waste, dust, and noise, traffic, and construction schedule at least 02 weeks before start of the construction. - Provide safe and easy access to the household businesses putting clean and strong thick wood panels or steel plates over the open ditches or mainholes. - Do not gather materials and wastes within 20m from household businesses and shops. - Do not use machines generating loud noise and high vibration levels near the household businesses. - Spray sufficient water to suppress dust during dry and windy days at least three times a day at site that is near household businesses. - Deploy staff to guide the traffic during construction during transportation, loading and unloading of construction materials and wastes, and to guard high risk operations. - Cleaning up construction areas at the end of the day, especially construction areas in front of business shops. - Manage the worker force to any avoid the conflict with the local people and household businesses. - Compensate goods, products damaged by construction activities of the subproject. - Immediately address any issue/problem caused by the construction activities and raised by the local household businesses. 	Contractor	PMU, CSC
<p>Impacts on EMs (Living of Hre and Co Peoples) <i>(5) Va Ranh bridge; (6) Dam bridge and road and (8) Ha Rieng road.</i></p>	<p>To mitigate impacts on the Co and H'Re people communities and to maximize benefits for the community, an Ethnic Minority Development Plan (EMDP) was prepared for Quang Ngai subproject. The main content of this EMDP is summarized below.</p> <ul style="list-style-type: none"> - Living and earning activities of Co and H'Re peoples are affected by land acquisition: Design for limiting land acquisition by social assessment survey, consultation with Co and H'Re peoples and reasonable compensation for affected households. - Supply information about subproject components and summarize decisions of Co and H'Re peoples through confirmation of the subproject. - Raise awareness of contractors, workers and Co and H'Re peoples of social problems and protection measures HIV/AIDs, drug use, infectious diseases, environmental pollution, 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Site-specific impacts	Specific mitigation measures	Responsi-bility	Super-vised
	<p>violence increased due to conflicts of workers during construction.</p> <ul style="list-style-type: none"> - Monitoring environmental protection during construction. 		

Mitigation measures for impacts on sensitive receptors:

The construction process will be likely to affect part of these works' activities, including the people's safety and access to these places; smoke and dust as nuisance to residents and cultural works that can be affected by the subproject operations are listed in Table 25.

Table 25. Impact mitigation measures on sensitive receptors at the construction site

No.	Sensitive receptors	Impacts	Specific mitigation measures	Responsi-bility	Super-vised
1	Northern Embankment of Cau Bua river				
1.1	<p>Residential Area in Nang Tay 1 hamlet</p> 	<ul style="list-style-type: none"> - Public health related to dust - Traffic disturbance - Safety risks related to truck movements 	<ul style="list-style-type: none"> - Ensure that the contract requires the contractor, before commencing work, to provide a construction plan with a detailed health, safety, environment and traffic management plan. - Inform local residents in advance (at least 07 days) of construction and work schedules, interruption of services, traffic routes. Inform the community of the planned night construction at least 2 days in advance. - Put and maintain bulletin boards at the construction site, containing the following information: full name and phone number of the Contractor, Site Manager, Supervision Consultants and Subproject Owner, duration and scope of work. - Carry out watering for dust control at least 2 times a day: in the morning and in the afternoon during dry weather with temperatures of over 25°C, or in windy weather. - Contractors should provide lighting at all construction sites at night; security guard staff at construction sites to moderate vehicles entering and exiting the construction site; - Put road construction warning signs at the site and maintain them for 		

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Sensitive receptors	Impacts	Specific mitigation measures	Responsi-bility	Super-vised
			<p>the duration of the work.</p> <ul style="list-style-type: none"> - Sediment shall be transported out of construction site or transfer site within the day. Do not transport sediment during rush hours; - Limit the construction area to that within the designated site boundary. - Assign staff to control traffic during transportation, loading and unloading, at construction sites and sediment transfer site. 		
1.2	<p>Cay Bua River section with dense vegetation cover and trees</p> 	<ul style="list-style-type: none"> - Loss of trees and vegetation cover, landscape change 	<ul style="list-style-type: none"> - Spray water every day to reduce dust, especially on dry and hot days, at least twice a day. - Damage compensation - if any, due to the construction process. - Do not allow cutting trees outside construction area for any purpose (such as piling or firewood) - Setting signs “No smoking” or using explosives (stoves, gas, ...) near the planted areas along the route to minimise fire risk. 	Contractor	PMU, CSC
1.3	<p>Pumping station of Nghia Phuong commune</p> 	<ul style="list-style-type: none"> - Temporarily block the canal and water flow; - Contaminate irrigation water due to the spill of construction materials into the canal; - Physically damage to the pumping station, especially at water collection points - Loss 200 m2 of land covered with grasses, 	<ul style="list-style-type: none"> - Schedule construction at this location to avoid high irrigation water demand period. Inform the community of the construction schedule at least two weeks before the construction. - Arrange drainage around the construction sites to prevent soil erosion and sedimentation into water collection points of Pumping station. - Regularly check the Pumping station to ensure they are not blocked by construction spoil or waste and if they are affected, provide alternative water collection points from Cay Bua river to the locations the local people request. - Immediately rehabilitate water collection points if they are damaged by construction activities to ensure that water supply for the rice fields is maintained. - mark up the construction area and separate them from the pumping station. Place warning sign and avoid causing disturbance to the 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Sensitive receptors	Impacts	Specific mitigation measures	Responsi-bility	Super-vised
			<p>outside marked-up areas.</p> <ul style="list-style-type: none"> - Closely consult with the local community to ensure that suitable solutions to problems are taken and communities' concerns related to construction activities are addressed. 		
1.4	<p>Cultural house of Nang Tay 1 hamlet</p> 	<ul style="list-style-type: none"> - Obstruct people's approach to the culture house; - Cause dangers to people; - Increase dust, noise, vibration level and waste; - Disturb community meeting/activities. - Loss 280 m2 of land covered with bushes and grass 	<ul style="list-style-type: none"> - Inform the cultural house management of the construction activities and their potential impacts such, waste, dust, and noise, traffic, and construction schedule at least 02 weeks before start of the construction - Construction area to be fenced and marked with warning signs to prevent unauthorized people from entering. - Prohibit use of construction methods that cause noise during meeting hours. - Spray sufficient water to suppress dust during dry and windy days at least three times a day at site. - Immediately collect any domestic wastes and construction spoils around the cultural house and dispose in a designated site. - Deploy staff to guide the traffic during construction during transportation, loading and unloading of construction materials and wastes when people go to and leave the cultural house. - Do not load construction materials within 20m from the cultural house and tidy construction materials and stockpiles every working session. - Cover the incomplete trenches under construction at end of the working day. - Immediately address any issue/problem caused by the construction activities and raised by the cultural house. 	Contractor	PMU, CSC
1.5	<p>Oriental medicine treatment association of Tu Nghia district</p>	<ul style="list-style-type: none"> - Increased dust, emissions and noise. - Potential risk of traffic accidents - Obstructing access to unit for patients - Obstructing activities to 	<ul style="list-style-type: none"> - Inform the Oriental medicine treatment association of the construction activities and their potential impacts such, waste, dust, and noise, traffic, and construction schedule at least 02 weeks before start of the construction. - Construction equipment with loud noise will not operate near residential areas at night. - Gathering construction equipment and materials outside the construction sites are strictly prohibited. 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Sensitive receptors	Impacts	Specific mitigation measures	Responsi-bility	Super-vised
		visit and work in the Association.	<ul style="list-style-type: none"> - Minimize simultaneous operation of multiple equipment on site to minimize the synergetic impacts of equipment. - Install safety warning signs around the construction site, especially at the entrances of sites, at listed sensitive areas, and at the beginning and the end of the road. - Regular humidify the construction site and surrounding areas at least 02 times per day. - Traffic regulators are necessary when means of transport enter and leave the construction sites. 		
2	Ve river – southern embankment, 445 m				
2.1	Fishery farming pond 	<ul style="list-style-type: none"> - Wastewater can overflow into the fish pond affecting water quality. It impacts on growth of fishes. - Solid wastes can fall into the ponds affecting water quality. It impacts on growth of fishes. 	<ul style="list-style-type: none"> - Informing the AH of the construction schedule at least two week before the construction. - Arrange drainage around the construction sites to prevent soil erosion and sedimentation into the rice fields and irrigation canals. - Regularly check the affected on-field irrigation canals to ensure they are not blocked by construction spoil or waste and if they are affected, provide alternative irrigation water from canals to the locations the local people request. - Immediately rehabilitate irrigation canals if they are damaged by construction activities to ensure that water supply for the rice fields is maintained. - Closely consult with the local community to ensure that suitable solutions to problems are taken and communities' concerns related to construction activities are addressed. 	Contractor	PMU, CSC
2.2	Primary school of Duc Thang commune	<ul style="list-style-type: none"> - Dust, noise and emissions by trucks - Impact on living activities officers and students - Traffic safety risk 	<ul style="list-style-type: none"> - Inform the school management of the construction activities and their potential impacts such, waste, dust, and noise, traffic, and construction schedule at least two weeks before start of the construction. - Install safety warning signs at around the school. - Spray sufficient water to suppress dust during dry and windy days at least two times a day on the route. - Deploy staff to guide the traffic during transportation of construction materials and wastes when pupils go to and leave the school. 		

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Sensitive receptors	Impacts	Specific mitigation measures	Responsi-bility	Super-vised
			<ul style="list-style-type: none"> - Truck drivers shall restrict the use of horns close to the school location. - Limiting transporting on rush hours when pupils go to and leave the school (the school every weekday: 7h-7h30; 11h-11h30; 13h-13h30; 16h30 - 17h30). 		
2.3	<p>Fishing boats, Small landing stage</p> 	<p>Interrupt accessibility of local fishing boats.</p>	<ul style="list-style-type: none"> - Coordinate with the local authority to inform local people of the construction plan prior to construction; - Coordinate with the management unit of waterway to flag the signal system on the inland waterway the transport will travel through; - Place warning boards along the construction route, both on land and water surface (arrange the road and waterway traffic guide) - Arrange for temporary landing stage at a convenient location for boats approaching the riverbank. 		
2.4	<p>Residential area in Thanh Long hamlet</p> 	<ul style="list-style-type: none"> - Public health related to dust - Traffic disturbance Safety risks related to truck movements 	<ul style="list-style-type: none"> - Ensure that the contract requires the contractor, before commencing work, to provide a construction plan with a detailed health, safety, environment and traffic management plan. - Inform local residents in advance (at least 07 days) of construction and work schedules, interruption of services, traffic routes. Inform the community of the planned night construction at least 2 days in advance. - Put and maintain bulletin boards at the construction site, containing the following information: full name and phone number of the Contractor, Site Manager, Supervision Consultants and Subproject Owner, duration and scope of work. - Carry out watering for dust control at least 2 times a day: in the morning and in the afternoon during dry weather with temperatures of over 25°C, or in windy weather. 		

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Sensitive receptors	Impacts	Specific mitigation measures	Responsi-bility	Super-vised
			<ul style="list-style-type: none"> - Contractors should provide lighting at all construction sites at night; security guard staff at construction sites to moderate vehicles entering and exiting the construction site; - Put road construction warning signs at the site and maintain them for the duration of the work. - Sediment shall be transported out of construction site or transfer site within the day. Do not transport sediment during rush hours; - Limit the construction area to that within the designated site boundary. - Assign staff to control traffic during transportation, loading and unloading, at construction sites and sediment transfer site. 		
2.5	River section with dense vegetation cover and trees 	- Loss of trees and vegetation cover, landscape change	<ul style="list-style-type: none"> - Spray water every day to reduce dust, especially on dry and hot days, at least twice a day. - Damage compensation - if any, due to the construction process. - Do not allow cutting trees outside construction area for any purpose (such as piling or firewood) - Setting signs “No smoking” or using explosives (stoves, gas, ...) near the planted areas along the route to minimise fire risk. 	Contractor	PMU, CSC
3	Ve river – northern embankment, 542 m				
3.1	Agricultural land 	Runoff from construction site could contaminate irrigation water and soil, affecting productivity of crops	<ul style="list-style-type: none"> - Informing the community of the construction schedule at least two week before the construction. - Arrange drainage around the construction sites to prevent soil erosion and sedimentation into the rice fields and irrigation canals. - Regularly check the affected on-field irrigation canals to ensure they are not blocked by construction spoil or waste and if they are affected, provide alternative irrigation water from canals to the locations the local people request. - Immediately rehabilitate irrigation canals if they are damaged by construction activities to ensure that water supply for the rice fields is maintained. 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Sensitive receptors	Impacts	Specific mitigation measures	Responsi-bility	Super-vised
			<ul style="list-style-type: none"> - Closely consult with the local community to ensure that suitable solutions to problems are taken and communities' concerns related to construction activities are addressed. 		
3.2	Waterway traffic 	Interrupt accessibility of local fishing boats.	<ul style="list-style-type: none"> - Coordinate with the local authority to inform local people of the construction plan prior to construction; - Coordinate with the management unit of waterway to flag the signal system on the inland waterway the transport will travel through; - Place warning boards along the construction route, both on land and water surface (arrange the road and waterway traffic guide) - Arrange for temporary landing stage at a convenient location for boats approaching the riverbank. 	Contractor	PMU, CSC
4	Northern bank, Tra Khuc river, 1030 m				
4.1	Residential area in Truong Quang Trong ward 	<ul style="list-style-type: none"> - Public health related to dust - Traffic disturbance - Safety risks related to truck movements 	<ul style="list-style-type: none"> - Ensure that the contract requires the contractor, before commencing work, to provide a construction plan with a detailed health, safety, environment and traffic management plan. - Inform local residents in advance (at least 07 days) of construction and work schedules, interruption of services, traffic routes. Inform the community of the planned night construction at least 2 days in advance. - Put and maintain bulletin boards at the construction site, containing the following information: full name and phone number of the Contractor, Site Manager, Supervision Consultants and Subproject Owner, duration and scope of work. - Carry out watering for dust control at least 2 times a day: in the morning and in the afternoon during dry weather with temperatures of over 25°C, or in windy weather. - Contractors should provide lighting at all construction sites at night; security guard staff at construction sites to moderate vehicles entering and exiting the construction site; - Put road construction warning signs at the site and maintain them for the duration of the work. 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Sensitive receptors	Impacts	Specific mitigation measures	Responsi-bility	Super-vised
			<ul style="list-style-type: none"> - Sediment shall be transported out of construction site or transfer site within the day. Do not transport sediment during rush hours; - Limit the construction area to that within the designated site boundary. - Assign staff to control traffic during transportation, loading and unloading, at construction sites and sediment transfer site. 		
4.2	Waterway traffic 	Interrupt accessibility of local fishing boats.	<ul style="list-style-type: none"> - Coordinate with the local authority to inform local people of the construction plan prior to construction; - Coordinate with the management unit of waterway to flag the signal system on the inland waterway the transport will travel through; - Place warning boards along the construction route, both on land and water surface (arrange the road and waterway traffic guide) - Arrange for temporary landing stage at a convenient location for boats approaching the riverbank. 	Contractor	PMU, CSC
4.3	Agricultural land 	Loss of a part of land and crops by households.	<ul style="list-style-type: none"> - Informing the community of the construction schedule at least two week before the construction. - Arrange drainage around the construction sites to prevent soil erosion and sedimentation into the rice fields and irrigation canals. - Regularly check the affected on-field irrigation canals to ensure they are not blocked by construction spoil or waste and if they are affected, provide alternative irrigation water from canals to the locations the local people request. - Immediately rehabilitate irrigation canals if they are damaged by construction activities to ensure that water supply for the rice fields is maintained. - Closely consult with the local community to ensure that suitable solutions to problems are taken and communities' concerns related to construction activities are addressed. 	Contractor	PMU, CSC
5	Va Ranh Bridge and approach road				
5.1	Va Ranh stream is dried in dry season	Accidental risk in rainy/flood season	<ul style="list-style-type: none"> - Prepare a backup plan in the rainy season such as covering, transporting materials, machinery and workers to wait for stable weather to continue working. 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Sensitive receptors	Impacts	Specific mitigation measures	Responsi-bility	Super-vised
			<ul style="list-style-type: none"> - Design of temporary sewers, ditches, drainage ditches, especially during the rainy season. - Provision of pumps and generators to enhance water drainage on heavy rainy days and to treat low-lying areas in the event of floods, causing damage to people and property; - Identification of technical stopping points to ensure safety for construction participants, works and equipment before the rainy season; - Check the equipment, machinery and location of planned safety; - Provide the workers with all appropriate PPE and ensure that life jackets are used in proximity to water. Safety staff must be available at all times for timely rescue in case of incidents. - Update weather and climate to prevent storms in each area of deployment. - Coordinate with local authorities to promptly prevent and overcome the consequences of storms and floods. 		
5.2	Existing bridge 	Access through existing bridge will be interrupted during construction phase	<ul style="list-style-type: none"> - Inform the local people of the construction activities and their potential impacts such as waste, dust, and noise, traffic, especially vibration, potential damage to infrastructure and construction schedule at least 02 weeks before start of the work. - Install temporary bridges (such as wooden, pontoon bridge) at the convenience of people traveling on the route. - Provide appropriate traffic control signage at the other bridges (as if) across Rivers/Stream during construction. 	Contractor	PMU, CSC
6	Dam Bridge and Approach road 1000 m				
6.1	Perennial crops	<ul style="list-style-type: none"> - Loss of trees and vegetation cover. - Dust and emissions impact on the growth and development of plants. - Increased forest fire risk 	<ul style="list-style-type: none"> - Spray water every day to reduce dust, especially on dry and hot days, at least twice a day. - Damage compensation - if any, due to the construction process. - Do not allow cutting trees outside construction area for any purpose (such as piling or firewood) - Setting signs “No smoking” or using explosives (stoves, gas, ...) near 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Sensitive receptors	Impacts	Specific mitigation measures	Responsi-bility	Super-vised
		- Insects, snake may attack the workers	the planted areas along the route to minimise fire risk.		
7	Dong Yen 3 bridge, 158m and approach road				
7.1	Dong Thanh existing bridge 	Interrupt access through the existing bridge	<ul style="list-style-type: none"> - Inform the local people of the construction activities and their potential impacts such as waste, dust, and noise, traffic, especially vibration, potential damage to infrastructure and construction schedule at least 02 weeks before start of the work. - Install temporary bridges (such as wooden, pontoon bridge) at the convenience of people traveling on the route. - Provide appropriate traffic control signage at the other bridges (as if) across Rivers during construction. 	Contractor	PMU, CSC
7.2	Residential area 	<ul style="list-style-type: none"> - Public health related to dust - Traffic disturbance - Safety risks related to truck movements 	<ul style="list-style-type: none"> - Ensure that the contract requires the contractor, before commencing work, to provide a construction plan with a detailed health, safety, environment and traffic management plan. - Inform local residents in advance (at least 07 days) of construction and work schedules, interruption of services, traffic routes. Inform the community of the planned night construction at least 2 days in advance. - Put and maintain bulletin boards at the construction site, containing the following information: full name and phone number of the Contractor, Site Manager, Supervision Consultants and Subproject Owner, duration and scope of work. - Carry out watering for dust control at least 2 times a day: in the morning and in the afternoon during dry weather with temperatures of over 25°C, or in windy weather. 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Sensitive receptors	Impacts	Specific mitigation measures	Responsi-bility	Super-vised
			<ul style="list-style-type: none"> - Contractors should provide lighting at all construction sites at night; security guard staff at construction sites to moderate vehicles entering and exiting the construction site; - Put road construction warning signs at the site and maintain them for the duration of the work. - Sediment shall be transported out of construction site or transfer site within the day. Do not transport sediment during rush hours; - Limit the construction area to that within the designated site boundary. - Assign staff to control traffic during transportation, loading and unloading, at construction sites and sediment transfer site. 		
7.3	Waterway traffic 	Interrupt accessibility of local fishing boats.	<ul style="list-style-type: none"> - Coordinate with the local authority to inform local people of the construction plan prior to construction; - Coordinate with the management unit of waterway to flag the signal system on the inland waterway the transport will travel through; - Place warning boards along the construction route, both on land and water surface (arrange the road and waterway traffic guide) 	Contractor	PMU, CSC
8	Road to Resettlement site in Ha Rieng Hamlet, 1691 m				
8.1	Productive forest land 	<ul style="list-style-type: none"> - Dust and emissions impact on the growth and development of plants. - Increased forest fire risks Health risk to workers related to insect bites. 	<ul style="list-style-type: none"> - Spray water every day to reduce dust, especially on dry and hot days, at least twice a day. - Damage compensation - if any, due to the construction process. - Do not allow cutting trees outside construction area for any purpose (such as piling or firewood) - Setting signs “No smoking” or using explosives (stoves, gas, ...) near the planted areas along the route to minimise fire risk. 	Contractor	PMU, CSC
8.2	Resettlement area in Ha Rieng hamlet	<ul style="list-style-type: none"> - Dust, noise and emissions - Impact on living 	<ul style="list-style-type: none"> - Ensure that the contract requires the contractor, before commencing work, to provide a construction plan with a detailed health, safety, environment and traffic management plan. 	Contractor	PMU, CSC

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Sensitive receptors	Impacts	Specific mitigation measures	Responsi-bility	Super-vised
		<ul style="list-style-type: none"> activities residents - Traffic safety risk - Interrupted access to the resident area. - Risk on social issues 	<ul style="list-style-type: none"> - Inform local residents in advanced (at least one week) about construction and work schedules, traffic routes etc. - Put and maintain bulletin boards at the construction site, containing the following information: full name and phone number of the Contractor, Site Manager, Supervision Consultants and Subproject Owner, duration and scope of work. - Construction in a successive manner, section by section in a short a period as feasible. Avoid simultaneous construction and delays that may affect to residents in the RS. - Contractors should provide lighting at all construction sites at night; security guard staff at construction sites to moderate vehicles entering and exiting the construction site; - Put road construction warning signs at the site and maintain them for the duration of the work. 		
9	<p>Disposal sites</p> <ul style="list-style-type: none"> - Nang Tay 1 hamlet in Nghia Phuong commune - Dong Yen 3 hamlet in Binh Duong commune - Thanh Long hamlet in Duc Thang commune - The Binh hamlet in Nghia Hiep commune - Go Ro disposal site in Tra Phong commune. 	<ul style="list-style-type: none"> - The risk of erosion and subsidence due to non-compliance with the height regulation (2-3m) - Drainage of waste dumps with a design area of 1-2 ha 	<ul style="list-style-type: none"> - To pursuant to compliance with the height regulation (about 2-3m) - Design the drainage of waste disposal properly for a 1-2 ha designed disposal area. 	Contractor	PPMU, CSC

5.4. Mitigation measures during operation phase

Specific impacts mitigation measures during the operational phase are presented in Table 26:

Table 26. Specific impact mitigation measures description

Site-specific impacts	Specific mitigation measures	Person in charge	Monitoring unit
- Incident of falling into rivers, streams, drowning on Cay Bua, Ve, Tra Khuc, Tra Bong Rivers and Va Ranh, Ha Rieng Streams	- Design and erect fences or barrier gate at the up and down steps to the walking paths under the embankment, - Plug warning signs and install lighting system in the positions. - Take propaganda about this risk in the first operational phase for local people accustomed to this situation. - Taking first aids for persons who get accidents and transporting them to the nearest hospitals and health service units.	PPMU/ Other management unit	PPMU/ Other management unit
- Road Safety during the operation of 4 embankments, 3 bridges and 2 roads	- Improving knowledge of local people on road use regulations and practices - Monitoring and enforcement of driver speed and behavior. - When traffic volume is high, generation of dust, exhausted gases, noise, and vibration could be an additional issue but this could be mitigated through long term planning. -	PPMU/ Other management unit	PPMU/ Other management unit
- Induced development	- Improving people knowledge on socio-economic development opportunity and risks related to social issues	PPMU/ Other management unit	PPMU/ Other management unit

6. ROLES AND RESPONSIBILITIES FOR ESMP IMPLEMENTATION**6.1. ESMP implementation arrangement**

ESMP during construction requires the involvement of several stakeholders and agencies, each with different roles and responsibilities including, PPMU, DONRE (Quang Ngai Department of Natural Resources and Environment), the Contractors, the Construction Supervision Consultant (CSC), Detailed Technical Design, and local communities.

To ensure effective implementation of the ESMP, the following actions will be carried out during the implementation of the subproject:

During the detailed design and tender documentation making

- During the detailed design and preparation of bidding/ contractual documents for each package, the detailed technical design consultant will incorporate the mitigation measures and monitoring responsibilities provided in the ESMP and Environmental, Social, Health and Safety (ESHS) requirements into the detailed technical designs and standard procurement documents and contractual documents.

- PMU make effort to inform the bidders/contractors about the subproject safeguard requirements and request them to commit to comply.

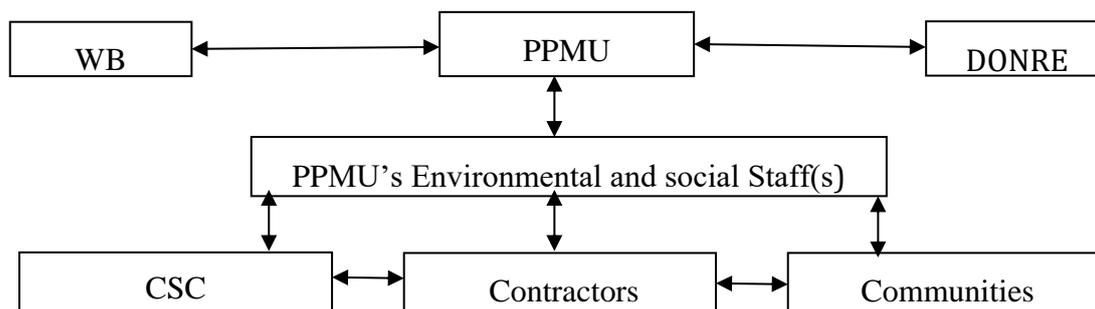


Figure 5. ESMP implementation structure

6.2. Responsibilities of Stakeholders

The roles and responsibilities of the key parties and their relationships regarding the implementation of the ESMP are described as follows:

Table 27. Environmental protection responsibilities

Community/ Agencies	Responsibilities
PPMU	<ul style="list-style-type: none"> - PPMU will be responsible for monitoring the overall subproject implementation, including environmental compliance of the subproject. PPMU will have the final responsibility for ESMP implementation and environmental performance of the subproject during the construction and operational phases. Specifically, the PPMU will: (i) closely coordinate with local authorities in the participation of the community during subproject preparation and implementation; (ii) monitor and supervise ESMP implementation including incorporation of ESMP into the detailed technical designs and bidding and contractual documents; (iii) ensure that an environmental management system is set up and functions properly; (iv) be in charge of reporting on ESMP implementation to the DONRE and the World Bank. - In order to be effective in the implementation process, PPMU will assign Environmental Staff(s) (ES) to help with the environmental aspects of the subproject.
PPMU Environmental and Social Staff(s) (ES)	<ul style="list-style-type: none"> - The ES is responsible for monitoring the implementation of the subproject ESMP. Specifically, ES will be responsible for: (i) helping PPMU incorporate ESMP into the detailed technical designs and civil works bidding and contractual documents; (ii) helping PMU incorporate responsibilities for ESMP and supervision into the TORs, bidding and contractual documents for the Construction Supervision Consultant (CSC) and other safeguard consultant (IEMC) as needed; (iii) providing relevant inputs to the consultant selection process; (iv) reviewing reports submitted by the CSC and safeguard consultants; (v) conducting periodic site checks; (vi) helping the PPMU on solutions to handle social issues of the subproject; and (vii) preparing environmental and social performance section on the progress and review reports to be submitted to the DONRE and the World Bank.
Construction Supervision Consultant (CSC)	<ul style="list-style-type: none"> - The CSC will assign Environmental and Social Staff(s) and will be responsible for routine supervising and monitoring all construction activities and for ensuring that Contractors comply with the requirements of the contracts and the ECOP. The CSC will engage sufficient number of qualified staffs (e.g. Environmental Engineers) with adequate knowledge on environmental protection and construction subproject management to perform the required duties and to supervise the Contractor's performance. - The CSC will also assist the PPMU in reporting and maintaining close coordination with the local community.

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Community/ Agencies	Responsibilities
Contractor	<ul style="list-style-type: none">- The contractor will assign Environmental and Social Staff(s) to carry out Environmental and Social mitigation measures proposed in ESMP.- Based on the approved environmental specifications (ECOP) in the bidding and contractual documents, the Contractor is responsible for establishing a Contractor ESMP (CESMP) for each construction site area, submit the plan to PPMU and CSC for review and approval before commencement of construction. In addition, it is required that the Contractor get all permissions for construction (traffic control and diversion, excavation, labor safety, etc. before civil works) following current regulations.- The Contractor is required to appoint a competent individual as the contractor's on-site <i>Safety and Environment Officer (SEO)</i> who will be responsible for monitoring the contractor's compliance with health and safety requirements, the CESMP requirements, and the environmental specifications (ECOP).- Take actions to mitigate all potential negative impacts in line with the objective described in the CESMP.- Actively communicate with local residents and take actions to prevent disturbance during construction.- Ensure that all staffs and workers understand the procedure and their tasks in the environmental management program.- Report to the PPMU and CSC on any difficulties and their solutions.- Report to local authority and PPMU and CSC if environmental accidents occur and coordinate with agencies and keys stakeholders to resolve these issues.
Local community	<ul style="list-style-type: none">- Community: According to Vietnamese practice, the community has the right and responsibility to routinely monitor environmental performance during construction to ensure that their rights and safety are adequately protected and that the mitigation measures are effectively implemented by contractors and the PPMU. If unexpected problems occur, they will report to the CSC and PPMU.
Quang Ngai People's Committees, DONRE	<ul style="list-style-type: none">- Oversee implementation of subproject under recommendations of DONRE and PPMU to ensure compliance of Government policy and regulations. DONRE is responsible for monitoring the compliance with the Government environmental requirements.

7. ENVIRONMENTAL COMPLIANCE FRAMEWORK

7.1. Environmental duties of the contractor

The contractor firstly shall adhere to minimize the impact that may be result of the subproject construction activities and secondly, apply the mitigation measures under ESMP to prevent harm and nuisances on local communities and environment caused by the impacts in construction and operation phases.

Remedial actions that cannot be effectively carried out during construction should be carried out on completion of the works (and before issuance of the acceptance of completion of works)

The duties of the Contractor include but not limiting to:

- Compliance with relevant legislative requirements governing the environment, public health and safety;
- Work within the scope of contractual requirements and other tender conditions;
- Organize representatives of the construction team to participate in the joint site inspections undertaken by the Environmental Staffs of the CSC;
- Carry out any corrective actions instructed by the Environmental Staffs of the PPMU and

CSC;

- In case of non-compliances/discrepancies, carry out investigation and submit proposals on mitigation measures, and implement remedial measures to reduce environmental impact;
- Stop construction activities, which generate adverse impacts upon receiving instructions from the Environmental Staffs of PPMU and CSC. Propose and carry out corrective actions and implement alternative construction method, if required, in order to minimize the environmental impacts; Non-compliance by the Contractor will be cause for suspension of works and other penalties until the non-compliance has been resolved to the satisfaction of the ES of PPMU and CSC.

7.2. Contractor's safety, social and environmental officer (SEO)

The contractor shall be required to appoint competent staff(s) as the Contractor's on-site safety, Social and environmental officer (SEO). The SEO must be appropriately trained in environmental management and must possess the skills necessary to transfer environmental management knowledge to all personnel involved in the contract. The SEO will be responsible for monitoring the contractor's compliance with the ESMP requirements and the environmental specifications. The duties of the SEO shall include but not be limited to the following:

- Carry out environmental site inspections to assess and audit the contractors' site practice, equipment and work methodologies with respect to pollution control and adequacy of environmental mitigation measures implemented;
- Monitor compliance with environmental protection measures, pollution prevention and control measures and contractual requirements;
- Monitor the implementation of environmental mitigation measures;
- Prepare audit reports for the site environmental conditions;
- Investigate complaints and recommend any required corrective measures;
- Advise the contractor on environment improvement, awareness and proactive pollution prevention measures;
- Recommend suitable mitigation measures to the contractor in the case of non-compliance. Carry out additional monitoring of noncompliance instructed by the ES of PPMU and CSC
- Inform the contractor and ES (of PPMU and CSC) of environmental issues, submit contractor's ESMP Implementation Plan to the ES of PPMU and CSC, and relevant authorities, if required;
- Keep detailed records of all site activities that may relate to the environment.

7.3. Environmental and social supervision during construction (CSC)

During construction phase, a qualified CSC reporting to the PPMU shall carry out the environmental supervision. The CSC will assign environmental and social staff(s), will be responsible for inspecting, and supervising all construction activities to ensure that mitigation measures adopted in the ESMP are properly implemented, and that the negative environmental impacts of the subproject are minimized. The CSC shall engage sufficient number of Environmental Supervision Engineers with adequate knowledge on environmental protection and construction subproject management to perform the required duties and to supervise the Contractor's performance. Specifically, ES of CSC will:

- Review and assess on behalf of the PPMU whether the construction design meets the requirements of the mitigation and management measures of the ESMP,
- Supervise site environmental management system of contractors including their

performance, experience and handling of site environmental issues, and provide corrective instructions;

- Review the ESMP implementation by the contractors, verify and confirm environmental supervision procedures, parameters, monitoring locations, equipment and results;
- Report ESMP implementation status to PPMU and prepare the environmental supervision statement during the construction phase.

7.4. Compliance with legal and contractual requirements

The constructions activities shall comply not only with contractual environmental protection and pollution control requirements but also with environmental protection and pollution control laws of the Socialist Republic of Viet Nam.

All the works method statements submitted by the Contractor to the CSC and PPMU for approval to see whether sufficient environmental protection and pollution control measures have been included.

The CSC and PPMU shall also review the progress and program of the works to check that relevant environmental laws have not been violated, and that any potential for violating the laws can be prevented.

The Contractor shall copy relevant documents to the SEO and the ES of CSC and PPMU. The document shall at least include the updated work progress report, the updated work measure, and the application letters for different license/permits under the environmental protection laws, and all the valid license/permit. The SEO and the ES shall also have access, upon request, to the Site Log-Book.

After reviewing the documents, the SEO or the ES shall advise the PPMU and the contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the SEO or the ES concludes that the status on license/permit application and any environmental protection and pollution control preparation works may not comply with the work measure or may result in potential violation of environmental protection and pollution control requirements, they shall advise the Contractor and the PPMU accordingly.

7.5. Reporting Arrangements

ESMP monitoring and reporting requirements are summarized in Table 28.

Table 28. Regular Reporting Requirements

No.	Report Prepared by	Submitted to	Frequency of Reporting
1	Contractor to the Employer	PPMU	The Contractor is obliged to report (immediately of certain aspects and monthly with respect to a wider range of aspects) to the CSC.
2	Construction Supervision consultant (CSC)	PPMU	The CSC is required to report (immediately or monthly) to the employer every weekly and monthly.
4	Community Monitoring	PPMU	When the community has any complaint about the subproject safeguards implementation
5	PPMU	DONRE	PPMU is required to report to DONRE every six-month in accordance with Gov's regulations
6	PPMU	WB	PPMU is required to report to WB every six-month in accordance with the Section II of the Loan Agreement

PPMU' report on environmental performance/compliance of the subproject should be included

in the progress report submitted to the WB before each subproject implementation support mission and must include sufficient information on: i) preparation and disclosures of environmental safeguards instruments for subprojects; ii) incorporation of new subproject ESMPs in the bidding and contractual documents; iii) monitoring and supervision of ESMP implementation by the contractor, the construction supervision engineer, and the PCs; iv) any challenges in safeguard implementation, solutions, and lessons learned.

8. ENVIRONMENTAL MONITORING PROGRAM

8.1. Objectives of the environmental monitoring program

Implementation plan of monitoring program is divided into 2 phases: Design phase is the preparation phase and subproject construction; Do not conduct environmental monitoring during subproject operation phase due to mostly positive impacts on this phase. Mitigation measures determined during subproject preparation must be completed by the designer before construction. The proper design results must be included into the contractor's bids.

During construction phase, some mitigation measures must be carried out before construction such as training for contractor and Construction Supervision Consultant (CSC). The detailed implementation plan for mitigation measures must be given out to be applied at site on commencement date. Such requirement is also available in the Bidding Documents and such plan shall be inspected by PPMU.

8.2. Review of contractor's documents

ESMP's Implementation Plan must be prepared by the contractor and inspected by PPMU before the Bids are submitted. All documents submitted by the contractor are appraised in accordance with the subproject requirements and CSC to ensure that no works are undertaken unless the supervising engineer/supervision consultant is satisfied that the contractor has suitable proposals for managing the E&S risks of the activity in accordance with the employers requirements. Any changes in documents must be accepted by the environmental officer and CSC. Such documents must be continuously updated.

8.3. Environmental monitoring criteria

8.3.1. Environmental monitoring plan

a. Construction phase

During subproject preparation and construction, the environmental monitoring is carried out by the Subproject Owner, concretely:

Table 29. Location, parameters and frequency of air ambience monitoring during construction

No	Monitored items	Construction phase
I	Monitoring of air quality, noise, vibration	
	1. Monitoring parameters	TSP, CO, NO ₂ , SO ₂ , Noise (L _{eq}), vibration
	2. Monitoring frequency	Measurements taken every six-months
	3. Applied Regulation	QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT; QCVN 26:2010/BTNMT; QCVN 27:2010/BTNMT
	4. Monitoring positions	8 samples/time x 2 times = 16 samples (Sampling locations are presented in Appendix)
II	Surface Water Quality Monitoring	
	1. Monitoring parameters	pH, DO, COD, BOD, N-NH ₄ ⁺ , N-NO ₂ ⁻ , N-NO ₃ ⁻ , P-PO ₄ ³⁻ , oil & grease, Coliform, Cl ⁻ , Fe, TSS
	2. Monitoring frequency	Measurements taken every six-months
	3. Applied Regulation	QCVN 08-MT:2015/BTNMT
	4. Monitoring positions	8 samples/time x 2 times = 16 samples (Sampling locations are presented in Appendix)
III	Other monitoring	
	Monitoring of erosion, subsidence, cracking	During embankment construction
	Monitoring of an environmental incident/risk	The event of an environmental incident (i.e. should there be accidental discharge of sewage to a water course or oil to an aquifer)

8.3.2. Social monitoring plan

Social monitoring plan during construction is showed in the Table 30 below:

Table 30. Social monitoring plan during construction

No.	Form	Site	Frequency	Basis
I	OSH monitoring			
1	Environmental hygiene	- Construction site - Worker camping area - Material mobilization areas	3 months/ time	- Quantity and conditions of cleaning tools - First aid box - Medical works - Number of infectious and contamination cases - Communication plan on community health
2	Labor safety	- Construction site - Worker camping area - Material mobilization areas	3 months/ time	- PPEs - Safety signs - Number of accidents

The supply of data on environmental monitoring at the construction site by contractors is considered a quantitative assessment tool for environmental quality around the construction site. Since then, construction supervision consultants have requested to add or change the construction methods and mitigation measures to minimize the social and environmental impact.

9. CAPACITY BUILDING PROGRAM

9.1. Technical Assistance support for the implementation of safeguards

An assessment of safeguards implementation capacity of existing PPMU staffs indicate that PPMU staffs have limited knowledge on WB safeguard requirements as well as limited knowledge of environment and social issues. Such lack of capacity represents a risk to subproject implementation of safeguards requirements contained in the ESMP and, as required by the WB policy, is to be addressed through capacity building. Therefore, it is proposed to provide capacity building through technical assistance that will support the PMU during the implementation of the safeguards requirements. The technical assistance will provide the necessary technical support the PPMU in its work with contractors as well as other entities involved in the implementation of the ESMP.

This technical assistance must be made available at an earlier stage to ensure that the ESMP is properly and appropriately translated into the bidding (and subsequent contract) documentation. The technical assistance should be undertaken by appropriately skilled and experienced personnel, and be undertaken in accordance with a Terms of Reference that includes specific reference to developing effective Employers Requirements sections of the standard Procurement Documents (SPDs).

The scope of the technical assistance would cover support from experts and training that would cover both the knowledge on safeguards requirements and procedures for the subproject as well as training that covers both specific knowledge on safeguard procedures and requirement for the subproject staffs, consultants, and national contractor would be important. This would include, for example, assistance in the preparation of documents and implementation of training program on environmental management and environmental monitoring for contractors, CSC and relevant staffs of PPMU (environmental staffs and coordinators of packages) to do their tasks. It would also include assisting the PPMU's environmental staffs with the review of contract documents on the bidding packages for construction items of the subproject to ensure compliance with environmental protection policies and impact mitigation and monitoring requirements as well as provide general environmental guidance as requested by the PPMU to enhance overall subproject implementation and performance.

Given the nature, locations, and scale of construction, it is anticipated that the safeguard technical assistance support and training will be provided at least 2 times (one on pre-construction phase and another on construction phase). The WB safeguard specialists will participate in the capacity building in particular in the training activities as appropriate.

9.2. Training programs proposed

Table 32 below provides examples of the basic trainings for safeguards during subproject implementation. The training programs will be developed and delivered by the PPMU. The PPMU with the support of the Consultant for the implementation of safeguards will provide the training to contractors, CSC and other groups.

Other more specific and tailored training will be developed and agreed upon between PPMU and the Technical Assistance team for the implementation of safeguards during subproject implementation based upon an reassessment of needs and the status of safeguards implementation.

- ✓ *Target groups for the training:* include PPMU staffs, ESU staffs, field engineers, CSC, construction contractors, local authorities, and community representatives in the

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

subproject area. Training of workers and drivers is the responsibility of the contractor.

- ✓ *Training schedule:* At least 1 month before the construction of the first contract. The training can be adjusted in line with the implementation schedule of the subproject/contracts.
- ✓ *Training frequency:* The basic training programs proposed in Table 31 will take place every six months on a yearly basis and its content updated and adapted to implementation issues. Training frequency and content will be reassessed during implementation depending on needs. It is foreseen that the training program for PPMU staffs will continue until year three of implementation.

Table 31. Training programs for capacity building on environmental supervision and management

I. Objects	Provincial Subproject Management Unit (PMU)
Training course	Environmental supervision, monitoring and reporting
Participators	Environmental staffs and technical staffs
Training Frequency	Soon after subproject effectiveness but at least 1 month before the construction of the first contract. The follow-up training will be scheduled as needed.
Time	Four days of training twice a year to be repeated on a yearly basis until year three of implementation
Content	<ul style="list-style-type: none"> - General environmental management relating to subproject including requirements of WB, DONRE, cooperating with relevant enterprises - Requirements on environmental supervision; - Supervision and implementation of mitigation measures; - Community participation in environmental supervision - Guide and supervise contractor, CSC, and community representatives in implementation of environmental supervision. - Forms used in environmental supervision; - Risk response and control; - Other areas to be determined; - Receiving approach and submit forms.
Responsibilities	PMU, with support of the Technical Assistance team for the implementation of safeguards
II. Objects	CSC, contractor, commune/wards authorities, community representatives
Training course	Implementation of mitigation measures
Participators	CSC; on-site construction management staffs; environmental staffs of contractor; commune/ward/group authorities
Training frequency	After bidding, update based on requirements
Time	Three days of training for CSC and contractors and two days of training for other also to be repeated twice a year on an annual basis depending on needs
Content	<ul style="list-style-type: none"> - Overview of environmental monitoring; - Requirements of environmental monitoring; - Role and responsibilities of contractors and CSC - Content and methods of environmental monitoring; - Response and risk control; - Propagate monitoring forms and guide how to fill in the forms and risk report; - Other areas to be determined; - Preparation and submission of report
Responsibilities	PMU with support of the Technical Assistance team for the implementation of safeguards

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

III. Objects	Communities and workers
Training course	Environmental sanitation and safety
Participators	Representatives of community and/or worker leaders (as appropriate)
Training frequency	As appropriate
Time	One-day presentation and one-day on-the job training twice a year to be repeated on a per needs basis
Content	<ul style="list-style-type: none">- Preliminary presentation on environmental protection and environmental overview- Key issues that require community and workers attention to minimize safety risks (roads, equipment, machines, etc.) as well as reduce pollution (dust, fume gases, oil/grease spill, waste management, etc.)- Management of environmental safety and sanitation in work sites and worker camps;- Mitigation measures at construction site and work camps;- Safety measures on electricity, mechanical, transportation, air pollution;- Other areas to be determined;- Procedures to deal with emergency situation
Responsibilities	Contractor, PMU

10. ESMP COST ESTIMATION

10.1. Cost for mitigation measures by contractor

Expenditure for implementing ESMP includes the main financial resources, covering the environmental monitoring expenses and expenses for implementing the mitigation measures. The expenses of implementing the mitigation measures have been included into the expenditure for implementing construction subprojects on environmental protection works and measures.

10.2. Costs for environmental monitoring program

According to the unit price of environmental monitoring in the locality, the estimated cost for environmental quality monitoring of Quang Ngai subproject is stated in the table below:

Table 32. Cost for samples and analysis during construction phase

No	Name of analysis index	Unit	Quantity	Price (VND)	Sub-Total	
					(1 USD = 22,700 VNĐ)	
				VND	VND	USD
1	Air, noise	sample	16	2,500,000	40,000,000	1,762
2	Surface water	sample	16	3,500,000	56,000,000	2,467
3	Preparing report	Report	2	15,000,000	30,000,000	1,322
	TOTAL				126,000,000	3,789

10.3. Cost for training and capacity building

Estimated cost for training program on environmental monitoring management capacity is presented in the following table:

Table 33. Cost for capacity building training

Training content	Trainee	Unit	Quantity	Price	Sub-Total	
					(1 USD = 22,700 VNĐ)	
				VND	VND	USD
Environmental monitoring and reporting	PPMU: Staff in charge of environmental issues; environmental managers	course	2	30,000,000	60,000,000	2,643

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

Implementation of mitigation measures	CSC; construction engineers, site construction field manager, etc	course	2	30,000,000	60,000,000	2,643
III. Safety and environmental sanitation						
Safety and environmental sanitation	Representatives of workers	course	2	20,000,000	40,000,000	1,762
Total:					160,000,000	7,048

10.4. Total cost for the ESMP implementation

The following table provides a cost estimate for the implementation of environmental management plan (ESMP). The cost of ESMP implementation will include (i) the costs of implementing mitigation measures by the contractor, (ii) expenses supervised by CSC, (iii) the costs of environmental quality monitoring, (iv) the cost of safety management for the PMU and (v) costs of environmental capacity building, including both technical assistance in implementing safety policies and training programs. The costs of implementing mitigation measures during construction will be a part of the value of construction contracts, while the costs for a site-specific environmental monitoring plan (SEMP) by the construction supervision consultant (CSC) will be provided in construction supervision contracts. The costs of the PMU operations relating to ESMP are allocated from the subproject management budget of the PMU, including safety training programs, and basic allowances to participants in the monitoring programs. After the subproject has been completed, the costs of environmental monitoring of constructed works will be taken from the operation and maintenance budget of the city (as if).

It should be noted that the involvement of the community in the process of ESMP implementation is completely voluntary participation for the benefit of own community and households. Therefore, communities partaking in monitoring the ESMP will not get paid. However, in order to encourage community participation, it is necessary to allocate costs of materials and instruments for monitoring activities and some remuneration for a small number of members chosen by the public to participate in monitoring activities. As stipulated in the Prime Minister's Decision No. 80/2005/QD-TTg dated 18 April 2005 promulgating the regulations on investment supervision by the community and Joint Circular guiding the implementation of Decision 80/2005/QD-TTg, "expenses for the community's investment monitoring in the commune/ward in are reflected in the cost estimates of the Communal Fatherland Front Committee's budget and allocated from the communal/municipal budget; support funds for the dissemination, organization of training courses, guidance, preliminary and final report on investment monitoring by the community at provincial and district levels are balanced in the cost estimates of the Fatherland Front Committee at provincial/district level and allocated from the provincial budget".

The following table provides the estimated costs for environmental quality monitoring and capacity building for reference purposes. However, final costs will be updated in the detailed design phase.

Table 34. Cost for ESMP implementation

Content	Items of Quang Ngai subproject (thousand USD)	Funded by
(a) Mitigation during construction	As a part of the contract	WB

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

(b) Monitoring safety policies during construction	As a part of the cost for Construction Supervision Consulting (CSC)	WB
(c) PPMU's units in charge of environmental safety policies	As part of the costs for the PMU	Counterpart funds
(d) Environmental quality monitoring	3.789	WB
(e) Capacity building programs on safeguard policies	7.048	WB

11. GRIEVANCE REDRESS MECHANISM (GRM)

Complaints relating to any subproject's problems will be solved through negotiations to achieve the consensus. A complaint will go through three stages before it can be transferred to the court. The enforcement unit will pay all administrative and legal fees relating to the acceptance of complaints. This cost is included in the subproject budget.

Complaint procedures and resolution will be performed as follows:

The first level People's Committee of ward/commune. An affected household is to take his/her complaint to any member of the People's Committee of the ward / commune, through the village head or directly to People's Committee of the commune / ward, in written or oral form. The said member(s) of the People's Committee or the village head will inform the People's Committee of the ward/commune on the complaint. The People's Committee of Ward/Commune will work directly in person with the said affected household and will decide on the settlement of the complaint 5 days after receiving such complaint (this may take 15 days in mountainous or remote areas). The Secretariat of the People's Committee of the relevant commune/ward is responsible for documenting and recording all the complaints that it is handling.

After the Ward/Commune People's Committee issues its decision, the relevant household can make an appeal within 30 days. In case a second decision has been issued but the said household is still not satisfied with such decision, such household can appeal to the municipal (city) People's Committee (CPC).

The second level The CPC. Upon receiving a complaint from a household, the CPC will have 15 days (or 30 days in case of remote and mountainous areas) after receiving the complaint to resolve the case. The CPC is responsible for filing and storing documents on all complaints that it handles.

When the CPC has issued a decision, the household can make an appeal within 30 days. In case a second decision has been issued and the household is still not satisfied with such a decision, they can appeal to the Provincial People's Committee (PPC).

The third level The PPC. Upon receiving a complaint from the household, the PPC will have 30 days (or 45 days in case of remote and mountainous areas) after receiving the complaint to resolve the case. The PPC is responsible for filing and storing documents for all complaints to be submitted.

After the PPC has issued a decision, the household can appeal within 45 days. In case a second decision has been issued and the household is still not satisfied with such decision, they can appeal to the court within 45 days. The PPC will then have to pay the compensation into an account.

The Forth level Provincial Court. In case a complainant brings his/her case to a provincial court and the court rules in favor of the complainant, the provincial authorities will have to increase

the compensation up to such a rate as may be ruled by the court. In case the court's ruling is in favor of the PPC, the complainant will be refunded the amount of money that has been paid to the court.

The decision ruling the settlement of complaints will have to be sent to complainants and concerned parties, and shall be publicly posted at the headquarters of the People's Committee of the relevant level. The complainant will receive such ruling three days after the result of complaint resolution at the ward / commune / town level has been decided upon and 7 days at the district or provincial level.

Personnel: The environment and resettlement staff chosen by the PMU will design and maintain a database of the subproject-related complaints from affected households, including information such as: the nature of the complaint, the source and date of receipt of the complaint, the name and address of the complainant, action plan, and current status.

For oral complaints, the receiving / mediator board will record these requests in a complaint form at the first meeting with the affected person.

Contractor and Construction Supervision Consultant:

During construction, the GRM will also be managed by the contractors under supervision of the CSC. The contractors will inform the affected communities and communes about the GRM availability to handle complaints and concerns about the subproject. This will be done via the community consultation and information disclosure process under which the contractors will communicate with the affected communities and interested authorities on a regular basis. Meetings will be held at least quarterly, monthly information brochures will be published, announcements will be placed in local media, and notices of upcoming planned activities will be posted, etc.

All complaints and corresponding actions undertaken by the contractors will be recorded in subproject safeguard monitoring reports. Complaints and claims for damages could be lodged as follows:

- Verbally: direct to the CSC and/ or the contractors' safeguard staff or representatives at the site offices.
- In writing: by hand-delivering or posting a written complaint to specified addresses.
- By telephone, fax, e-mails: to the CSC, the contractors' safeguard staff or representatives.

Upon receipt of a complaint, the CSC, the contractors' safeguard staff or representatives will register the complaint in a complaint file and maintain a log of events pertaining to it thereafter, until it is resolved. Immediately after receipt, four copies of the complaint will be prepared. The original will be kept in the file, one copy will be used by the contractor's safeguard staff, one copy will be forwarded to the CSC, and the fourth copy to the PPMU within 24 hours since receipt of the complaint.

Information to be recorded in the complaint log will consist of:

- The date and time of the complaint.
- The name, address and contact details of the complainant.
- A short description of the complaint.
- Actions taken to address the complaint, including contact persons and findings at each step in the complaint redress process.
- The dates and times when the complainant is contacted during the redress process.

- The final resolution of the complaint.
- The date, time and manner in which the complainant was informed thereof.
- The complainant's signature when resolution has been obtained.

Minor complaints will be dealt with within one week. Within two weeks (and weekly thereafter), a written reply will be delivered to the complainant (by hand, post, fax, e-mails) indicating the procedures taken and progress to date.

The main objective will be to resolve an issue as quickly as possible by the simplest means, involving as few people as possible, and at the lowest possible level. Only when an issue cannot be resolved at the simplest level and/ or within 15 days, will other authorities be involved. Such a situation may arise, for example, when damages are claimed, the to-be-paid amount cannot be resolved, or damage causes are determined.

World Bank Grievance Redress Mechanism:

Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported subproject may submit complaints to existing subproject-level grievance redress mechanism or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address subproject-related concerns. Subproject affected communities and individuals may submit their complaints to the WB's independent Inspection Panel which determines whether harms 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 WB'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 www.worldbank.org/grs. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

12. PUBLIC CONSULTATION AND INFORMATION DISLCOSURE**12.1. Objectives of public consultation**

The subproject's public consultation required during ESMP was implemented. The community involvement and consultancy meetings were carried out to: Provide the useful information and better understand about the subproject and its potential impacts and improve the subproject as necessary; Allow the controversy issues to appear early; Facilitate to quickly solve the problems; Facilitate to set up the transparent procedures to implement the proposed subproject and create the accountability and awareness on local ownership during subproject performance. The affected groups and local NGOs were notified in accordance with WB's action policy (OP 4.01) on EIAs or EPPs; the involvement was required during subproject preparation to some extent and regularly recommended as a part of implementation.

12.2. Result of public consultation**i) Participants**

The subproject is implemented in 8 communes/wards of Quang Ngai province namely: Tra Linh, Tra Phong - Tay Tra district; Ba Dien commune - Bo To district; Nghia Phuong and Nghia Phuong communes - Tu Nghia district; Duc Thang commune - Mo Duc district and Truong Quang Trong ward - Quang Ngai city. The subproject implementation will have local socio-economic and environmental impacts. Therefore, the subproject management unit chooses to carry out public consultation with representatives of mass

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

organizations in subproject communes/wards and households being affected in terms of environment and society, including: Ward People's Committee; Fatherland Front; Mass organizations (Veterans Association, Women's Union, Youth Union), representatives of environmentally and socially affected households in each subproject area. Consultation process in communes / ward is as follows:

Table 35. Community consultation process

No.	Time	Location	No of participants	Invested items under subproject
1	14h on 14/3/2017	Office of People's committee of Nghia Phuong commune	- 19 people	- Embankment on northern bank of Cay Bua river
2	8.am on 15/3/2017	Office of People's committee of Duc Thang commune	- 20 people	- Embankment on southern bank of Ve river
3	8.am on 14/3/2017	Office of People's Committee of Nghia Hiep commune	- 16 people	- Embankment on northern bank of Ve river
4	14pm on 15/3/2017	Office of People's Committee of Truong Quang Trong ward	- 17 people	- Embankment on northern bank of Tra Khuc river
5	14pm on 15/3/2017	Office of People's committee of Ba Dien commune	- 21 people	- Construction of Va Ranh bridge
6	8 am on 14/3/2017	office of People's committee of Tra Lanh commune	- 16 people	- Construction of Dam bridge
7	8am. on 15/3/2017	office of People's committee of Binh Duong commune	- 17 people	- Construction of Dong Yen 3 bridge
8	14pm on 14/3/2017	office of People's Committee of Tra Phong commune	- 18 people	- Construction of Ha Rieng bridges and road

ii) Method of public consultation

Meeting was held with the aforesaid respondents, including: local authorities, local mass organizations; households to be directly affected by the subproject. The opinions were released after the Subproject Owner presents the report: Overview about the contents and main items of the subproject, financial resources for implementation. The consultant presents the Environmental and social impacts (ESIs) of the subproject. The consultant presents the ESMP, including the mitigation measures and implementation plans. The environmental incidents and ESIs in the past had been consulted.

iii) Public consultation results and feedback of the Subproject Owner

Local authorities and people of ward/commune in the subproject area totally agreed with the implementation of the subproject because it will bring many socio-economic and environmental benefits. However, it is required to ensure environmental sanitation during construction process, particularly prevention from dust, gas, damage of roads and construction needs to be fast to ensure scheduled progress. The results of public consultation in 8 communes/wards are showed in Table 36 below.

Table 36. Public consultation results and feedback of the Subproject Owner

No.	Opinion of participants	PMU's feedback
1.	Nghia Phuong CPC (Embankment on northern bank of Cay Bua river)	

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Opinion of participants	PMU's feedback
	Survey and design should be implemented seriously and carefully to promote full efficiency of the investment as well as to minimize impacts on local people;	Subproject owner ensured that survey and design will be carried out seriously to ensure maximum subproject efficiency.
	Subproject implementation should ensure subproject quality, progress and subproject should be implemented soon before flood season;	Subproject owner ensured that construction will be done by competent contractor, ensuring quality and progress. Construction supervision will be performed strictly ensuring quality and progress.
	Embankment should be constructed to prevent landslide in the area with suitable design and construction method;	Subproject owner committed that design and construction would be done with suitable measures to ensure progress and quality
	Dustbins should be provided publicly, promoting waste collection and treatment	Subproject owner will ask contractor to arrange dustbins at construction site and worker camp area.
	There should be place to gather materials, place for worker's accommodation. Workers should register temporary residence.	Subproject owner will ask construction contractor to submit list of workers and register temporary residence with People's committee of Nghia Phuong commune.
2.	Duc Thang CPC (Embankment on southern bank of Ve river)	
	Affected land area mostly is the riverbank land, so the resettlement is negligible.	Compensation and support, resettlement will be implemented in accordance with Government policies and Quang Ngai province
	Subproject owner needs to apply mitigation measures for environmental protection during construction process like: watering for dust reduction, covering transport vehicles ...	Subproject owner commits to strictly implement environmental protection measures as mentioned in the EMP report; Watering vehicles will be hired to wet the roads twice a day to reduce dust generation; Vehicles for transporting materials will be registered and use with its registered load, covered with canvas to prevent dust and waste scattering on the road.
	Domestic wastes of worker need to be collected daily and transported to landfill for treatment;	Subproject owner will request contractor to arrange dustbins for collecting domestic wastes from worker camps and construction site, and will sign contract with competent agency for collecting and treating the wastes as regulated.
	Construction wastes after being collected need to be transported to leveling area for reuse;	Construction wastes will be reused for leveling at low-lying area
	Subproject should be implemented before rainy season	Subproject owner promises to soon complete procedures to implement the subproject at the soonest time
	To ensure social safety, to register temporary residence for immigrant workers; to give priority for recruiting labor workers	Subproject owner commits to give priority to recruit local labors; Subproject owner will request construction contractor to have record of workers and contact with People's Committee of Duc Thang commune for registration of temporary residence
3.	Nghia Hiep CPC (Embankment on northern bank of Ve river)	

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Opinion of participants	PMU's feedback
	Construction process will generate negative impacts like dust, noise affecting people's life. Material transporting vehicle needs to be covered, roads need to be watered twice a day in the morning and in the afternoon	Subproject owner commits to implement mitigation measures mentioned in the EMP report for environmental protection; Roads will be watered twice a day; Transport vehicles will operate with right load, being registered and being covered with canvas.
	There should be measures to collect and treat the domestic waste and construction waste	Subproject owner will request construction contractor to arrange dustbin at construction site and worker camps and sign contract with competent agency for collecting and treating waste as regulated.
	Subproject should be implemented soon.	Subproject owner will try to complete procedures for implementing the subproject soon
4.	Truong Quang Trong WPC (Embankment on northern bank of Tra Khuc river)	
	Construction site needs to be covered/shielded, not affecting people in surrounding area;	Subproject owner will ask construction contractor to build fence/barrier of 2m high surrounding subproject area, ensuring safety for people
	There should be measures to ensure traffic safety when transport vehicles run through residential area. Vehicles need to be covered and carry with right load, not affecting the road;	Subproject owner will request construction contractor to arrange at least 2 personels to regulate traffic flow at peak hours. Signboard and signal lights will be installed at the entrance of construction site.
	There should be temporary system for collecting wastewater to prevent water stagnant and pollution of water source	During construction process, temporary ditches and sedimentation pits will be constructed for wastewater drainage, avoiding water pollution
5.	Ba Dien CPC (Construction of Va Ranh bridge)	
	Construction of the subproject should apply effective measures, ensuring maximum efficiency as well as minimum impacts on residential community;	Subproject owner commits to carry out the survey and design ensuring high efficiency and minimum impacts on residents.
	Subproject owner needs to have measures to prevent dust and noise pollution;	Subproject owner commits to apply mitigation measures for environmental protection such as watering roads twice a day, covering transport vehicles, using vehicles with right load and preventing dust and wastes on the roads.
	Subproject owner needs to provide temporary wastewater drainage system on construction site, not to construct in rainy season affecting river's flow;	Subproject owner commits to construct temporary drainage system and manholes for water drainage.
6.	Tra Lanh CPC (Construction of Dam bridge)	
	Subproject owner needs to have measures to ensure safety for people when material transporting vehicles run through residential area;	Subproject owner will ask construction contractor to arrange at least 2 staffs to participate in traffic regulation at peak hours. Signboard and signal lights will be installed at the entrance of the construction site.
	Subproject owner needs to get agreement from local government and people on construction schedule, not to construct at peak hours;	Subproject owner commits to send details of construction schedule to people's committee of the commune
	Subproject owner needs to strictly follow mitigation measures for environmental protection as mentioned in the EMP report;	Subproject owner commits to follow mitigation measures for environemtnal protection as mentioned in the EMP report;

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

No.	Opinion of participants	PMU's feedback
7.	Binh Duong CPC (Construction of Dong Yen 3 bridge)	
	Impacts on waterway navigation on Tra Bong river should be taken into account while construction of Dong Yen 3 bridge is carried out.	The site for pile driving operation of Dong Yen 3 bridge will be in a 5m radius while the river's width is 100m thus the waterway transport on Tra Bong river will not be disrupted.
	Provide appropriate compensation and resettlement support to affected households.	This issue will be considered and addressed in the RAP.
8.	Tra Phong CPC (Construction of Ha Rieng bridges and road)	
	During construction, the construction area must be covered/shielded to ensure the safety of people living in the subproject area;	Subproject owner will request construction contractor to install boundary walls of 2m high around construction area, ensuring safety for people in the subproject area.
	To have methods for collecting and treating domestic waste of workers and construction waste;	Subproject owner will ask construction contractor to arrange dustbins at construction site and worker camps and will sign contract with competent authority for collecting and treating waste as regulated. Construction waste will be reused for land leveling.
	To restore affected works to be former state	Subproject owner commits to restore the site as former state after completing the subproject.

Major consultation comments from the community, local representatives, and commune / town authorities are discussed directly to the Subproject Owner. The Subproject Owner agrees with the above comments and discussion, as a basis for supplementing and improving the mitigation measures in the process of construction, operation and environmental and social monitoring. During the preparation as well as construction process and when the project goes into operation, the Owner undertakes to comply with the approved ESMP as well as the regulations on safety and environment of the Government of Vietnam. And guidance on the environment, health and safety of the Donor. Investors always listen and find the most suitable solution to continue to receive the approval and support of the local government and surrounding communities.

Some pictures on public consultant meeting in the subproject area:



(1) Meeting in Nghia Phuong commune



(2) Meeting in Duc Thang commune



(3) Meeting in Binh Duong commune

Figure 6. Consultancy meeting in the subproject

12.3. Information disclosure

The first draft ESMP in Vietnamese had been published at the offices of 8 communes/wards and the Quang Ngai PPMU on May 2017 for public consultation. Basing themselves on the contents of the ESMP, the local people could get the subproject information and contribute their opinions/comments on environmental issues. The final draft ESMP in Vietnamese language was

Environmental and Social Management Plan (ESMP)

Vietnam Emergency Natural Disaster Reconstruction Project - Quang Ngai subproject

published at the offices of 8 communes/wards and the Quang Ngai PPMU on on June 12nd, 2017. The final draft ESMP in English will be disclosed at the World Bank's internal and external websites on June 20th, 2017.

APPENDIX: Diagram of loacation of sampling air, noise, vibration and surface for environmental monitoring

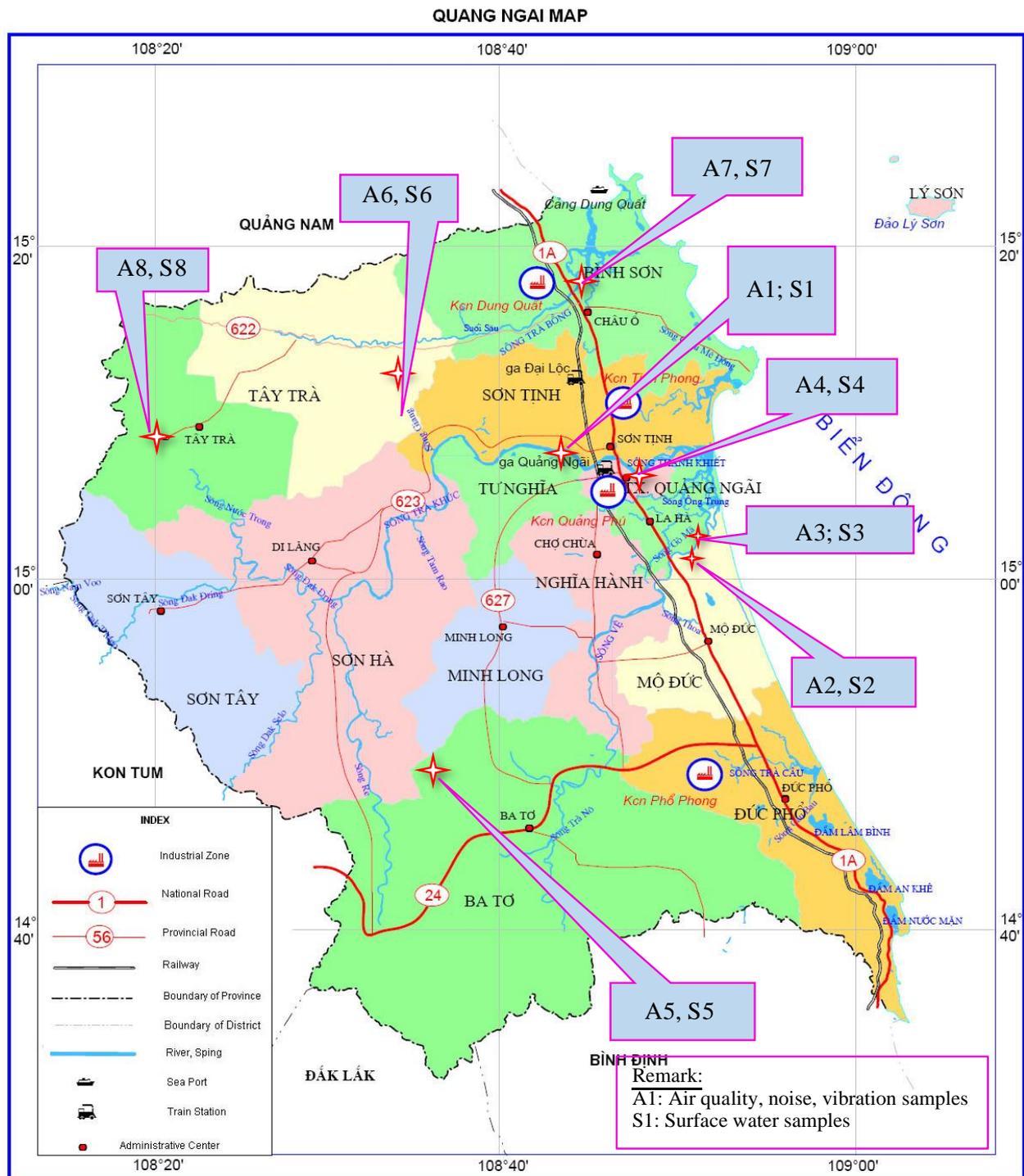


Table. Location of sampling air, noise, vibration and surface for environmental monitoring

Symbol	Location
I	Ambient air environment monitoring
A1	Construction site of the northern bank of Cay Bua river embankment.
A2	Construction site of the southern bank of Ve river embankment (Duc Thang commune)
A3	Construction site of the northern bank of Ve river embankment (Nghia Hiep commune)
A4	Construction site of the northern bank of Tra Khuc river embankment
A5	Construction site of Dam bridge
A6	Construction site of Va Ranh bridge
A7	Construction site of Dong Yen 3 bridge
A8	Construction site of Ha Rieng road
II	Surface water environment monitoring
S1	Cay Bua river at the construction site
S2	Ve river at the construction site in Duc Thang commune
S3	Ve river at the construction site in Nghia Hiep commune
S4	Tra Khuc river at the construction site
S5	Stream at the construction site of Dam bridge
S6	Va Ranh stream at the construction site
S7	Tra Bong river at the construction site
S8	Ha Rieng stream at the construction site