

**BINH DINH PROVINCIAL PEOPLE'S COMMITTEE
BINH DINH PMU FOR CONSTRUCTION INVESTMENT
WORKS OF AGRICULTURE AND RURAL DEVELOPMENT**

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ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

(Final draft)

**VIETNAM - EMERGENCY NATURAL DISASTER
RECONSTRUCTION PROJECT**

BINH DINH SUBPROJECT

(For the first 18 months)

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CLIENT
Binh Dinh PMU of
Agriculture and Rural Development

CONSULTANT
Viet Nam Investment and
Development Consultant Company
Limited

Binh Dinh, June - 2017

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ABBREVIATIONS

| | |
|------------------|---|
| AH | Affected household |
| BOD ₅ | 5-day Biochemical Oxygen Demand |
| CMC | Construction Management Consultant |
| COD | Biochemical Oxygen Demand |
| DO | Dissolved Oxygen |
| DONRE | Department of Natural Resources and Environment |
| DRM | Disaster Risk Management |
| EIA | Environmental Impact Assessment |
| EMC | Environment Monitoring Consultant |
| ESMP | Environment and Social Management Plan |
| FS | Feasibility Study |
| HC | Hydrocarbon |
| MONRE | Ministry of Natural Resources and Environment |
| NH | National Highway |
| ODA | Official Development Assistance |
| PPC | Provincial People's Committee |
| PPMU | Provincial Project Management Unit |
| PR | Province Road |
| RC | Reinforced Concrete |
| TDS | Total Dissolved Solids |
| TSS | Total Suspended Solid |
| TSP | Total Suspended Particles |
| USD | US Dollar |
| USEPA | United States Environmental Protection Agency |
| VND | Vietnamese Dong |
| WB | The 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 Binh Dinh 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: rehabilitation and reconstruction of 02 weirs, 2,502 km of irrigation canals and 02 fresh water supply works; Sub-component 1.2- Dyke, embankment: rehabilitation and reconstruction of 51.75km of dykes, river and sea embankment; Sub-component 1.3- Transport infrastructure: construction of 09 damaged bridges, repair and rehabilitation of 74.11km 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); and Component 3: Project Management Support. The total cost of the Binh Dinh subproject is 58.24 million USD.

Legal and Technical Basis for ESMP

The Binh Dinh 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 Binh Dinh subproject: (a) Environmental Assessment (OP 4.01); (b) Natural Habitats (OP/BP 4.04); (d) Physical Cultural Resources (OP/BP 4.11); (e) Involuntary Resettlement (OP/BP 4.12); (f) 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 Binh Dinh subproject.

Subproject Description

For Binh Dinh subproject in the first 18 months, 26 works will be constructed, including: 18 embankments (including: (i) Repairing, rehabilitation of 8 embankments; (ii) New construction of 10 embankments), rebuild of 05 bridges and repairing, rehabilitation of 03 roads. Each work item of the subcomponent will be constructed in 10-12 months (from 7/2017 - 7/2018).

Environmental and Social baselines

In May 2017, 26 air samples, 26 samples of surface water, groundwater and 26 soil samples were monitored and analyzed to evaluate quality of environmental baseline at the subproject area. The results showed that quality of these samples are within the permitted limits of the national technical regulations QCVN 05: 2013/BTNMT, QCVN 26: 2010/BTNMT, QCVN 08-MT:2015/BTNMT, QCVN 09-MT: 2015/BTNMT and QCVN 03-MT:2015/BTNMT. However, the results of noise monitoring and the concentration of organic substances in the

surface water samples at the three locations PR635, PR639, and PR639B are high and close to the allowable limits.

Most of the subproject sites are far from residential areas and in sparsely populated or unpopulated areas, except for: (5) Repairing, rehabilitation of Embankment of La Tinh river downstream (about 50 households living near the river bank, about 10-50 meters away), (7) New construction of Thu Tinh embankment (about 30 households living near the river bank, about 20-100 meters away), (15) New construction of Embankment of Kon river - Vinh Thanh section (about 50 households living near the river bank, about 20-50 meters away), (17) New construction of Phu Ngoc embankment (about 100 households living near the river bank, about 10-30 meters away), (18) Repairing, rehabilitation of Embankment of An Nhon township (about 100 households living near the river bank, about 10-100 meters away). Some sensitive areas/receptors include: Kindergarten in An Xuyen 3 village, Pumping station for agricultural activities in Binh Nghi commune, Ancestral temple in Binh Nghi commune, Tay Phu Primary School, Tay Thien Ancestral temple, An Nhon entertainment area, Binh Dinh station, Ngo May High School, Cat Tuong CPC. There is no PCR being affected in all eight project areas. Vinh Thuan commune has 150 ethnic minority households who are Ba Na 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

Social impacts: The subproject will affect 1,098 households, including 953 directly AHs by partial land acquisition and 145 directly AHs because they cultivate on the land managed by communal/ward PC. In which (i) 158/1,098 households are affected with residential land, and 07/158 households have to relocate; (ii) There are 150 Ba Na ethnic households in Vinh Thuan commune of Tay Son district to be affected (none of ethnic minorities households have to displace); (iii) 270/1,098 households fall into vulnerable households; (iv) 72/1,098 households are severely affected.

Impacts on water environment: The excavation and backfilling for reinforcement of the embankments, abutments and piers (10 newly built embankments and 05 rebuild bridges) contribute to the increase in suspended solid wastes which are swept away towards the downstream. Surface water suffers from these impacts including: Kon river, La Tinh river, Can river, Cut river, Queo river, Dai An river, Ta Dinh stream, etc. The impacts only happen during construction period which last about 10 - 12 months for each embankment and would stop by operation. The level of the impacts, therefore, is low to moderate, temporary and could be mitigated by good construction practices.

Erosion, soil subsidence: The current status river bank is natural earth banks. During the embankment process of Rivers, there will be risks on shore erosion and subsidence. Works can be suffered from the risks including: 1, 3, 7, 9, 10, 13, 14, 15, 16, 17. These impacts are localized, short term and avoidable via appropriate design and good construction practices. This impact is assessed at moderate.

Impact on waterway traffic activities on the rivers: These impacts can be generated from some works including (1) Embankment of La Tinh river (Vinh Thanh – Thai Phu section); (7)

Thu Tinh embankment; (14) Embankment of Kon river (Lai Nghi section). 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: 670 households would be affected with agricultural land due to construction of the 11 embankments. Without any appropriate management of runoff from construction site, the soil and irrigation water can be contaminated, affecting productivity of crops. The impacts can be low as it is localized and will cease upon the completion of construction work.

Impacts on aquaculture: For 02 works of embankment of La Tinh river and Lach Moi drainage embankment. 125 households in My Chanh and My Thanh communes will be affected. Construction of works can interrupt the water supply, water resource pollution for aquaculture areas. The impacts are assessed at low and controllable because the construction is mainly taken placed in dry season within about 10-12 months, and only within the construction site

Impact on groundwater quality: Piling or drilling activities at the distance from 8-13m in the construction sites of Trang bridge, Dich Nghi, Suoi San, Phu Son and Bu Nu may affect the underground water. contaminated surface water will overflow in gaps between the casing and the hole drilled underground. When penetrated, dirt can contaminate the groundwater. The impacts are assessed at low level because the pile driving activities are only carried out in dry season when the water volume and river water use demands are low, short-term (about 1-2 weeks) and local at the construction site.

Transport interruption: The embankment of Thang Cong 2, Nhon Phuc commune will affect the road transportation at the project areas because the embankment is part of the Provincial Road 636B connecting between An Nhon Township and Tay Son district. At the area, transport, material transportation will be interrupted about 10-12 months because of construction activities. These impacts are assessed to be moderate and will end right after completion of the work.

Disruption of business activities: There are 06 households affected with business activities because of Kon river embankment in Vinh Thanh town (households have café business). Besides being a safety risk, noise and dust from road construction activities and equipment might temporarily disrupt business activities (10 - 12 construction months). The contractor should take caution on this matter to avoid accidents and dust impacts to the shops.

Social impacts include arising social issues and impacts on Ethnic Minority. Living and earning activities of Ba Na Peoples are affected by land acquisition for Ta Dinh and Xem stream embankment is needed and will affect living and earning activities of Ba Na peoples. There are 150 Ba Na Peoples households will be affected by land acquisition but there is no household must be relocated.

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 (5/26 work items), including (i) Embankment of La Tinh river downstream, (ii) Embankment of Kon river (Lai Nghi section), (iii) Cut river embankment, (iv) Embankment of An Nhon town, (v) PR 635. 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.

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 construction 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 Binh Dinh subproject components including: (i) Collection of redundancy material on site is implemented daily. Upon forecasted stormy weather, suspend all the construction activities, tidy up the sites, brace and protect the materials and construction machines. (ii) 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. (iii) Coordinate with management unit of waterway to flag the signal system on the inland waterway the transport will travel through; (iv) 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.; (v) 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. (vi) 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. (vii) Raise awareness of contractors, workers and Ba Na peoples of social problems and protection measures HIV/AIDs, drug use, infectious diseases, environmental pollution, violence increased due to conflicts of workers during construction.

Specific impact mitigation measures for sensitive receptors during the construction phase are presented as: (i) 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. (ii) Spray sufficient water to suppress dust during dry and windy days at least two times a day on the route. (iii) Limiting transporting on rush hours when pupils go to and leave the school (the school every weekday 6h30 - 7h30, 11h - 12h, 13h - 14h and 16h30 - 17h30). (iv) Regularly check the affected on-field Pumping station to ensure they are not blocked by construction spoil or waste and if they are affected, provide alternative water collection points from Kon river to the locations the local people request. (v) Contractors will implement measures to mitigate dust, noise and vibration impacts on the pagoda as agreed with the pagoda manager. (vi) Arrange traffic guide workers in the process of transporting construction materials and waste. (vii) Install safety warning signs, especially speed limit sign; Deploy staff to guide the traffic during transportation of construction materials and wastes.

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 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 Binh Dinh subproject includes measures to reduce the negative impacts; roles and responsibilities for ESMP implementation, supervisors, and 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 16,211 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 PPMU, DONRE (Binh Dinh 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 ECOP 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 (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. 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

Public consultation: Public consultation was implemented in 26 communes/wards of Binh Dinh province in March and April 2017. Meetings were held with the representatives of local authorities, mass organizations such as: Representatives of People's Committee, Vietnam's Fatherland Front, Farmer Association, Women 's 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, it is all 26 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 26 communes/wards and the Binh Dinh PPMU in May 2017 for public hearings. The final draft ESMP in Vietnamese language will be disclosed at the offices of 26 communes/wards and the Binh Dinh PPMU on June 9th, 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

The Vietnam Emergency Natural Disaster Reconstruction Project (ENDR) funded by the World Bank (WB) will provide financial and technical supports in order for rehabilitation and reparation of infrastructures damaged by natural disasters in 05 Central Provinces: Ha Tinh, Quang Ngai, Binh Dinh, Phu Yen and Ninh Thuan.

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 ENDR consists of 3 components:

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 will be implemented by the respective provinces:

- Subcomponent 1: Resilient reconstruction in Binh Dinh province
- Subcomponent 2: Resilient reconstruction in Phu Yen province
- Subcomponent 3: Resilient Reconstruction in Quang Ngai Province
- Subcomponent 4: Resilient Reconstruction in Ninh Thuan Province
- 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

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. Binh Dinh Subproject

Binh Dinh Subproject consists of 03 components. Its objectives are to: repair, rehabilitate and upgrade infrastructures for production (irrigation works, dykes, river and sea embankment, irrigation ditches, reservoirs, etc) to restore the production, ensure people’s safety and assets and reduce risks caused by natural disasters. Damages settlement for transportation infrastructures will be carried out to facilitate the travel of the people, goods exchange and production development.

Component 1: Resilient Reconstruction of Damaged Public Use and Preventive Infrastructure at the Provincial Level

- Sub-component 1.1 - Dyke, embankment: The sub-component will finance the rehabilitation and reconstruction of 51.75km of dykes, river and sea embankment (inclusive of 35 works in 34/159 communes in 11/11 districts in Binh Dinh province) for recovering and enhancing the capacity of storm and flooding fighting for embankments and dykes
- Sub-component 1.2 - Irrigation: This sub-component will finance the rehabilitation and reconstruction of 02 weirs, 2,502 km of irrigation canals and 02 fresh water supply works for restoring the designing capacity and ensuring active irrigation.
- Sub-component 1.3 - Transport: (i) rehabilitation of (09) bridges; (ii) recovery of (08) provincial routes of grade VI as plain and hilly nature, total length of L=43.31km; (iii) recovery of (09) district/inter-communal roads with a total length of L=30.8 km.

Component 2: Disaster Recovery Capacity Enhancement

- Training, capacity building, community communication and costs for O&M.
- Study, capacity building and training for promoting the efficiency of works funded by the subproject.

Component 3: Subproject Management Support

- Support the subproject implementation, including auditing, monitoring, mid-term and end-term assessment; provide equipment and technical assistances for the subproject in the course of subproject implementation;
- Provide reports and subproject management support for other components.
- Supply institution assistance and capacity building for subproject management; coordinate, review and assess technical, environmental and social safeguard and subproject assessment monitoring.
- Hold of seminars to enhance the awareness of management staffs as well as the communities in regards of natural disasters.
- Support the budget for specialized staffs that are responsible for the subproject.

The subproject's total investment is US\$58.24 million, in which WB's loan is US\$52.0 million; the Viet Nam Gov's reciprocal capital is US\$6.24 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;
- The Law on Construction No. 50/2014/QH13 approved on 18th June 2014;
- Land Law No. 45/2013/QH13 of the National Assembly of Vietnam dated November 29, 2013, and took effect on 01/07/2014;
- Law on Natural Disaster Prevention and Control No. 33/2013/QH13 of the National Assembly of Vietnam dated on June 19, 2013, and took effect on 01/05/2014;
- Law on Water Resources No. 17/2012/QH13 of the National Assembly of Vietnam dated June 21, 2012;
- Law on Biodiversity No. 20/2008/QH12 of the National Assembly of Vietnam dated November 13, 2008, and took effect on 01/07/2009;

- 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/NĐ-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 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 2015 of Ministry of Natural Resources and Environment on management of hazardous waste management;
- 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 Ministry 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. 13/2015/QĐ-UBND on compensation, assistance, resettlement policies when the State acquires land in Binh Dinh province;
- Decision No. 32/2016/QĐ-UBND on amendment and supplementation of Decision No. 13/2015/QĐ-UBND on compensation, assistance, resettlement policies when the State acquires land in Binh Dinh province;
- Decision No.40/2013/QĐ-UBND dated December 16th, 2013 of Binh Dinh PPC on compensation rates for trees and crops when the State acquires land in Binh Dinh province;
- Decision No. 41/2013/QĐ-UBND dated December 16th, 2013 of Binh Dinh PPC on compensation rates for houses, structures when the State acquires land in Binh Dinh province;
- Decision No.34/2014/QĐ-UBND dated December 22nd, 2014 on price list in 2015 in Binh Dinh province in the 5-year period (2015 – 2019).

➤ **National Technical Regulations**

- QCVN 01:2009/BYT: National technical regulation on drinking water quality.
- 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)¹

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, Binh Dinh subproject is to rehabilitate, upgrade or re-construct of 18 embankment sections; construction of 5 bridges and 03 provincial roads. The implementation will imply potentially negative impacts on the environment and people in the subproject area, especially in construction phase. According to the OP 4.01, the Environmental and Social Management Plan (ESMP) covering these works were prepared. The official ESMP of the Subproject will be disclosed at the communal PC in the subproject area and Binh Dinh 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.

¹The 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>

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)

The subproject sites have been screened for PCR. Construction of the subproject items would affect some temples and pagodas located near the construction sites during construction. Therefore this policy is triggered. 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)²

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

The Indigenous Peoples policy (OP/BP 4.10)³

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. Projects 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 150 ethnic minority households affected in Binh Dinh subproject and the EM households are mainly Ba Na 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)⁴

²Full 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>

³ 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>

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.

The survey results show that Binh Dinh Subproject will cause impacts on 1,131 households, including 986 households directly affected by land acquisition and 145 households indirectly affected by loss of arable land which is managed by the communal/ward PC; affected land area is of 191.490 m².

The subproject RAP will be 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*⁵

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 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

There are 26 work items under Binh Dinh subproject to be carried out: 18 embankments, 05 bridges and 03 roads. The works are scattered in 26 communes, 8 districts, namely: An Nhon, Tuy Phuoc, Tay Son, Vinh Thanh, Phu Cat, Phu My, Hoai Nhon and Hoai An. The locations of the proposed works for the first 18 months are presented in Figure 1 and Table 1, 2 and 3.

⁴ 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>

⁵The EHS Guidelines can be consulted at www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines.

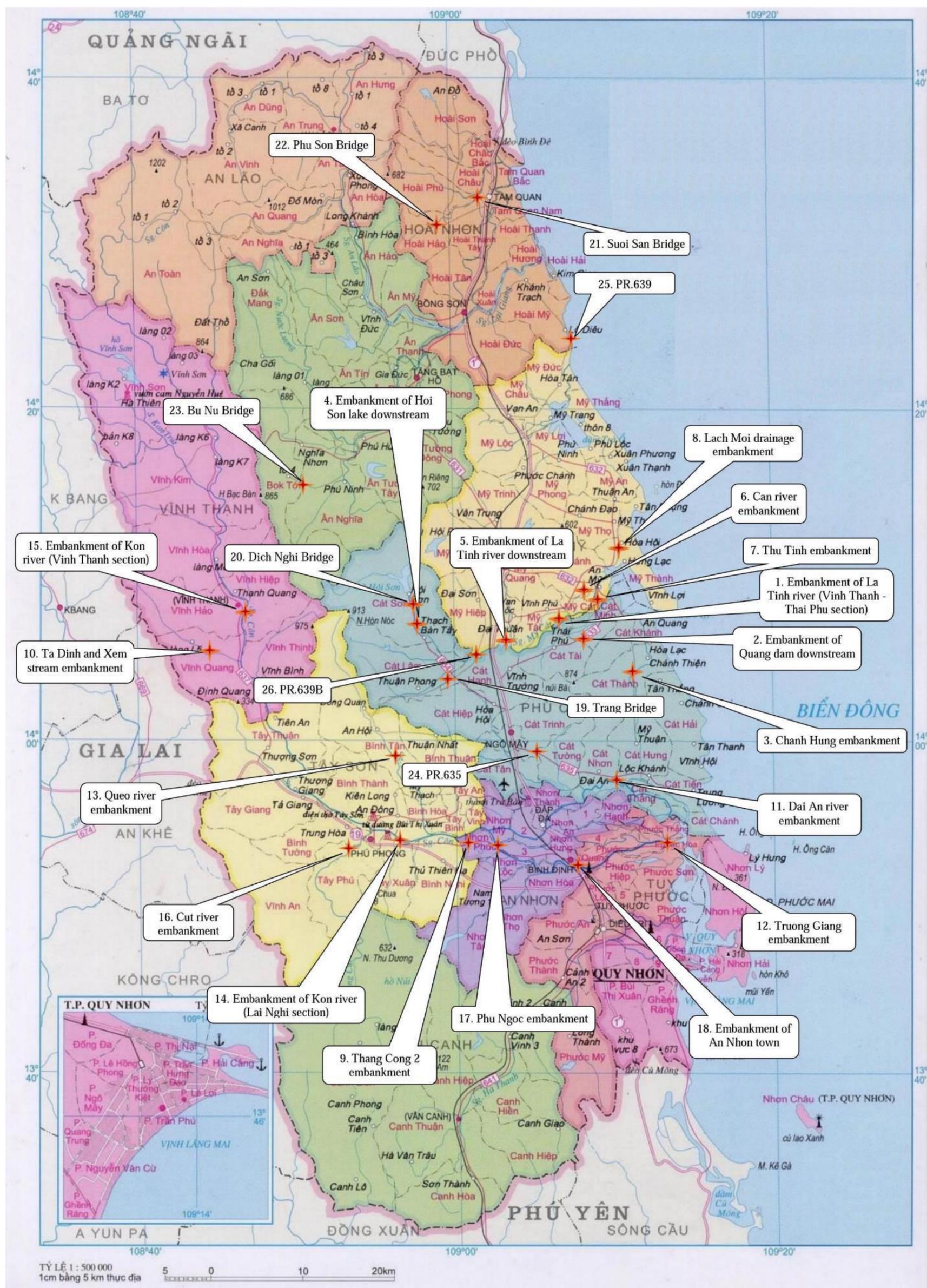


Figure 1: Location of 26 work items under the Binh Dinh Subproject

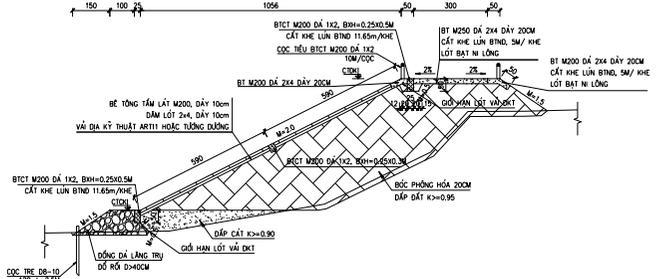
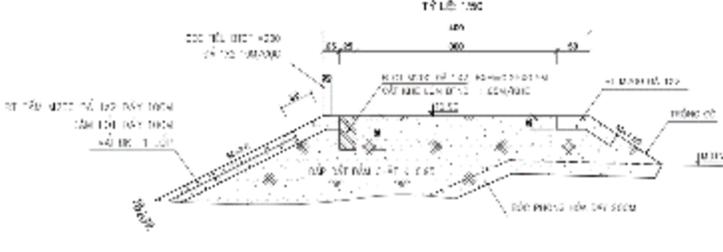
2.2. Scope of works

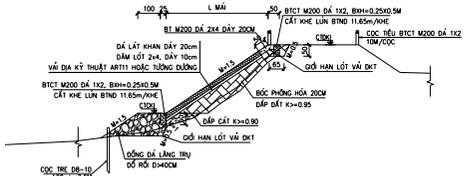
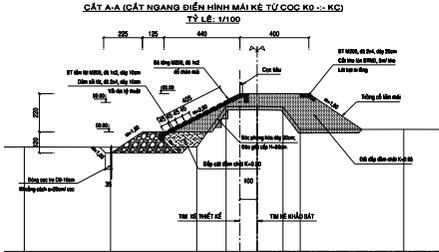
2.2.1. The embankment

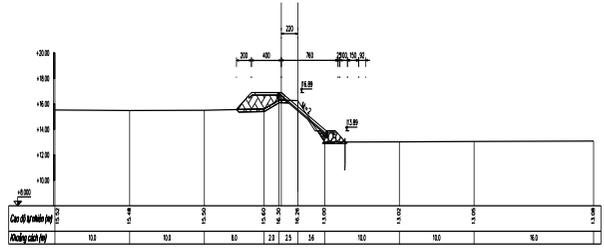
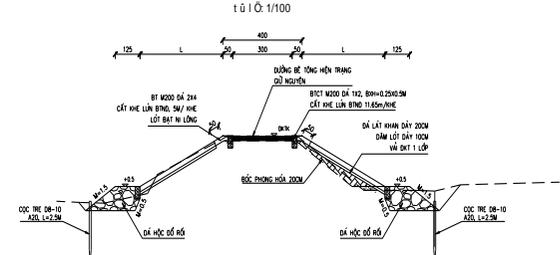
The Binh Dinh subproject is new construction and repairing of of 18 embankments (including 10 new embankments and 08 repaired embankments) on 02 main river basins of Binh Dinh province (La Tinh river and Kon river). Detail in Table 1.

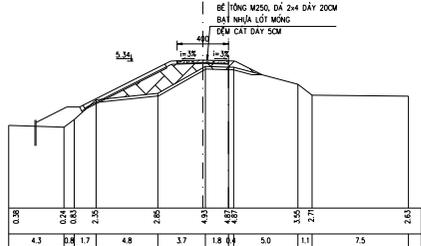
Table 1: Detailed description of the embankments

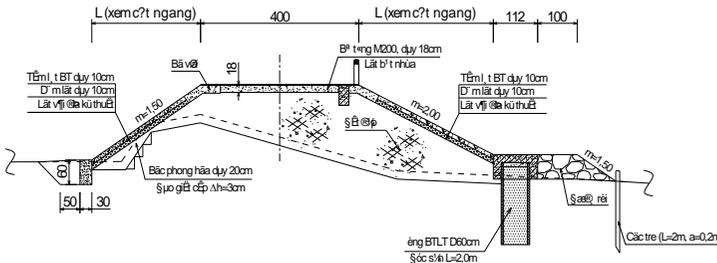
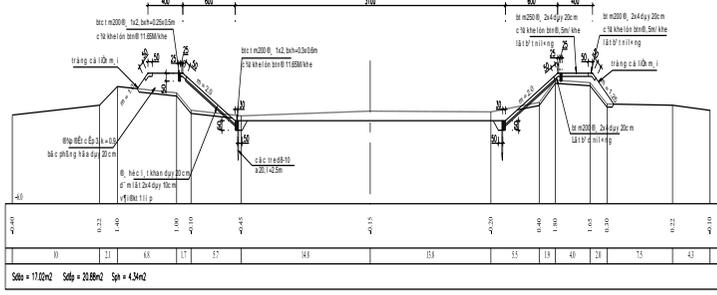
| No. | Items | Characteristics | Investment scale | Images |
|----------|---|---|---|--|
| I | La Tinh river basin: including 05 embankments with following general features (including 02 newly built embankments, 3 repaired embankments) | | | |
| | | <ul style="list-style-type: none"> - Flooding prevention frequency P = 10%; - Structure: <ul style="list-style-type: none"> • Body: compacted soil K95 • Surface: cement concreting M250, thickness of 20cm • The embankment roof toward the river: dry rubble masonry, thickness of 20cm • Field embankment roof: planting grass • Along river bank, opposite embankment: mostly alluvial areas; Plant: bamboo, acacia, eucalyptus and shrubs; Agriculture: corn, vegetable and rice field • Dimension: B = 4.0m - Displaced households: 02. | | |
| | The detail information of 05 embankments at La Tinh river basin is the following rows | | | |
| 1. | New construction of Embankment of La Tinh river (Vinh Thanh - Thai Phu section) | <ul style="list-style-type: none"> - Location: Thai Phu village, Cat Tai commune, Phu Cat district - Coordinates: 14°05'25"N; 109°04'38.5E - Current status: broken, eroded and serious salt intrusion - Along embankment river bank: <ul style="list-style-type: none"> • No households • Plant: bamboo, acacia, eucalyptus and shrubs. • Agriculture: corn, vegetable - Distance with PR 633 about 300-400m, connecting with works through inter-commune road. | <ul style="list-style-type: none"> - L = 2,510m - Auxiliary works: <ul style="list-style-type: none"> • River watering place: 01, B = 1.5m; • Construction: 4 culverts, D = 800mm. |  |

| No. | Items | Characteristics | Investment scale | Images |
|-----|---|--|--|--|
| | | | |  |
| 2. | Repairing, rehabilitation of Embankment of Quang dam downstream | <ul style="list-style-type: none"> - Location: Chanh Danh village, Cat Tai commune, Phu Cat district - Coordinates: 14°05'25"N; 109°06'53"E - Current status: broken, erode and intruded bank sections - Along embankment (both 2 banks): <ul style="list-style-type: none"> • No households • Plant: bamboo, acacia, eucalyptus and shrubs. • Agriculture: rice field - Distance with PR 633 about 540-700m, connecting with works through inter-commune road. | <ul style="list-style-type: none"> - L = 810m: <ul style="list-style-type: none"> • Upstream of Quang dam: L = 60 m. • Downstream of Quang dam: L = 750 m (right: 450 m, left: 300m). - Auxiliary works: <ul style="list-style-type: none"> • Reconstruction of upstream spillway, concrete M200, B = 44.0 m; • Reconstruction of down spillway, B = 20m |   |
| 3. | New construction of Chanh Hung embankment | <ul style="list-style-type: none"> - Location: Chanh Thang and Chanh Hung village, Cat Thanh commune, Phu Cat district. - Coordinates: 14°03'18"N; 109°11'41"E - Current status: eroded to the edge of inter-communal concrete road. - Along embankment river bank: <ul style="list-style-type: none"> • No households • Plant: bamboo and shrubs. | <ul style="list-style-type: none"> - L = 608.60m, including: <ul style="list-style-type: none"> • Section 1: L = 479m. • Section 2: L = 129.6m. - Auxiliary works: <ul style="list-style-type: none"> • Reparation of broken culverts: reinforced concrete M200, • Dimension BxH = |  |

| No. | Items | Characteristics | Investment scale | Images |
|-----|--|---|--|--|
| | | <ul style="list-style-type: none"> • Agriculture: rice field - Distance with PR 640 about 4,000m, connecting with works through inter-commune road. | 1.6x1.0 m. |   |
| 4. | Repairing, rehabilitation of Embankment of Hoi Son lake downstream | <ul style="list-style-type: none"> - Location: Hoi Son village, Cat Son commune, Phu Cat district - Coordinates: 14°08'14"N; 108°57'44"E - Current status: seriously eroded - Along embankment river bank: <ul style="list-style-type: none"> • No households • Plant: bamboo and shrubs. • Agriculture: rice field - Distance with PR 634 about 250-300m, connecting with works through inter-commune road. | <ul style="list-style-type: none"> - L = 1,053m; in which: <ul style="list-style-type: none"> • Right: L = 117.0m, • Left: L = 936.0m. - Auxiliary works: <ul style="list-style-type: none"> • Steps level: 14, B = 2.0m; concrete structure M200. • Drainage culverts: 04, by RC M200, combination of round culverts of Centrifugal Concrete D600, H30. |    |

| No. | Items | Characteristics | Investment scale | Images |
|-----|--|---|--|--|
| 5. | Repairing, rehabilitation of Embankment of La Tinh river downstream | <p>The work includes 02 sections</p> <p>Section 1:</p> <ul style="list-style-type: none"> - Location: My Hiep commune - Coordinates: 14°05'44"N; 108°02'36"E - Current status: broken, eroded and intruded banks - Along embankment river bank: <ul style="list-style-type: none"> • No households • Plant: bamboo and shrubs. • Agriculture: rice field - Distance with NH1 about 900m connecting with works through inter-commune road. <p>Section 2:</p> <ul style="list-style-type: none"> - Location: My Chanh commune - Coordinates: 14°09'36"N; 109°09'6,5"E - Current status: broken, strongly intruded - Along embankment river bank: <ul style="list-style-type: none"> • 50 households and aquaculture ponds, distance 10-50m. • Plant: shrubs, coconut. • Agriculture: rice field - Distance with PR640 about 250m, connecting with works through inter-commune road. | <ul style="list-style-type: none"> - L = 1,277m - Auxiliary works: <ul style="list-style-type: none"> • Reconstruction of 4 new steps, B = 1.4m. • Reconstruction of 4 new culverts |     |
| II | <p>Can river basin: including 03 embankments with following general features (including 01 newly built embankment, 2 repaired embankments)</p> <ul style="list-style-type: none"> - Flooding fighting frequency P = 10%; - Structure: <ul style="list-style-type: none"> • Body: compacted soil K95 | | | |

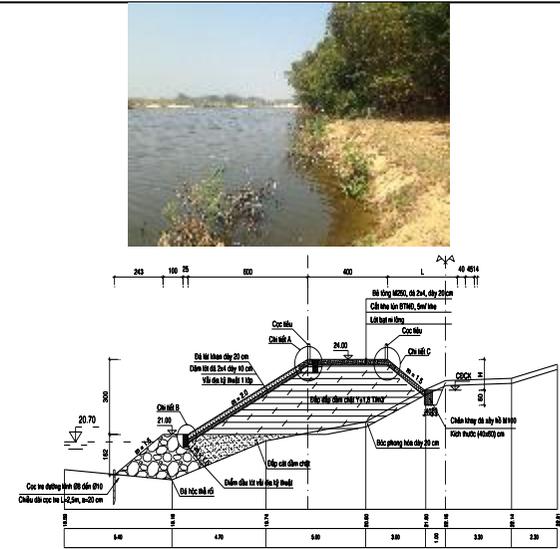
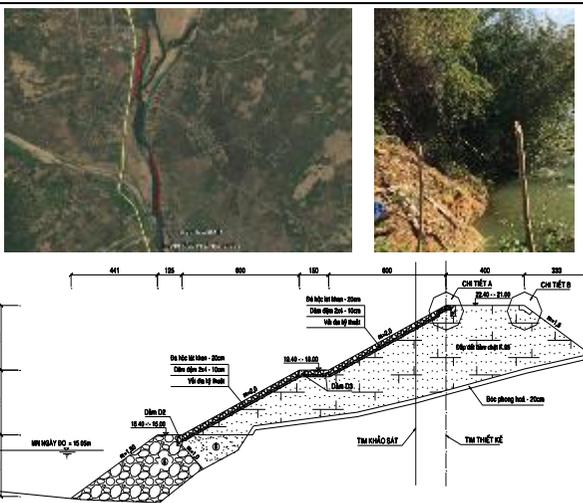
| No. | Items | Characteristics | Investment scale | Images |
|-----|---|--|--|--|
| | <ul style="list-style-type: none"> • Surface: cement concreting M250, thickness of 20cm • The embankment roof toward the river: dry rubble masonry, thickness of 20cm • Field embankment roof: planting grass • Along embankment river bank: mostly alluvial areas; Plant: bamboo, acacia, eucalyptus and shrubs; Agriculture: corn, vegetable and rice field • Dimension: B = 4.0m Displaced households: 03 <i>The detail information of 03 embankments at Can river basin is the following rows</i> | | | |
| 6. | Repairing, rehabilitation of Can river embankment | <ul style="list-style-type: none"> - Location: My Chanh commune - Coordinates: 14°08'40"N; 109°08'14"E - Current status: broken - Along embankment river bank: <ul style="list-style-type: none"> • 10 households and the concreted local road, distance 10-30m. • Plant: shrubs, coconut. • Agriculture: rice field - Distance with PR640 about 500 - 1,000m, connecting with works through inter-commune road. | <ul style="list-style-type: none"> - L = 718.3m. - Auxiliary works: None |    |
| 7. | New construction of Thu Tinh embankment | <ul style="list-style-type: none"> - Location: Duc Pho river, Cat Minh commune, Phu Cat district - Coordinates: 14°08'10,5"N; 109°09'14"E - Current status: annually flooded, sediment - Along embankment (both 2 banks): <ul style="list-style-type: none"> • About 30 households, distance 20-100m • Plant: bamboo, acacia, eucalyptus and shrubs. • Agriculture: rice field - Distance with PR639 about 500m, connecting with works through inter- | <ul style="list-style-type: none"> - L = 2,796m; • Right L = 1,382m • Left L = 1,414m. - Auxiliary work: <ul style="list-style-type: none"> • Irrigation culverts: structure of concrete M200, RC M200, combination with centrifugal concrete D600, H30. |   |

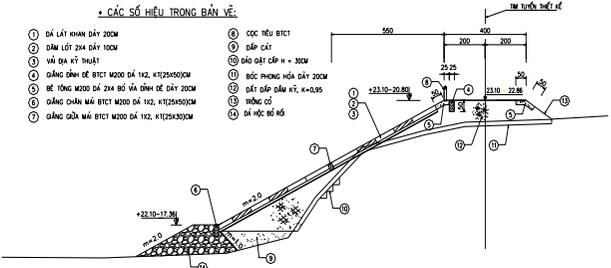
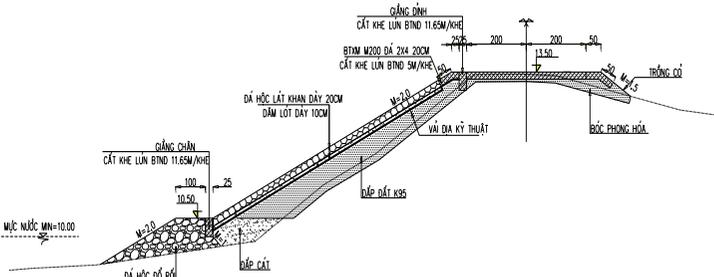
| No. | Items | Characteristics | Investment scale | Images |
|-----|--|---|---|--|
| | | commune road. | |  |
| 8. | Repairing, rehabilitation of Lach Moi drainage embankment | <ul style="list-style-type: none"> - Location: Xuan Binh village, My Thanh commune, Phu My district - Coordinates: 14°10'53"N; 109°10'33"E - Current status: annually flooded, sediment - Along embankment (both 2 banks): <ul style="list-style-type: none"> • No household • Agriculture: aquaculture - Distance with PR632 about 500m, connecting with works through inter-commune road. | <ul style="list-style-type: none"> - L = 1,100m. - Auxiliary work: <ul style="list-style-type: none"> • Spillway: L = 85m; • Irrigation culverts: 27 culverts. |   |
| III | <p>Kon river basin: including 10 embankments with following general features (including 07 newly built embankments, 3 repaired embankments)</p> <ul style="list-style-type: none"> - Flooding fighting frequency P = 10%; - Structure: <ul style="list-style-type: none"> • Body: compacted soil K95 • Surface: cement concreting M250, thickness of 20cm • The embankment roof toward the river: dry rubble masonry, thickness of 20cm • Field embankment roof: planting grass • Along river bank, opposite to embankment: mostly alluvial areas; Plant: bamboo, acacia, eucalyptus and shrubs; Agriculture: corn, vegetable and rice field • Dimension: B = 4.0m | | | |

| No. | Items | Characteristics | Investment scale | Images |
|---|---|--|--|--|
| - Displaced households: 02. <i>The detail information of 10 embankments at Kon river basin is the following rows</i> | | | | |
| 9. | New construction of Thang Cong 2 embankment | <ul style="list-style-type: none"> - Location: Nhon Phuc commune, An Nhon township - Coordinates: 13°54'12"N; 109°00'00E - Current status: partially broken - Along embankment river bank: <ul style="list-style-type: none"> • 02 households, distance is about 50 m. • Plant: grass. - The embankment is part of the PR 636B (asphalted road). | <ul style="list-style-type: none"> - L = 291.88m; B = 6.5m. - Auxiliary works: None |  |
| 10. | New construction of Ta Dinh and Xem stream embankment | <ul style="list-style-type: none"> - Location: Vinh Thuan commune, Vinh Thanh district - Coordinates: 14°05'46"N; 108°44'39"E - Current status: seriously broken, eroded and intruded - Along embankment river bank: <ul style="list-style-type: none"> • 01 household, distance is about 20m • Plant: bamboo. • Agriculture: rice field in village 1, 2, 5 and 7 - Distance with PR537 about 5,000m, connecting with works through inter-commune road. | <ul style="list-style-type: none"> - L = 1,200.3m; • Right: L = 815.5m, • Left: L = 384.8m - Auxiliary works: <ul style="list-style-type: none"> • Centrifugal Concrete drainage culverts: D1200, D500, D600; • Expansion of 01 span of Ta Dinh bridge: B = 6.5m, box bridge, structure of reinforced concrete. |  |

| No. | Items | Characteristics | Investment scale | Images |
|-----|--|---|--|--------|
| | | | | |
| 11. | Repairing, rehabilitation of Dai An river embankment | <ul style="list-style-type: none"> - Location: Dai An river (from Vung Thi bridge to Xoi Dau bridge) in Dai Hao village, Cat Nhon commune, Phu Cat - Coordinates: 13°57'34"N; 109°09'24E - Current status: eroded partially and Xoi Dau spillway is damaged - Along embankment river bank: <ul style="list-style-type: none"> • No household • Plant: bamboo, acacia, eucalyptus and shrubs. • Agriculture: rice field - Distance with NH19B about 550m, connecting with works through inter-commune road. | <ul style="list-style-type: none"> - L = 1,477m; B = 5.0m. - The embankment roof: precast concrete slabs of 50x50x10cm. - Auxiliary works: <ul style="list-style-type: none"> • Xoi Dau spillway L = 133.8m. • Reparation: 02 drainage culverts ϕ800mm and ϕ600mm. | |
| 12. | Repairing, rehabilitation of Truong Giang embankment | <ul style="list-style-type: none"> - Location: Truong Giang spillway to Bo culvert in Phuoc Son commune, Tuy Phuoc district - Coordinates: 13°53'42"N; 109°12'48"E - Current status: damaged by the flood in 2016 - Along embankment river bank: | <ul style="list-style-type: none"> - L = 467.33m; B = 3.5m. - The embankment roof: precast concrete slabs of 50x50x10cm. - Auxiliary works: Truong Giang spillway, L = 120m. | |

| No. | Items | Characteristics | Investment scale | Images |
|-----|--|--|--|--------|
| | | <ul style="list-style-type: none"> • 10 households, distance 10-30m • Plant: bamboo • Agriculture: rice field - Transport: connecting with works through inter-commune road . | | |
| 13. | New construction of Queo river embankment | <ul style="list-style-type: none"> - Location: Binh Tan commune, Tay Son district - Coordinates: 13°57'00"N; 108°57'57"E - Current status: broken, eroded and seriously intruded - Along embankment river bank: <ul style="list-style-type: none"> • No household • Plant: bamboo • Agriculture: rice field - Distance with PR636 about 540-700m, connecting with works through inter-commune road. | <ul style="list-style-type: none"> - L = 814m; • Section 1 L= 432.1m (both banks) • Section 2 L=381.9m (Left bank) - The embankment roof: precast concrete slabs of 50x50x10cm. - Auxiliary works: None | |
| 14. | New construction of Embankment of Kon river (Lai Nghi section) | <ul style="list-style-type: none"> - Location: Binh Nghi and Binh Hoa commune, Tay Son district - Coordinates: 13°54'16"N; 108°58'17"E - Current status: broken, eroded and seriously intruded - Along embankment river bank: <ul style="list-style-type: none"> • No household • Plant: bamboo, fruit trees, timbers and other trees | <ul style="list-style-type: none"> - L = 3,321m • Section 1 in Binh Hoa commune: L = 1,789.8m, B = 5.0m • Section 2 in Binh Nghi commune: L = 1,531.2m, B = 4.0m - Auxiliary works: <ul style="list-style-type: none"> • Drainage culverts: 6, | |

| No. | Items | Characteristics | Investment scale | Images |
|-----|--|---|--|--|
| | | <ul style="list-style-type: none"> • Agriculture: rice field - Distance with PR636 about 2,000m or PR 19 and 636B about 200-500m, connecting with works through inter-commune road. | <ul style="list-style-type: none"> • D500 and D800. • Spillway: L = 61.0m, reinforced concrete M200, • Box culvert: 2, (BxH = 3,0.6x1.2) m, |  |
| 15. | New construction of Embankment of Kon river (Vinh Thanh section) | <ul style="list-style-type: none"> - Location: Vinh Thanh town, Vinh Thanh district - Coordinates: 13°05'27"N; 108°47'35" - Current status: seriously intruded - Along embankment river bank: <ul style="list-style-type: none"> • 50 households (include 6 business households), distance 20-50m. • Plant: bamboo • Agriculture: rice field - Distance with PR637 about 100m, connecting with works through inter-commune road. | <ul style="list-style-type: none"> - L = 1,934.25m • Section 1: L = 1,152.15m, • Section 2: L = 782.1m - Auxiliary works: <ul style="list-style-type: none"> • Reconstruction of new drainage culverts and • 8 steps to go up and down the embankment roof. |  |

| No. | Items | Characteristics | Investment scale | Images | | | | | | | | | | | | |
|---|--|--|---|--|------------------------|-----------------|------------------------|-----------|--------------------|--------------------------|---|--------------------------|---|------------|---|----------------|
| 16. | New construction of Cut river embankment | <ul style="list-style-type: none"> - Location: Phu Tho village, Tay Phu commune, Tay Son district - Coordinates: 13°54'10"N; 108°54'17"E - Current status: broken, eroded and seriously intruded - Along embankment river bank: <ul style="list-style-type: none"> • 5 households, distance 20-50m • Plant: bamboo • Agriculture: rice field - Distance with NH19 about 500m. It is convenient to access to the work through Vo Van Dung road (inter-commune road). | <ul style="list-style-type: none"> - L = 753.5m. - Auxiliary works: <ul style="list-style-type: none"> • Drainage culverts: 3 ϕ600mm. • 03 short soldering tool under the river to direct the main flow away from the bank, L = 30.0m, rubble structure. |  <p style="text-align: center;">• CÁC SỐ HIỆU TRONG BẢN VẼ.</p> <table border="0" style="width: 100%; font-size: small;"> <tr> <td>① ĐÁ LÁT KHAN DÂY 20CM</td> <td>⑥ CỌC THỦY BIẾT</td> </tr> <tr> <td>② ĐÁM LỘT 2X4 DÂY 10CM</td> <td>⑦ ĐẬP CÁT</td> </tr> <tr> <td>③ VỎ BÀNG KỲ THUẬT</td> <td>⑧ BỐC PHONG HÓA DÂY 20CM</td> </tr> <tr> <td>④ CĂNG CHÈN ĐỂ BIẾT M200 DÁ 1X2, K125X500CM</td> <td>⑨ ĐÁI CẤP ĐÁM KỲ, n=0,95</td> </tr> <tr> <td>⑤ BÊ TÔNG M200 DÁ 2X4 MỖ VÀ ĐỀM ĐỂ DÂY 20CM</td> <td>⑩ TRỒNG CỎ</td> </tr> <tr> <td>⑥ CĂNG CHÈN MÀ BIẾT M200 DÁ 1X2, K125X500CM</td> <td>⑪ ĐÁ HỘC BỔ HỖ</td> </tr> </table>  | ① ĐÁ LÁT KHAN DÂY 20CM | ⑥ CỌC THỦY BIẾT | ② ĐÁM LỘT 2X4 DÂY 10CM | ⑦ ĐẬP CÁT | ③ VỎ BÀNG KỲ THUẬT | ⑧ BỐC PHONG HÓA DÂY 20CM | ④ CĂNG CHÈN ĐỂ BIẾT M200 DÁ 1X2, K125X500CM | ⑨ ĐÁI CẤP ĐÁM KỲ, n=0,95 | ⑤ BÊ TÔNG M200 DÁ 2X4 MỖ VÀ ĐỀM ĐỂ DÂY 20CM | ⑩ TRỒNG CỎ | ⑥ CĂNG CHÈN MÀ BIẾT M200 DÁ 1X2, K125X500CM | ⑪ ĐÁ HỘC BỔ HỖ |
| ① ĐÁ LÁT KHAN DÂY 20CM | ⑥ CỌC THỦY BIẾT | | | | | | | | | | | | | | | |
| ② ĐÁM LỘT 2X4 DÂY 10CM | ⑦ ĐẬP CÁT | | | | | | | | | | | | | | | |
| ③ VỎ BÀNG KỲ THUẬT | ⑧ BỐC PHONG HÓA DÂY 20CM | | | | | | | | | | | | | | | |
| ④ CĂNG CHÈN ĐỂ BIẾT M200 DÁ 1X2, K125X500CM | ⑨ ĐÁI CẤP ĐÁM KỲ, n=0,95 | | | | | | | | | | | | | | | |
| ⑤ BÊ TÔNG M200 DÁ 2X4 MỖ VÀ ĐỀM ĐỂ DÂY 20CM | ⑩ TRỒNG CỎ | | | | | | | | | | | | | | | |
| ⑥ CĂNG CHÈN MÀ BIẾT M200 DÁ 1X2, K125X500CM | ⑪ ĐÁ HỘC BỔ HỖ | | | | | | | | | | | | | | | |
| 17. | New construction of Phu Ngoc embankment | <ul style="list-style-type: none"> - Location: Nhon Phuc commune, An Nhon township - Coordinates: 13°54'01"N; 109°02'15"E - Current status: broken, eroded and seriously intruded - Along embankment river bank: <ul style="list-style-type: none"> • About 100 households, distance 10-30m • Plant: bamboo - Distance with PR636B about 100m, connecting with works through inter-commune road. | <ul style="list-style-type: none"> - L = 1,202m - Auxiliary works: None |   | | | | | | | | | | | | |

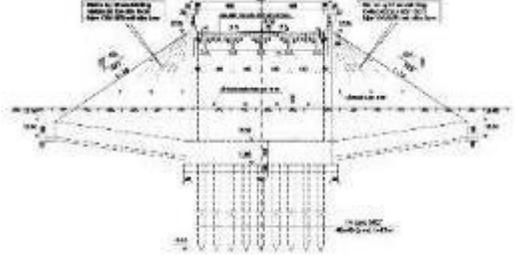
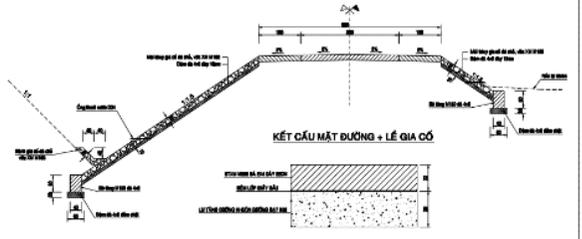
| No. | Items | Characteristics | Investment scale | Images |
|-----|---|---|---|---|
| 18. | Repairing, rehabilitation of Embankment of An Nhon township | <ul style="list-style-type: none"> - Location: Binh Dinh ward, An Nhon township - Coordinates: 13°52'51"N; 109°06'30"E - Current status: seriously damaged, can't ensure the flooding prevention capacity - Along embankment river bank: <ul style="list-style-type: none"> • 100 households, distance 10-100m • Agriculture: rice field - Distance with NH1A about 500m. The end of the embankment intersects with the PR 636. | <ul style="list-style-type: none"> - L = 3,721m; B = 6.0m. - Flood fighting frequency P = 5%; - Auxiliary works: <ul style="list-style-type: none"> • Beacon: 02 rows. |  <p>The 'Images' column contains three visual elements: an aerial photograph showing the project location along a river with a red line indicating the embankment; a ground-level photograph of a dirt road and vegetation; and a technical cross-section diagram of the embankment. The diagram shows a trapezoidal structure with a top width of 6.0m and a bottom width of 30m. It includes details for concrete piles (BT M200), a concrete cap (CÁT KHE LƯN BÌNG), a core of concrete blocks (CÁC TÔNG LẮM LÁT ĐÁY 10CM), and a top layer of concrete (CÁT KHE LƯN BÌNG 5M/KHE LỚT BÁT NỈ LÔNG). Slopes are indicated as m=1.5, and there are labels for 'TRỒNG CỎ' (grass planting) and 'BỨC PHÒNG HỎA 20CM' (fire wall).</p> |

2.2.2. Bridges

The Subproject consists of 05 bridges; all bridges are rebuilt on the current status of bridges which were damaged the by flooding in 2016. The construction will not require land acquisition and on-land assets. Bridges will have following general features:

- Design load: HL93
- Structure: Reinforced concrete
- Auxiliary works: cement concrete access roads of the bridges.

Table 2: Specific description for bridges

| No. | Items | Locations | Investment scale | Images |
|-----|-----------------------------|--|---|--|
| 19. | Rebuild of Trang Bridge | <ul style="list-style-type: none"> - Location: at Km91+670 PR.639B (Chuong Hoa – Nhon Tan), Cat Lam commune, Phu Cat district - Current status: the subsidence of the bridge, abutment of the bridge was swept away. - Agricultural land is near the bridge (rice field), distance with the nearest residential area: about 200m. - Distance with PR634 about 4,500m. - Access road to bridge: inter-commune transport road (asphalted road) | <ul style="list-style-type: none"> - L = 49.55m, B = 9.0m. - Designed flood frequency P=1%. - Auxiliary works: <ul style="list-style-type: none"> • Road: L = 226.65m, • B = 9.0m • V = 40 Km/h, |   |
| 20. | Rebuild of Dich Nghi bridge | <ul style="list-style-type: none"> - Location: at Km17+415 of the PR 634, Cat Son commune, Phu Cat district - Current status: The flood in 2016 cause erosion and swept all the bridge's abutment and about 20m of the bridge's access road to the East. The structure of the bridge span dropped into the river and the transportation was totally cut. - Agricultural land is near the bridge (rice field), distance from the nearest residential area: about 100m. - Access road to bridge: inter-village transport road (concreted road) | <ul style="list-style-type: none"> - L = 55.95m, B = 7.0m - Designed flood frequency P=1%. - Auxiliary works: <ul style="list-style-type: none"> • Road: L = 32.47m • B = 6.5m • V = 30 Km/h. |   |

| No. | Items | Locations | Investment scale | Images |
|-----|----------------------------|--|--|---|
| 21. | Rebuild of Suoi San bridge | <ul style="list-style-type: none"> - Location: at Km1+100 on the district road 11 (Tam Quan road – Tan Binh 1), in Tam Quan town, Hoa Nhon district. - Current status: The flood in 2016 caused erosion and broke a bridge abutment - Agricultural land is near the bridge (rice field) distance from the nearest residential area: about 150m. - Access road to bridge: inter-commune transport road (asphalted road) | <ul style="list-style-type: none"> - L = 22.01m, B = 6.5m - Designed flood frequency P=4%. - Auxiliary works: <ul style="list-style-type: none"> • Road: L = 150.62m • B = 6.5m. |  <p>The image block for item 21 contains an aerial photograph on the top left showing the bridge location on a road. To its right is a photograph of the bridge structure over a river. Below these are two technical drawings: a plan view labeled '1/2 MẶT CHÍNH CẦU (T/L: 1/100)' and a cross-section labeled '1/2 CẮT ĐỐC CẦU (T/L: 1/100)'. The drawings show the bridge's layout and structural details.</p> |
| 22. | Rebuild of Phu Son bridge | <ul style="list-style-type: none"> - Location: Km0+600, road SH02, in Hoi Phu village, Hoai Hao commune, Hoai Nhon district. - Current status: The flood in 2016 caused erosion and broke a bridge abutment - Agricultural land is near the bridge (rice field), distance from the nearest residential area: about 150m. - Access road to bridge: inter-village transport road (concreted road) | <ul style="list-style-type: none"> - L = 16.5m, B = 5.5m - Designed flood frequency P=4%. - Auxiliary works: <ul style="list-style-type: none"> • Road: L = 25.32m • B = 5.0m |  <p>The image block for item 22 contains an aerial photograph on the top left showing the bridge location. To its right is a photograph of the bridge structure over a river. Below these is a technical drawing of the bridge cross-section, labeled '1/2 CẮT ĐỐC CẦU (T/L: 1/100)'. The drawing shows the bridge's width, height, and structural details, including a central span of 500 units and side spans of 200 units, with a total width of 900 units.</p> |

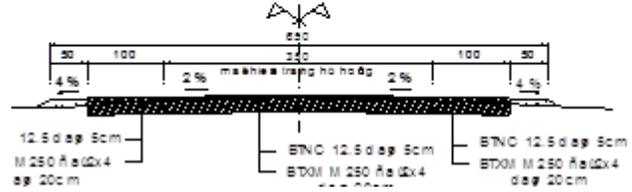
| No. | Items | Locations | Investment scale | Images |
|-----|-------------------------|---|--|--|
| 23. | Rebuild of Bu Nu bridge | <ul style="list-style-type: none"> - Location: From Km0+168.84 to Km0+205, in Kim Son – Nghia Dien road, Bok Toi commune, Hoai An district. - Current status: The flood in 2016 broke a bridge span towards Kim Son. - Agricultural land is near the bridge (rice field), distance from the nearest residential area: about 30-50m. - The bridge was prepared by installing a temporary bridge for the travelling of motorbike. - Access road to bridge: inter-village transport road (macadam road) | <ul style="list-style-type: none"> - L = 52.95m, B = 7.0m - Designed flood frequency P=1%. - Auxiliary works: <ul style="list-style-type: none"> • Road: L = 296.95m • B = 6.5m • V = 30 Km/h |  <p style="text-align: center;">C.NGANG ĐIỂN HÌNH TRÊN ĐƯỜNG CONG (1/50)</p> |

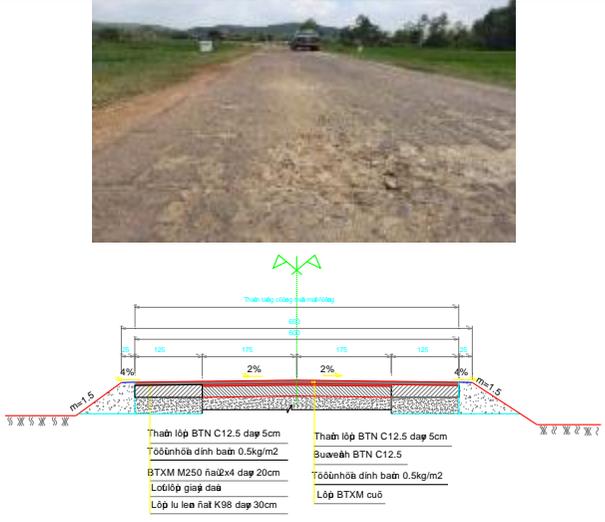
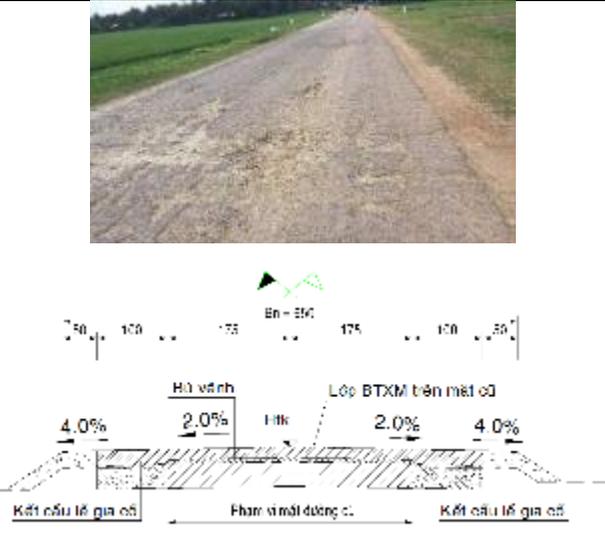
2.2.3. Transportation roads

The Subproject has 03 roads to be repaired and upgraded on current status and don't require land acquisition and on-land assets. Works have general features as follows:

- B = 6.5 m
- Design load: HL93
- Culvert's load: H30 -XB80
- Road kind: Province road
- V = 30 km/h

Table 3: Specific description for roads

| No. | Items | Locations | Investment scale | Images |
|-----|---|--|--|--|
| 24. | Repairing, rehabilitation of PR.635 (NH 1 – NH 19B section) | <ul style="list-style-type: none"> - Location: Cat Trinh and Cat Tuong communes, Phu Cat district. - Starting point intersects with NH1, ending point intersects with NH19B. - Current status: Expand the road from (3.5-5.5)m with asphalted concrete structure. This is an arterial route connecting the center of Ngo May town with communes in the East of Phu Cat district. However, the road is deteriorated, cracked and uneven; the road has no drainage system, therefore, it frequently is flooded. | <ul style="list-style-type: none"> - L = 6,146m - Structure: <ul style="list-style-type: none"> • Cement concrete M250 stone 2x4 with 20cm thick, • Asphalted concrete layer C12,5 with 5cm thick. - Auxiliary works: <ul style="list-style-type: none"> • Ditch: along the route b = 0.7m, RC M200 stone 2x4. • Culvert: $\Phi = 100\text{cm}$, L = 8.0 m, load H30, Centrifugal Concrete structure |   |

| No. | Items | Locations | Investment scale | Images |
|-----|--|--|---|---|
| 25. | Repairing, rehabilitation of PR.639 (Nhon Hoi – Tam Quan section) | <ul style="list-style-type: none"> - Location: Hoai Huong and Hoai Thanh communes. - From Km 63+300 to Km 66+00 and Km95 to Km98. - Current status: The current road surface is cement concrete but is deteriorated. The direction of the route is winding through sand area, some sections are slope. Annually, in rainy season, the water flow along the road surface and spread towards both sides, causing erosion in the talus roof and road edge. | <ul style="list-style-type: none"> - L = 7,100m, - Structure: compacted K95, concrete M300 layer, stone 2x4 with 20cm thick. - Auxiliary works: <ul style="list-style-type: none"> • Ditch along the route B = 0.7m, L = 1,220m, ditch structure of RC M200, stone 1x2. • (ii) Culvert $\Phi 100$, L = 8.0 m, load H30, Centrifugal Concrete structure |  <p>The image for item 25 includes a photograph of a dirt road and a detailed cross-section diagram. The diagram shows a road with a width of 6.0m and a height of 0.6m. It features a 4% slope on both sides and a 2% slope in the center. The structure consists of a top layer of compacted K95 (30cm), followed by a concrete M300 layer (20cm), and a stone 2x4 layer (20cm). The diagram also indicates the presence of a ditch and a culvert.</p> |
| 26. | Repairing, rehabilitation of PR.639B (Chuong Hoa – Nhon Tan section) | <ul style="list-style-type: none"> - Location: Cat Lam commune, Phu Cat district - From Km65+300 to Km71 and From Km78 to Km81. - Current status: The flood in 2016 damaged seriously the road surface, road ledge, talus roof, etc. that threaten the safety of people and vehicles travelling through the route. - The arterial route linking Van Canh, An Nhon, Tay Son, Phu Cat, Phu My, Hoa An and Hoai Son districts to Quy Nhon city. | <ul style="list-style-type: none"> - L = 8,200m - Structure: compacted K95, concrete M300 layer, stone 2x4 with 20cm thick - Auxiliary works: some additional drainage sections are needed along residential areas and highly slope section. |  <p>The image for item 26 includes a photograph of a dirt road and a cross-section diagram. The diagram shows a road with a width of 6.0m and a height of 0.6m. It features a 4.0% slope on both sides and a 2.0% slope in the center. The structure consists of a top layer of compacted K95 (30cm), followed by a concrete M300 layer (20cm), and a stone 2x4 layer (20cm). The diagram also indicates the presence of a ditch and a culvert.</p> |

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**

The embankment upgrading 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;
- 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**

The road construction measure includes the following steps:

❖ *Preparation*

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

❖ *Concrete road construction*

- Step 1: Digging and dredging top soil
- 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.

❖ *Construction of asphalt concrete layer*

- Step 1: Digging and dredging organic soil
- 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.

➤ **Methods of bridge construction**

- Positioning the bridge center and removing the high position - coordinates out of the subproject area
- Excavating the pier foundation by opening excavation method
- Erecting the false works, reinforced concrete processing for the pier-abutment

- Constructing of reinforced false work and concreting the slab beam
- Constructing handrail, then reinforcing the talus roof in the bridge access roads
- Completing and cleaning the site.

2.4. Material/machine demand and waste disposal

a. List of machines and equipment

26 construction works under the subproject have small and medium size, mainly relating to rehabilitation and reparation. The construction activities in each embankment, bridge and road share same type, number of equipment and machines. Thus, list of machines and equipment for 01 work is shown in the following.

Table 4: List of machines and equipment

| Machines/equipment | Quantity (machine) | | | | | |
|--------------------|--------------------------------|----------------------|--------------|-----------|-------------------|-----------------|
| | Excavator 1,6m ³ | Bulldozer ≤ 140CV | 10T truck | Generator | Concrete Mixer | Mobile crane |
| Embankment | 2 | 2 | 4 | 1 | 2 | 1 |
| Bridge | 2 | 2 | 4 | 1 | 1 | 1 |
| Road | 2 | 2 | 4 | 1 | 2 | 1 |

(Source: FS, 2017)

b. Demand on materials and fuels

Main materials for construction of subproject's items are: sand, stone, cement and steel. Major equipment and tools for installation of the subproject's items include: water pipes and water related equipment, electrical wire and illuminating devices, waste binc. In addition, for ensuring the schedule and quality of the subproject's items, precast and ready-made materials which is high quality and convenient for installation such as: precast concrete culvert, asphalt concrete should be used.

Volume of materials for construction of the items is displayed in the following Table 5:

Table 5: Volume of materials for construction

| No. | Contents | Unit | Embankment | Bridge | Road |
|-----|--------------------------------|----------------|------------|--------|---------|
| 1 | Excavated soil | m ³ | 197,474 | 1,905 | 27,769 |
| 2 | Backfilling soil | m ³ | 675,699 | 2,980 | 23,513 |
| 3 | Types of concrete | m ³ | 47,859 | 805 | 14,147 |
| 4 | Formworks | m ² | 203,232 | 13,431 | 12,768 |
| 5 | Steel | ton | 31,030 | 516 | 441 |
| 6 | Lining macadam | m ³ | 18,583 | 1,590 | 2,051 |
| 7 | Foundation lining nylon canvas | m ² | 233,182 | - | - |
| 8 | Geotextile | m ² | 229,443 | 255 | 121,492 |
| 9 | Stone | m ³ | 126,676 | 8,455 | 27,349 |
| 10 | Bamboo piles D8-10, L=2,5m | m | 241,604 | - | - |
| 11 | Sand for filling | m ³ | 98,942 | 4,365 | 15,554 |
| 12 | Grass planting | m ² | 82,890 | - | - |
| 13 | Asphalt coated cloth | m ² | 11,738 | - | - |
| 14 | Demolition | m ³ | 5,000 | 2,000 | - |

(Source: FS, 2017)

c. Construction material supply sources

The subproject will utilize available materials in Binh Dinh province (material suppliers all have exploitation license):

- Type of stones and macadam: bought from pits in Chua mountain, My Hoa commune, Phu My district; Son Trieu mountain, Nhon Hoa ward, An Nhon; Hon Cha mountain, Phuoc Thanh, Tuy Phuoc; Ngang mountain, Cat Nhon commune, Phu Cat district; Trai Tim mountain, Tay Thuan commune, Tay Son; Ngang mountain, Cat Tuong commune, Phu Cat district, etc.
- Sand, gravel: bought from pit in Ha Thanh river, Phuoc Thanh commune, Tuy Phuoc district; Kon river, Binh Nghi commune, Tay Son district; Kon river, Binh Nghi commune, Tay Son district; Lai Giang river, Hoai Huong commune, Hoai Nhon district; La Tinh river, My Tai commune, Phu My district.
- Backfilling materials: bought from pits in Nhon Hoa ward, An Nhon township; Giong Dieu mountain, Binh Nghi commune, Tay Son district; Cha Ray mountain, Nhon Tan commune, An Nhon township, etc.
- Types of cement, iron, steel, material: bought in districts in the subproject areas.

These are available and licensed material pits in the Province. The subproject needs 10-ton truck for transporting materials to the subproject area.

Main roads for material construction and the distance to the construction works are shown in the following table:

Table 6: Roads for material transportation to the work

| District | Main transportation road | Distance to the subproject area (km) |
|------------|---|--------------------------------------|
| Phu Cat | NH1A → PR635, PR634 → inter-village and inter-communal roads → the work | 2 - 16 |
| Phu My | NH1A → PR632 → inter-village and inter-communal roads → the work | 2 - 14 |
| An Nhon | PR636B → inter-village and inter-communal roads → the work | 0.7 - 12 |
| Vinh Thanh | PR637 → inter-village and inter-communal roads → the work | 0.5 - 7 |
| Tuy Phuoc | NH1A → NH19B, PR636A, PR640 → inter-village and inter-communal roads → the work | 10 - 13 |
| Tay Son | NH19 → PR636 → inter-village and inter-communal roads → the work | 1 - 10 |
| Hoai Nhon | NH1A → PR639, PR640 → the work | 0.5 - 10 |
| Hoai An | PR630 → inter-village and inter-communal roads → the work | 18 |

➤ Waste disposal

Waste arising from each works includes concrete, iron, steel, broken pieces (From demolition of broken works and during the construction process), weathered stone on the surface. Waste will be transported by contractor or units hired by contractor to transport to landfill from the district.

Hazardous waste is mainly cloth with grease from the maintenance process of equipment, machines. Client will coordinate with units to transport and treat hazardous waste in accordance with regulations.

Table 7: Waste transportation road

| Works | Waste receiving site (District) | Transportation road | Distance | Information |
|-----------------------------------|---------------------------------|---|----------|---|
| 1, 2, 3, 4, 7, 11, 19, 20, 24, 26 | Phu Cat | The work → inter-village and inter-communal roads → PR634 → inter-village and inter-communal roads → Waste receiving site | 2 - 10 | <ul style="list-style-type: none"> - Name: Phu Cat Solid Waste Treatment Area - Location: Tung Chanh village, Cat Hiep commune - S: 8.22ha - Capacity: 19 - 22 tons/day - Start year: 2014 |
| 5, 6, 8 | Phu My | The work → inter-village and inter-communal roads → PR632 → NH1A → inter-village and inter-communal roads → Waste receiving site | 2 - 17 | <ul style="list-style-type: none"> - Name: Phu My Solid Waste Treatment Area - Location: Gia Hoi village, My Phong commune - S: 1.6ha - Capacity: 36.3 tons/day - Start year: 2016 |
| 9, 17, 18 | An Nhon | The work → inter-village and inter-communal roads → PR636B → NH19 → inter-village and inter-communal roads → Waste receiving site | 5 | <ul style="list-style-type: none"> - Name: An Nhon Solid Waste Treatment Area - Location: Dong Binh village, Nhon Tho commune - S: 20 ha - Capacity: 1ha landfill with capacity of 100,000 m³. - Start year: 2012 |
| 10, 15 | Vinh Thanh | The work → inter-village and inter-communal roads → PR637 → inter-village and inter-communal roads → Waste receiving site | 5 | <ul style="list-style-type: none"> - Name: Vinh Thanh Solid Waste Treatment Area - Location: Vinh Thanh town - S: 2.1 ha - Capacity: 1ha landfill with capacity of 100,000 m³. - Start year: 2016 |
| 12 | Tuy Phuoc | The work → inter-village and inter-communal roads → PR640 → inter-village and inter-communal roads → Waste receiving site | 8 | <ul style="list-style-type: none"> - Currently, Tuy Phuoc district has no concentration waste collection and treatment site. Wastes from the construction work are discharged temporarily in dumping site of Phuoc Son commune with area of 5,000 m². |
| 13, 14, 16 | Tay Son | The work → inter-village and inter-communal roads → PR636 → NH19 → inter-village and inter-communal roads → Waste receiving site | 6 | <ul style="list-style-type: none"> - Name: Tay Son Solid Waste Treatment Area - Location: Phu An village, Tay Xuan commune - S: 7 ha - Capacity: 51.9 m³/day. - Start year: 2015 |
| 21, 22, 25 | Hoai Nhon | The work → inter-village and inter-communal roads | 12-20 | <ul style="list-style-type: none"> - Name: Hoai Nhon Solid Waste Treatment Area |

| Works | Waste receiving site (District) | Transportation road | Distance | Information |
|-------|---------------------------------|--|----------|--|
| | | → PR639 → inter-village and inter-communal roads → Waste receiving site | | <ul style="list-style-type: none"> - Location: Ba Nong mound, Thiet Dinh Bac village, Bong Son town or Hoai Son commune - S: 8.6 ha or 9.4 ha - Capacity: 40 tons/day or 30 tons/day - Start year: 2012 |
| 26 | Hoai An | The work → inter-village and inter-communal roads → PR630, PR631 → inter-village and inter-communal roads → Waste receiving site | 30 | <ul style="list-style-type: none"> - Name: Hoai An Solid Waste Gathering Site - Location: Thach Long 1, An Tuong Dong commune - S: 2,700 m². - Capacity: 10 tons/day - Operation period: 2017 - 2018 |

d. Workers and worker camps

Each item needs about 30-50 workers. 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. Almost all construction sites are large which is favorable for material gathering as well as worker camps.

Because the construction site is scattered in many locations in Binh Dinh, upon each construction site, the area for worker camps will be selected or the accommodation for workers will be hired from the local resident's house.

e. Power and water supply system

The national electrical grid will be used for illuminating system of communes/towns in the subproject area.

Water from underground drilled wells of local people will be used for domestic activities.

Surface water from Kon, La Tinh, Can, Cut, Queo, Dai An, Ta Dinh rivers and streams and canals will be used, with screening, to serve for the construction.

2.5. Total investment of the subproject

Estimated total investment of the subproject is shown as follows:

Table 8: Detailed costs for construction items

| No. | Item | Total investment (VND) | USD |
|-----|------------|------------------------|------------|
| 1 | Embankment | 369,891,964,000 | 16,294,800 |
| 2 | Bridges | 29,902,060,555 | 1,317,271 |
| 3 | Roads | 56,996,528,099 | 2,510,860 |

Exchange rate: 1 USD = 22,700 VND

2.6. The subproject schedule

Each item of the construction work will be built within 10 – 12 months since July in 2017.

2.7. Organization for subproject implementation

Subproject Owner: Binh Dinh Project Management Unit of Construction Investment Works for Agriculture and Rural Development

Compensation and site clearance: Contract with Centers for Land Fund Development of Tay Son, Phu My, Phu Cat, An Nhon, Vinh Thanh, Tuy Phuoc, Hoai Nhon and Hoai An districts to prepare options and compensation for each item in each district.

Appraisal and approval: Binh Dinh Provincial People's Committee is the competent agency for make appraisal and approval

Operation Management Unit: With objectives of rehabilitation and upgrading of agricultural, irrigation and transport infrastructure damaged and prone to be damaged in the coming years, almost all items proposed are old works which have been operated by local authorities. Thus, when the items are put into operation, they will be handed over the former management units as PC of districts and townships for large and inter-communal scale items; PC of communes for small scale items. Large-scale and inter-regional works will be transferred to Irrigation Department and Irrigation Exploitation Company for management and operation.

3. ENVIRONMENTAL AND SOCIO-ECONOMIC CONDITIONS

3.1. Geological and topographical conditions

Topographical condition

Binh Dinh subproject consists of 26 items scattering in 8 districts/townships in both plain area (An Nhon, Hoai Nhon, Phu My, Phu Cat and Tuy Phuoc) and mountainous area (Vinh Thanh, Hoai An and Tay Son).

- Medium and low mountainous terrain: the average height is from 500 m to 700m, some mountain is more than 1,000m, distributed in Vinh Thanh, Tay Son and Hoai An district. The terrain is sharply cleaved and highly slopes.
- Plain and coastal area: distributed along the terrain paralleling to the sea coast, creating an arc which embraces the midlands and mountains of the province. This kind of terrain is mainly in: Hoai Nhon, Phu My, Phu Cat, Tuy Phuoc districts and An Nhom commune. This region's height varies from 2-3m to 20m and it is a region which is very strong in annual crops, breeding, aquaculture production of the province, and is the province's major living location where has developed economy.

Geological conditions

Binh Dinh province has full of geological conditions from the oldest to the youngest, they have the following basic characteristics:

- Acheozoi: Components of Acheiozoi include 02 formations of metamorphic stones: Kongro (ARkr) and (ARbs) equivalent to Kannak (ARkn) complex.
- Proterozoi: Within Binh Dinh, only lower Dacmi formation (Pr1dm1) and some narrow ranges of South of Van Canh are remained. The formation is specialized by crystalline schist, interleaved with plagiogneis, thin layer of amfibiolite biotite; the lower is biotite schist. Almost all the stones are macmatitized.
- Paleozoi Components of low Paleozoi under the Sa Thay formation are remained in small areas in the South Van Canh and Dong Sim - Tay Son with a thickness of 800 - 1,000 m. Main stones mainly depend on the upper formation (PZ1st3), consisting of sericite quartzite, quaczite, interleaved with mica schist; the lower is coarse quaczite with andezite.
- Mezozoi: Components of Mezozoi are distributed widely in the South of NH19, mainly are terrigenous sediments interleaved with acid eruption under the Mang Giang formation (T2mg) and Don Duong formation (Kdd).
- Kainozoi: Include loose sediments such as coarse gravel, gravel, sand, silt and clay; they are distributed in valleys between rivers, streams and coastal plains. Loose sediments are distributed mainly in the upstream of rivers and streams. The

components consist of coarse gravel, boulder gravel, coarse sand in the lower layer and contain sand, and sand, clayey sand with a thickness of 2-5m. On the estuary in the coastal plain, the components include fine sand, sand, silt, clay, yellow and bluish grey clayey sand, and bentonite in some places in upper layer. On the coastal sandbank, the components mainly are clayey sand, coarse sand; yellow, whitish grey fine sand with many minerals such as Zircon, Rutile, Monazit. Generally, the thickness ranges from 10-15m. Some places in the coastal area has coral reef.

3.2. Climatic conditions

Binh Dinh climate belongs to South Central Coast climate – the climate of the Eastern Truong Son Range. There are two distinct seasons: dry season from January to August, rainy season from September to December; total rainfall varies from 1,800 - 3,300mm. Total annual radiation of the province is relatively high, from 140 to 150 cal/cm². Annual average temperature is 27.1⁰C, the highest and the lowest temperature is 34.6⁰C and 19.9⁰C respectively. The annual average humidity is low about 79%. The prevailing wind direction in months in Winter and Summer is Northwest wind and West or South west, respectively. Storms strike in September, October and November, mainly in October with 47% of total storms and cause serious impacts on Binh Dinh.

3.3. Hydrological conditions

The province has 04 large river basins including Lai Giang, La Tinh, Kon and Ha Thanh. The Subproject consists of 18 river embankments in Kon and La Tinh river basins. These basins mostly start from high mountain ranges with narrow, slope stream; when it rains, water quickly stagnates and the flooding transmission time is short (from 6-12 hours). The river plain area is large, shallow and has many canals, but the flow is so poor in the dry season. In rainy season, the flooding is taken place largely, curbing the agricultural and economic development activities in the region. Characteristics of river basins in Binh Dinh province are shown in Table 9 below:

Table 9: Morphology of river basins in the Binh Dinh province

| No. | River basins | Basin area (km ²) | River length (km) | Average height of basin (m) | Average slope of basin (%) | River density (km/km ²) | Winding coefficient |
|-----|--------------|-------------------------------|-------------------|-----------------------------|----------------------------|-------------------------------------|---------------------|
| 1 | Lai Giang | 1,466 | 85 | 277 | 22.0 | 0.65 | 2.99 |
| 2 | La Tinh | 719 | 52.0 | 151 | 71.5 | 0.71 | 1.46 |
| 3 | Kon | 3,067 | 178 | 567 | 15.8 | 0.65 | 1.54 |
| 4 | Ha Thanh | 580 | 58 | 179 | 18.3 | 0.92 | 1.42 |

(Source: FS, 2017)

3.4. Solid waste management system

Although almost all districts and townships have solid waste collection and treatment unit, the service scope is mainly in center of the districts and townships. Garbage in central areas is collected and transported to local sanitary landfills in the district/townships by local authorities.

There are 6/26 Communes/wards/towns within the subproject received waste collection services: Ngo May town, Cat Trinh commune, Binh Dinh ward, Nhon Phuc commune, Vinh Thanh town, Tam Quan town. Most of the subproject communes have not been provided with hygienic solid waste collection and treatment system.

3.5. Wastewater collection and treatment system

Currently, drainage system of all 26 subproject areas is natural drainage which the water

runoff flows through the surface to ditch, river, stream in and surrounding the area; there is no concentrated waste collection and treatment area in the subproject areas.

3.6. Power and water supply system

There are total 26 works equipped with national electrical grids, the power supply for the construction is relatively convenient. However, in some subproject areas, because the distance connecting power to the construction work is quite far, the Contractor shall use generators to supply power for the construction.

Almost all subproject areas (except the construction work in Binh Dinh ward, An Nhon town), the remaining areas have not been supplied with fresh water, people mainly use water from wells, surface water, storm water for domestic activities).

3.7. Transportation systems

Transportation system to construction sites are mainly National Highways, Provincial Roads, district roads and inter-village, inter-communal roads. Current status of the roads is as follows:

| | |
|-------------------------------------|---|
| National Highways (NH) | NH 1A runs through Binh Dinh province, with a length of 118 km and NH10 with 69.5km. These are high-quality and asphalted roads which are favorable for transportation. |
| Provincial Roads (PR) | There are 14 PRs with total length of 4555.2km. At the present, the roads are entirely concreted and asphalted with high-quality. However, there is some PR 635, 639, 640 were run-down as a result from the flood in 2016. |
| District roads | There are 48 district roads with total length of 475.6 km; in which 100% are concreted |
| Inter-village, inter communal roads | Total length of the road is 7,312 km; the structure is mainly cement concrete with a width from 3.5-7m and with a high quality. Some accessing to the work are soil roads because these are in-field roads. |



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. The existing components of natural environment

In May 2017, 26 air samples, 26 samples of surface water, groundwater and 26 soil samples in the subproject area were monitored by the consultant (according to the reports of environmental impact assessments of the sub-project). The results show that:

- 100% of parameters in air sample are lower than the limits of the Standard of Vietnam (QCVN 05:2013/BTNMT and QCVN 26:2010/BTNMT). However, noise at 03 monitoring locations on the transportation routes is nearly equivalent to the allowable limit, since this is the area where traffic density is higher than other construction sites.
- 100% of parameters in surface water samples are within the permitted limit of QCVN 08-MT:2015/BTNMT. However, surface water resource in Kon river and La Tinh river basins is contaminated with organic substances (organic concentration in the samples is quite high, close to the allowable limit).
- Groundwater quality and soil quality in subproject areas are within the limits of QCVN 09-MT:2015/BTNMT and QCVN 03-MT:2015/BTNMT.

Refer to the Environmental Impact Assessment of the subproject for more details about the results of monitoring current status at the construction sites

3.9. Natural/biological resource

Binh Dinh is a province with diversified landscape along with types of aquatic areas such as Coral reef ecosystem – Cu Lao Xanh, seaweed ecosystem, sensitive coastal lagoons such as Thi Nai, Tra O, De Gi lagoons and some unique reservoirs of ecological diversification with many species which have high economic value such as Anguillidae. In mountainous area in Binh Dinh province, there is some ecological diversification such as An Toan-An Lao, Ghenh Rang Natural Preservation Parks; mountainous areas bordering Tuy Hoa, Krongchai are hot locations in terms of ecosystem. However, the works are far from the Natural Preservation Parks in the province: 3km - 20km for plain area, > 20km mountainous area.

➤ Plain area

In general, the species and ecological system in the region are poor and no rare animals and plants are found. The fauna and flora are mainly artificial, unsustainable and low value in terms of ecology.

- The plants in the plain subproject area are characterized by plain ecological characteristics, mainly including rice, corn, potato, etc and fruit trees, timbers such as eucalyptus, longan, litchi and some weeds. No rare plants are found.
- The animals are not diversified, including some species such as flowerpecker, mouse, lizard, frog. No rare animals are found
- The aquatic fauna and flora mainly consist of anabas, snails, crustaceans (shrimp, crab, et). Flora includes water hyacinth, duckweed, morning glory, nipa, axonopus compressus, etc.

➤ Mountainous area

In mountainous subproject areas, there is no occurrence of animal or plant species listed in the Red Data List of Vietnam. The forest appears scattered near the subproject area as plantation forest. Production forests are mainly planted with eucalyptus, acacia, acacia hybrid planted and harvested periodically. In addition, the subproject area has the appearance of other shallow and aquatic ecosystems including:

- Horticultural ecology: This ecosystem is mainly planted with industrial trees such as longan, eucalyptus, acacia, etc.
- Agricultural ecosystems: Main trees are wet rice, crops or low hills grown with potato, sugarcane and elephant grass.
- Animals: According to the available documents and consultation with local people, there are several species in the subproject area that are mixed with residential areas and agricultural production areas such as bats and hamsters. Some pets in the family such as dogs, cats, pigs, chickens, ducks, buffalos, cows, goats. Reptiles, frogs like

lizards, snakes, frogs, yangs, frogs and so on live in fields or rivers. Some species are found at home gardens and around residential areas such as geckos, toads and bullfrogs. Birds are such as baboons, etc.

- Aquatic fauna and flora is mainly fish, snails, crustaceans (shrimps, crabs, etc) live in streams.

3.10. Socio-economic condition

26 works under the subproject are implemented in 8 districts/townships, consisting of Tay Son, Phu My, Phu Cat, Vinh Thanh, Tuy Phuoc, Hoai Nhon, Hoai An districts and An Nhon township. The socio-economic information of districts/town is shown in Table 10 below:

Table 10: Socio-economic information of the subproject districts

| Districts/townships | No. of communes | Wards, towns | Area (km ²) | Population (1,000 people) | People density (people/km ²) |
|---------------------|-----------------|--------------|-------------------------|---------------------------|--|
| Hoai Nhon | 15 | 2 | 421 | 207,7 | 493,3 |
| Hoai An | 14 | 1 | 745 | 85,3 | 114,5 |
| Phu My | 17 | 2 | 550 | 171,1 | 311,1 |
| Vinh Thanh | 8 | 1 | 723 | 28,3 | 39,1 |
| Tay Son | 14 | 1 | 693 | 124,6 | 179,8 |
| Phu Cat | 17 | 1 | 680 | 190,0 | 279,4 |
| An Nhon township | 10 | 5 | 243 | 180,3 | 742,0 |
| Tuy Phuoc | 11 | 2 | 217 | 181,8 | 837,8 |

(Source: FS, 2017)

Population of the province is about 1.5 million people, with density of 248,2 people/km², population is unevenly distributed, mainly in the city and An Nhon township, Tuy Phuoc district; Among 8 areas, the lowest population density is in Vinh Thanh district with 39.1 people/km². In Binh Dinh, apart from Kinh people (about 98%), there are some other ethnic people reside in (mainly Cham, Ba Na and Hre peoples) in mountainous and midland areas. At embankment construction location of Kon river (Vinh Thanh section), 150 Bana ethnic households are affected by the subproject.

3.11. Natural disasters in Binh Dinh provinces

Binh Dinh is annually affected by natural disasters including typhoons, tropical low pressures, floods, droughts, hurricanes, tides, salinity intrusion, landslides and other extreme weather events such as sea level rise, hot dry West wind, Northeast monsoon.

- Typhoons and tropical low pressure: usually occur in the rainy season from September to December, with an average of one to two typhoons each year, the highest typhoon intensity was 40 m/s in Quy Nhon, An Nhon, Hoai Nhon (1984, 1995).
- Floods: occur on a large scale, with 3.5 floods per year. There were 8 floods (1999), at least 2 floods (2004). The most frequent floods are the main floods occurring in October and November. May flood occur during the summer, in May. The historic flooding from 14 to 17/11/2013 is characterized by rainfall of 250 - 450mm. Total flow during the flood season accounts for 70% of the annual flow.
- Drought: occurs in January - August with low rainfall, 50-70% less than the average rainfall of many years. Most of the river basins are prone to droughts when the sun and hot weather lasts, and many rivers and streams have dried up completely in recent years.

- Northeast monsoon: occurs mainly from October to April every year. Monsoon brings dry weather, with little rainfall. On average, there are 10 monsoons in the North East per year.
- Hot dry West wind appears in the middle and late May and lasts from June to August. 8. Dry hot West winds have the highest temperature $\geq 37^{\circ}\text{C}$. West wind dried the most in 1982, 1986, 1987, 1992, 1993 with the total number of days in the year from 50 to 73 days.

A summary of the 2016 natural disaster situation in Binh Dinh Province: In 2016, in Binh Dinh province, there were 5 big floods. Total rainfall is from 900 - 2,400mm. The highest flood peak on Ha Thanh River on November 3, 2016 was 44.29 m; On 16/12/2016 rainfall on Con river was 18.86 m; on 01/12/2016, rainfall on Lai Giang river on was 23.84m. Flood rain cause deep inundation in the entire 11 districts, towns and cities of the province, 114/159 communes, wards and towns were inundated; In Hoai An, Phu My, Phu Cat, Tuy Phuoc districts, An Nhon town and Quy Nhon city, water depth is 1.5-2m; Houses, bridges, sewers were collapsed, dykes, embankments, transport roads were flooded, serious landslides, unable to walk. The people lives in flood-prone areas get many difficulties. According to the statistical results, the assessment of damages caused by natural disasters, the damage data is as follows;

- People: 39 deaths (including two people were missed), 10 injured;
- Houses: 908 houses were completely collapsed, 409 houses were damaged and 110,697 houses were flooded.
- Transport: 240.7 km of roads were damaged and landslides; 113 drainage culverts and 57 bridges were collapsed and damaged; 310 points were seriously landslides, traffic congestion.
- Irrigation and dyke: 86.67 km of embankment dyke was seriously damaged, 258.3 km of canals were landslide and sediment, 227 temporary and small dams were damaged, 32 km of river banks were landslide;
- Production: 2,253 hectares of rice were flooded; 18,829 hectares of new Winter-Spring rice was inundated; 5,262 hectares of crops were damaged; 3,775 hectares of paddy field were destroyed; 200 ha of seedlings were flooded; 23 hectares of industrial trees were demolished; 36,600 cattle, 196,200 birds were dead, swept away; 4,848 tons of food, 1,012 tons of rice seeds were flooded, damaged; 1.3 million apricot trees were submerged, shivered; 338 hectares of aquaculture were damaged and 25 fishing vessels were sunk and seriously smashed. Total damage value is estimated at VND 2,214 billion (approximately US\$ 99.3 million).

3.12. Description of sensitive receptors

5/26 construction works of the Binh Dinh subproject have sensitive receptors which are located near the works or along the material transportation roads. Details of sensitive receptors are presented in Table 11 below.

Table 11: Sensitive receptors in the subproject location

| No. | Sensitive receptors | Description |
|-----|------------------------------------|--|
| 1. | Kindergarten in An Xuyen 3 village | <ul style="list-style-type: none"> - Located in the end of the embankment of La Tinh river basin, about 10m away from the work. - The Kindergarten serves for about 50 children in An Xuyen 3 village and surrounding villages. - The Kindergarten time of the child is within days in the week, starting time: 7h-8h and ending time 16h30 - 17h30 |

| No. | Sensitive receptors | Description |
|-----|---|--|
| |  | |
| 2. | <p>Pumping station for agricultural activities in Binh Nghi commune</p>  | <ul style="list-style-type: none"> - Located at the beginning of the embankment of Lai Nghi village, (the Embankment No. 14), about 5 meters from the construction site. - The capacity of 0.2 m³/s, the pump station takes water directly from the Kon River to irrigate the rice paddies of Lai Nghi village (about 50ha) - The pumping station intermittently operates as they depend on the seasons, mainly in the dry season (from January to August). The operation frequency is about 7 days to timely catch up with the crop progress. |
| 3. | <p>Ancestral temple in Binh Nghi commune</p>  | <ul style="list-style-type: none"> - Located in the middle of the embankment in Lai Nghi village, about 10m away from the site. - The area of the work is about 1,000 m². - The worship is mainly in the lunar 1st and 15th of the months, festivals and Tet. There is only 1 day of ancestor worship (the descendants of the family are crowdedly gathered together) |
| 4. | <p>Tay Phu Primary School</p>  | <ul style="list-style-type: none"> - Located near Cut river, about 5m away from the work. The Primary School lies next to the road for transportation of materials to the construction site. - The school campus is about 2,500m²; there are 15 classes, more than 30 teachers and 500 students. - The school time of students is within days in the week, about 6h30 – 7h30, 11h-12h, 13h-14h and 16h30-17h30. |
| 5. | <p>Tay Thien Ancestral temple (Pagoda)</p>  | <ul style="list-style-type: none"> - Located near the embankment in An Nhon commune, about 5m away from the work, in the area near the beginning of the work. - The area of the temple is about 3,000m². - Buddha worshipping activities are in the lunar 01st and 15th. Additionally, there some special days of worshipping. |
| 6. | <p>An Nhon entertainment area</p>  | <ul style="list-style-type: none"> - Located near the embankment in An Nhon commune, in the area in the middle of the work. - The area of the station is about 4,500 m². - The work is about being put into operation and is water entertainment types, serving for a large number of residents in An Nhon commune, especially in hot weather days. - Opening hours: 8h to 20h all days of the week, estimated number of people: 200 people per day |

| No. | Sensitive receptors | Description |
|-----|--|---|
| 7. | Binh Dinh station  | <ul style="list-style-type: none"> - Located near the An Nhon township embankment, about 10m away from the embankment in Binh Dinh ward, An Nhon township. - S = 10,000 m², used for goods storage and transportation. |
| 8. | Ngo May High School  | <ul style="list-style-type: none"> - Located in the side of the PR 635 and about 300 m away from the beginning of the route. - S = 3,500m², with 30 classes, 50 teachers and more than 1.000 students. - School time is all days of the week, starting hour and ending hour 6h30 - 7h30, 11h - 12h, 13h - 14h and 16h30 - 17h30. |
| 9. | Cat Tuong CPC  | <ul style="list-style-type: none"> - Located in the position of 100m away from the PR 635 and 1.5km away from the end of the route. - There are about 25 officers working for Cat Tuong CPC and around 100-200 residents/day need to implement administrative procedures. - Cat Tuong CPC works in days within the week (except Saturdays, Sundays and holidays) to deal with socio-economic issues for about 16,975 people in 9 villages. |

4. ENVIRONMENTAL AND SOCIAL IMPACTS

4.1. Type and scope of impacts

The potential social and environmental impacts are screened in Table 12.

Table 12: Level of negative impacts of the Binh Dinh subproject

| Component | Physical aspects | | | Biological aspects | | Social 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</i> | <i>Traffic safeguard</i> |
| Embankment: Embankment of La Tinh river basin (5 works); Can river basins (3 works); Kon river basin (10 works) | | | | | | | | | | | |
| Pre-construction | N | N | N | N | N | L | L | N | L | N | N |
| Construction | L | L-M | M | N | L | N | L | M | M | L | L |
| Operation | N | N | N | N | N | N | N | N | L | N | N |
| 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. - Impact on Ethnic Minority. | | | | | | | | | | |
| Bridges (5 works) | | | | | | | | | | | |
| Pre-construction | N | N | N | N | N | N | N | N | N | N | L |
| Construction | L | L-M | M | N | N | N | N | M | M | L | L |
| Operation | N | N | N | N | N | N | N | N | L | N | L |
| Remark | <ul style="list-style-type: none"> - Small and medium impacts can be addressed through ECOPs. - Impacts on water environment; - Subsidence risk in pier of bridge during construction phase; - Community disturbance and traffic concern; | | | | | | | | | | |

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| Component | Physical aspects | | | Biological aspects | | Social 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 ethnic group</i> | <i>Physical cultural resources</i> | <i>Livelihood, community disturbance</i> | <i>Local flooding</i> | <i>Traffic safeguard</i> |
| | <ul style="list-style-type: none"> - Impact on groundwater quality during the drilling process; - Impact on agriculture land. | | | | | | | | | | |
| Roads (3 works) | | | | | | | | | | | |
| Pre-construction | N | N | N | N | N | N | N | N | N | N | L |
| Construction | L | L-M | M | N | N | N | N | M | M | L | L |
| Operation | N | N | N | N | N | N | N | N | L | N | L |
| Remark | <ul style="list-style-type: none"> - Small and medium impacts can be addressed through ECOPs. - Disruption of business activities; - Road safety concerns. | | | | | | | | | | |
| <p>Note:</p> <p>(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.</p> <p>(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.</p> | | | | | | | | | | | |

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 project area will be assessed during the construction process.

➤ Land acquisition

The bridge and road items (5 bridges and 3 roads) don't require land acquisition because the items are built on existing works. 18 embankments require land and on-land assets acquisition, detail in Table 13 below.

Table 13: Affected households and affected area from works

| No. | Items | Area + No. of AHs |
|-----|---|--|
| 1. | New construction of Embankment of La Tinh river (Vinh Thanh - Thai Phu section) | - AH: 45 (loss land, trees and crops). - Affected land: • Agriculture land: 5,050 m ² • Public land: 2,157m ² |
| 2. | Repairing, rehabilitation of Embankment of Quang dam downstream | - AH: 14 (loss land, trees and crops) - Affected land: • Agriculture land: 2,100 m ² • Public land: 500 m ² |
| 3. | New construction of Chanh Hung embankment | - AH: 22 (loss trees and crops) because they plant on public land. - Affected land: • Public land: 4,500 m ² |
| 4. | Repairing, rehabilitation of Embankment of Hoi Son lake downstream | - AH: 65 (loss land, trees and crops) - Affected land: • Agriculture land: 5,100 m ² • Public land: 1,000 m ² |
| 5. | Repairing, rehabilitation of Embankment of La Tinh river downstream | - AH: 155 (loss land, trees and crops). - 02 displaced households. - Affected land: • Residential land: 8,401 m ² • Aquaculture land: 30,324 m ² • Public land: 882 m ² |
| 6. | Repairing, rehabilitation of Can river embankment | - AH: 35 (loss land, trees and crops). - Affected land: • Residential land: 718 m ² • Agriculture land: 5,420 m ² • Public land: 1,876 m ² |
| 7. | New construction of Thu Tinh embankment | - AH: 115 (loss land, trees and crops). - 03 displaced households - Affected land: • Residential land: 2,620 m ² • Agriculture land: 17,640 m ² • Land of organizations: 20 m ² • Public land: 745 m ² |
| 8. | Repairing, rehabilitation of Lach Moi drainage embankment | - AH: 143 (loss land, trees and crops). - Affected land: • Residential land: 1,750 m ² |

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| No. | Items | Area + No. of AHs |
|-----|--|---|
| | | <ul style="list-style-type: none"> • Agriculture land: 25,400 m² • Public land: 1,050 m² |
| 9. | New construction of Thang Cong 2 embankment | <ul style="list-style-type: none"> - AH: 12 (loss land, trees and crops). - Affected land: <ul style="list-style-type: none"> • Agriculture land: 6,144 m² • Public land: 1,210 m² |
| 10. | New construction of Ta Dinh and Xem stream embankment | <ul style="list-style-type: none"> - AH: 150 (loss land, trees and crops). - Affected land: <ul style="list-style-type: none"> • Agriculture land: 9,660 m² • Public land: 750 m² |
| 11. | Repairing, rehabilitation of Dai An river embankment | <ul style="list-style-type: none"> - AH: 16 (loss land, trees and crops). - Affected land: <ul style="list-style-type: none"> • Agriculture land: 2,522 m² • Public land: 2,200 m² |
| 12. | Repairing, rehabilitation of Truong Giang embankment | <ul style="list-style-type: none"> - AH: 83 (loss land, trees and crops). - Affected land: <ul style="list-style-type: none"> • Residential land: 567 m² • Agriculture land: 25,520 m² • Public land: 840 m² |
| 13. | New construction of Queo river embankment | <ul style="list-style-type: none"> - AH: 50 (loss land, trees and crops). - Affected land: <ul style="list-style-type: none"> • Residential land: 3,688 m² • Agriculture land: 2,980 m² • Public land: 650 m² |
| 14. | New construction of Embankment of Kon river (Lai Nghi section) | <ul style="list-style-type: none"> - AH: 6 (loss land, trees and crops). - AH: 123 (loss trees and crops) because they plant on public land. - 02 displaced household - Affected land: <ul style="list-style-type: none"> • Residential land: 450 m² • Land of an organization: 22 m² • Public land: 12,700 m² |
| 15. | New construction of Embankment of Kon river (Vinh Thanh section) | <ul style="list-style-type: none"> - AH: 18 (loss land, trees and crops). - Affected land: <ul style="list-style-type: none"> • Residential land: 531 m² • Public land: 650 m² |
| 16. | New construction of Cut river embankment | <ul style="list-style-type: none"> - AH: 19 (loss land, trees and crops). - Affected land: <ul style="list-style-type: none"> • Residential land: 418 m² • Public land: 740 m² |
| 17. | New construction of Phu Ngoc embankment | <ul style="list-style-type: none"> - AH: 22 (loss land, trees and crops). - Affected land: <ul style="list-style-type: none"> • Residential land: 924 m² • Public land: 500 m² |
| 18. | Repairing, rehabilitation of Embankment of An Nhon township | <ul style="list-style-type: none"> - AH: 5 (loss land, trees and crops). - Affected land: <ul style="list-style-type: none"> • Residential land: 63 m² • Public land: 550 m² |

The subproject will affect 1,098 households, including 953 directly AH by land acquisition and 145 directly AH because they cultivate on the land managed by communal/ward PC. In addition, the subproject affects transportation and agricultural land of 18 communal/wards PCs and 02 organizations (Cat Minh and Binh Nghi communes).

- Out of 158 HHs affected with residential area, there are 07 households have houses and structures affected totally and have to relocate.
- There are 150 Ba Na ethnic households in Vinh Thuan commune of Tay Son district affected by the subproject implementation.

The subproject will affect 191,532 m² land of 953 households, 18 communal/ward PCs and 02 management organizations, including (i) 20,130 m² residential land; (ii) 107,536 m² agricultural land; (iii) 30,324 m² aqua cultural land; (iv) 42 m² land managed by organizations (v) 33,500 m² public land managed communal/ward PCs (including specialized land, land in streams and rivers, transport road, etc).

For the subproject, trees and crops of 973 households will be affected, in which there are 828 directly AH and 145 indirectly affected (because they cultivate on the land managed by communal/ward PCs). In addition, it is estimated that the subproject affects 228 fruit trees (longan, pomelo, banana, etc); 12,242 timbers, 14,148 bamboos and about 107,536 m² of rice field.

Estimatedly, there are 59 households severely affected from production land acquisition (include 21 households with 20% or more of affected cultivation land and 38 vulnerable households with more than 10% of affected cultivation land).

Impact from land acquisition is assessed to be low as there are only 5.4% severely affected households, 07/1,098 households have to be displaced; most of the households lose their agricultural land (make up 56%). In addition, 150/1,098 Bana ethnic minorities households are affected with agricultural land. Positive impacts brought about from the subproject are higher than negative impacts. At the same time, the negative impacts are mitigable through Resettlement Action Plan and Ethnic Minorities Development Plan formulated in the subproject.

For 3 embankments, there are 07 displaced households, the resettlement causes: (i) direct impacts on people's life and activities; (ii) negative effects on livelihood, income reduction; (iii) difficulties in new livelihood seeking. These impacts are considered to be minor because households who are prone to displacement will relocate within the localities with small amount and they are all compensated and supported under the project's policies to ensure the equal or better living conditions as before the project.

➤ **Safety risks related to Unexploded ordnances**

UXO left from the war still found in many parts of Viet Nam, these can cause casualties, accidents. Mine clearance is an important part to avoid the possible threats to the work and the safety of local people and workers. For the subproject, mine clearance must be taken into thoroughly consideration and review before the construction implemented. Without any mitigation measures UXO will cause significant impacts on people's safety and life, and infrastructures. Mine clearance must be done before the construction starts.

4.3. Potential Impacts and Risks in construction phase

4.3.1. Generic Impacts

1. Air quality impacts

Environmental impacts related to air quality are mostly dust and gases emissions, generating

from excavation, backfilling, equipment and transportation of materials and wastes. However those are discontinuous activities and happen in short period of time given the small to moderate scope and scale of the subproject. The scheduled the subproject will be implemented in 10 - 12 months from 7/2017 to 7/2018. Detailed assessment on the potential adverse impacts during construction of investments is described below.

➤ **Dust**

Dust from demolition, excavation and backfilling

Dust emission during the excavation and ground leveling depends on the excavated and backfilled volume. According to the Table 5 the excavating and backfilling volume of the embankments, bridges and roads is 878,172m³, 6,885m³ and 51,282m³ respectively. As the instruction document of WB, the pollution coefficient E (Kg/ton) is identified based on the particle structure (0.35), average wind speed (2.0m/s) and the humidity of excavated materials (range from 20-30%).

Table 14: Volume of dust from demolition, excavation and backfilling activities at the works

| No. | Items | Excavated volume (m ³) | Pollution coefficient (kg/ton) | Average volume at 01 work (kg/day) | Dust concentrations (mg/m ³) | QCVN 05:2013 (mg/m ³) |
|-----|-----------------------|------------------------------------|--------------------------------|------------------------------------|--|--|
| 1 | Embankment (18 works) | 878,172 | 0.00577 | 1.41 | 0.71 | 0.3 (Standard of EHS Guidelines is 0.25) |
| 2 | Bridge (5 works) | 6,885 | 0.00978 | 0.32 | 0.40 | |
| 3 | Road (3 works) | 51,282 | 0.00978 | 0.50 | 0.15 | |

In general, the concentration of dust emitted from the excavation, backfilling and ground leveling causes impacts on the air environment at the site (mainly in embankment items). Workers are directly affected from the impacts. However, as the works are scattered and far from residential areas, dust emission is only generated in the construction progress, the impact is assessed at low and controllable through measures of ECOPs.

Dust from the material and waste transportation

The subproject uses 10-ton trucks for material transportation during the construction period. The transported volume is displayed in Table 5. There are average 5-26 trucks going in and out of the construction site each day with a transportation distance of 15km. The average dust in the air at the height of 1.5m and distance of 30m from the receiving points is identified by SUTTON ranges from 0,172 - 1.375 mg/m³. The results show that dust concentration exceed the allowable limit of QCVN05:2013/BTNMT. Dust emission during the construction period will affect the vision distance, respiratory system and eye-related diseases on workers and local people. Construction sites affected with dust emission consist of: (5) La Tinh river downstream embankment, (6) Can river embankment, (12) Truong Giang river embankment, (14) Kone river embankment, Lai Nghi hamlet, (15) Kone river embankment, Vinh Thanh town, (16) Cut river embankment and (17) Phu Ngoc embankment 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.

➤ **Air emission**

Emission from machines on construction site

Construction of items under the subproject will have to use some construction machines and

equipment. Most of the devices use Diesel, so the process of operation will emit pollutants such as: dust, CO, SO₂, NO_x, etc. Emission arising from the operation of machines and equipment on the construction site depends on quantity, quality of construction machines, equipment and construction methods.

According to the rapid assessment method on environmental pollution by WHO 1993, the emission factor of vehicles used in construction uses Diesel (% S = 0.05%). Based on the pollutant emission factors listed in Table 15, the average amount of fuel consumed by machines and equipment on construction site, the pollutant load is estimated as follows:

Table 15: Pollutant load of some vehicles during construction phase

| No. | Type of equipment | No. of equipment | Fuel consumption norms (liter/8 hour)* | Pollutant load (kg/day) | | | |
|-----|-----------------------------|------------------|--|-------------------------|-----------------|-------|-------|
| | | | | SO ₂ | NO _x | CO | VOC |
| 1 | Excavator 1.6m ³ | 4 | 46.50 | 0.162 | 1.949 | 2.923 | 0.422 |
| 2 | Bulldozers ≤ 140CV | 4 | 82.62 | 0.289 | 3.462 | 5.193 | 0.750 |
| 3 | Electric generator | 6 | 37.80 | 0.198 | 10.89 | 5.544 | 2.376 |
| 4 | Truck with 10 tons | 4 | 38.00 | 0.133 | 7.298 | 3.715 | 1.592 |
| 5 | Concrete mixer | 3 | 75.62 | 0.198 | 2.377 | 3.565 | 0.515 |
| 6 | Mobile crane | 3 | 3.06 | 0.008 | 0.096 | 0.144 | 0.021 |

Note: () Circular No.06/2010/TT-BXD dated 26/5/2010 of the Ministry of Construction guiding the method of determining the price of machine and equipment for construction of works.
 - Specific gravity of diesel: 0,873kg/liter*

For equipment, including excavation, backfilling, bulldozers (bulldozer, excavator, etc.), due to the limited number of equipment and scattered equipment, it is possible to assess the amount of fuel emissions from the digging facilities is small.

The above pollution sources are temporary, discontinuous, dispersed and dependent on the intensity and duration of construction, the volume of motor vehicles, number of participants. Workers are affected persons. Therefore, impact magnitude on environment is insignificant. At the same time, during the course of implementation, the Subproject Owner requests the construction unit to implement mitigation measures as set out in ECOPs to limit pollution.

Emission from the material transportation

The subproject uses 10-ton trucks for material transportation during the construction period. The transported volume is displayed in Table 5. There are average 5-26 trucks going in and out of the construction site each day with a transportation distance of 15km. The average concentration of pollutants in the air at the height of 1.5m and distance of 30m from the receiving points is identified by SUTTON, accordingly: (i) SO₂ volume varies from 0.040-0.317 mg/m³; (ii) NO₂ volume is from 0.275 - 2.200mg/m³; (iii) CO volume is from 0.554 - 4.430mg/m³. The results show that NO₂ concentration exceeds the allowable limit of QCVN05:2013/BTNMT. The emission affects the respiratory and nervous system that makes people tired, dizzy, headache, anxious and unsafe. People living along the transportation route and some households ((5) La Tinh river downstream embankment, (6) Can river embankment, (12) Truong Giang river embankment, (14) Kone river embankment, Lai Nghi hamlet, (15) Kone river embankment, Vinh Thanh town, (16) Cut river embankment and (17) Phu Ngoc embankment), workers near the works are directly affected. The impacts are mitigable through measures set forth in ECOPs.

➤ **Noise**

Noise is mainly generated from demolition, excavators, trucks to transport construction materials and construction activities. As showed in Table 16 below, 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.

Table 16: 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 |
| | 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, and office. | | | | | |

The analysis shows that noise level from transportation means and construction activities is within allowable limit set forth in QCVN 26:2010/BTNMT with distance 50m. Noise will affect households along the transportation route, workers at the site and some households near the site (embankment of La Tinh river downstream, Can river, Thu Tinh, Dai An river, Truong Giang, Kon river in Vinh Thanh town, Phu Ngoc, and flooding prevention embankment in An Nhon township). Almost the embankments are about 100m or more away from the residential areas, 30-50m from the bridges and more than 10-20m from the roads. The impacts are assessed at low and controllable though mitigation measures in ECOPs.

➤ **Vibration**

Vibration generated by construction activities from construction machines as well as pile driving and concreting activities. It will affect to the neighboring structures. As calculated follow *Transit Noise and Vibration Impact Assessment, FTA, 2006*, the vibration of construction machines is within 76-94 dB at the area far ≥ 30 m. For the receiving points, far about 30m, the vibration is less than 75dB (within the allowable limit of QCVN 27:2010/BTNMT in terms of vibration and impact - Vibration due to construction and industrial production activities).

As for embankments, bridges and roads, vibration is from the pile driving activities, operation of equipment, vehicles and machines on the site. At the same time, the activities are taken place in small scope, open and far from residential areas. Therefore, vibration from operation of the items is assessed at low level and mainly affects workers at the site (especially workers in operating machines and equipment). These impacts temporarily happen, inconstant and mitigable through measures set forth in ECOPs.

2. Water quality degradation

➤ **Construction wastewater**

Generated from concrete curing; machine repair and facility and material washing. The wastewater volume is approximately 1 - 2 m³/day for each work item. This wastewater contains a large amount of sediment, suspended solids and high pH and may cause negative impacts on the receiving waterbody if it is discharged directly into the environment. Aquatic

areas are affected including Kon river, La Tinh river, Can river, Cut river, Queo river, Dai An river, Ta Dinh stream, etc. However, in fact, this wastewater is re-used for curing concrete and watering the haul road and construction site. At the same time, amount of arising waste is small, construction time is short (10-12 months), impacts are local at construction location. Therefore, the impacts caused by this wastewater source will be insignificant.

➤ **Domestic wastewater**

According to the subproject design report, a total of 30 - 50 people will be mobilized for construction of works for each work item. As calculated by the water supply 80 l/person/day, the average volume of wastewater discharged is 2.4 – 4.0 m³/day for each work item. Ingredients of wastewater include suspended sediment, oil, grease, organic content, soluble organic matters (like BOD₅, COD), nutrients (Nitrogen, Phosphorous) and bacteria. If there is no system for collecting and treating daily wastewater, there will be a source of pollutant being discharged into the environment (Aquatic areas are affected including Kon river, La Tinh river, Can river, Cut river, Queo river, Dai An river, Ta Dinh stream, etc). This will be a considerable pollution source, directly affecting living condition of workers and people around the subproject area. This impact is considered minor due to local arisen waste water amount at each the Project area, construction time is short (10-12 months), at the same time, the Contractor uses local labor or rents resident's houses to build workers camps, thus, waste water arising can be lower than expectation and mitigable through measures set forth in ECOPs.

➤ **Runoff**

Based on the calculation result of water runoff flow in this period in EIA reports, from 162 m³ to 1,953 m³ rainwater is generated for each work item (Calculation for the highest rainfall intensity of 450mm). The runoff during heavy rains can sweep soil, sand, other materials and wastes... toward water bodies, polluting surface water source, particularly when the construction is commenced in September and October (rainy season). The runoff water can affect surface water ecosystem at Kon, La Tinh, Can, Cut, Queo, Dai An, Ta Dinh..., affecting navigation on these rivers. However, the local ecosystem is simple and the waterway navigation is at low frequency so the impact will not be significant. At the same time, construction activities take place in dry season, construction time is short.. The impact is low, short term, in small scale and can be mitigable by suitable methods.

3. Impacts of solid wastes

➤ **Construction solid wastes**

Construction solid waste is mainly debris from demolition of old works, cleared plants, excavated land, pieces of irons, steels...at the site. Solid wastes as concrete are generated from the demolition and some dykes broken by the flooding in 2016 such as embankment of Quang dam, Hoi Son lake, La Tinh river; construction of Can river, Thang Cong, Dai An and Truong Giang embankments and 5 bridges. In addition, some embankments cause additional solid wastes as weathered surface soil. The volume of solid waste generated in each construction work is insignificant (range from 50 m³ - 500 m³) and scattered in 8 districts/townships in Binh Dinh province. If the amount of waste is not collected, leaving litter will affect local transport, affecting the landscape, surface water resource at locality when it rains. However, this amount of solid waste is collected and transported to local waste areas. This impact is considered moderate and can be mitigated.

➤ **Domestic solid wastes**

There are 30 - 50 people working at each construction site of the subproject and the total volume of domestic solid waste is 15 – 25 kg/day for each work item (Generated level of a worker per day is 0.5kg/person/day). 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.

➤ **Hazardous wastes**

Hazardous wastes at each construction site mainly are drag with welding rod head, grease, oil containers and chemicals from the process of maintenance, changing grease of equipment. The wastes are infrequent and insignificant (from 3-5kg/month at each construction site). For rehabilitation of large damages, equipment maintenance will be bought to local reparation and maintenance centers by the contractor. 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.

4. 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 (18 embankments); (ii) pile driving or precast pile boring for construction of bridge pillar/abutment with depth approximately 20m (05 bridges); (iii) excavation of organic soil layer for construction of road base, with depth of 0.5m from the ground (03 roads). 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.

5. Transport interruption

Construction and upgrading of 05 bridges, 03 roads will affect road traffics in the subproject site. At 05 bridges, the transportation will be interrupted in about 10-12 months because of construction activities (about 800 households are affected when moving. Upgrading of 03 roads will cause difficulties in travelling of people and students to school and good transportation activities (about 3,000 households are affected when moving). This will cause troubles for community due to change in transport direction and will increase traffic pressure for neighboring areas.

However, traffic density in construction site of bridges and roads is not high. Besides, for each bridges and roads, a temporary road and bridge will be arranged and successive construction methods are applied to reduce traffic congestion. 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.



Figure 2: Transport current status at some works locations

6. Social impacts

➤ **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 and disruption of existing public services may arise.

Construction of work items will mobilize up to 30 - 50 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. These impacts may occur in communes of My Chanh, Cat Minh, Phuoc Son, Vinh Thanh, Nhon Phuc, Binh Dinh, Bok Toi. 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. However, these construction works are small and medium size, the labor force are small. At the same time, local labor for the construction will be taken advantage by the contractor. So that, level of social impacts medium and can be mitigated.

➤ **Safety and occupational health of workers**

Earthworks, loading and unloading materials, operation of construction plants such as excavators, cranes, trucks, welders, and concrete mixers all have potential accident risks or pollution affecting workers if there are no control measures. The storage and usage of fuels such as power, gas, and petrol contains accident risks related to electrical shock, fire, explosion, leakage etc., and pollution which will affect the health and safety of workers.

There is safety risks associated with working at construction sites with various types of materials and machines, equipment, and with many vehicles passing by. Other site risks (such as downing risk) include working at rivers while construction embankments and bridges. In addition, weather factors need to be taken into account during construction such as high temperature in the summer when the outdoor temperature may reach 38-40°C that can also cause health risks to the workers. In conclusion, the risk level of these social impacts is assessed as medium and can be mitigated.

7. 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 38⁰C - 40⁰C).
- 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 peole 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 incidents and the levels of impact.

➤ **Welding**

Welding creates an extremely bright and intense light that may seriously injure a worker's eyesight. In extreme cases, blindness may result. Additionally, welding may produce noxious fumes to which prolonged exposure can cause serious chronic diseases. Workers are mainly affected by the impacts. Construction sites of bridges as Trang, Dich Nghi, Phu Son, Suoi San and Bu Nu will suffer from the impacts. However, this impact is small and can be mitigated because the residential areas are far from the sites with small volume of traffic activities and that welding activities are assessed to be minor, local and infrequent.

➤ **Short-circuit and electric shock**

Construction activities may cause risks of short-circuit affecting worker's and local people's health and their assets. Temporary power supply system for machines and equipment during construction can cause problems of short-circuit, electric shock, etc., leading to economic damage and labor accidents for workers. The impact level is considered moderate.

➤ **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. Increased incidence of communicable and vector-borne diseases attributable to construction activities represents a potentially serious health threat to the subproject personnel and residents of local communities. Communicable diseases pose a significant public health threat worldwide. Health hazards typically associated with activities are those relating to poor sanitation and living conditions, sexual transmission and vector-borne infections. Communicable diseases of most concern during the construction phase due to labor mobility are sexually-transmitted diseases (STDs), such as HIV/AIDS.

Since the construction period is 10 - 12 months and the number of workers is about 30 - 50 workers, the impact is considered low.

4.3.2. Site-specific impacts

➤ **Impacts on water environment**

10 newly built embankments and 05 rebuild bridges need to be excavated and backfilled with a large amount of soil (including works no 1, 3, 7, 9, 10, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23). The excavation and backfilling for reinforcement of the embankments, abutments and piers contribute to the increase in suspended solid wastes which are swept away towards the downstream. Besides, runoff may sweep pollutants at the site (construction materials, soil, sand, grease and waste, etc.) to aquatic areas (Kon river, La Tinh river, Can river, Cut river, Queo river, Dai An river, Ta Dinh stream, etc), causing water pollution. This increases the suspended substance in water source, affecting the aquatic life of the aquatic fauna and flora at the subproject. However, there are no endemic animals and plants that need protecting. The excavation and activities take place during the dry season when the flow in the river is the lowest. The impacts only happen during construction period which last about 10 - 12 months for each embankment and would stop by operation. The level of the impacts, therefore, is low to moderate, temporary and could be mitigated by good construction practices.



Figure 3: Surface water at the works location

➤ **Erosion, soil subsidence**

The current status river bank is natural earth banks. During the embankment process of Rivers, there will be risks on shore erosion and subsidence. 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. Works can be suffered from the risks including: 1, 3, 7, 9, 10, 13, 14, 15, 16, 17. For convenience and safety, the contractor should focus the construction in dry season because there will be much less rainfall during dry months. In addition, geological, hydrological and hydraulic conditions in the surrounding area of the embankment work need to be surveyed thoroughly during the work design and preparation. These impacts are localized, short term and avoidable via appropriate design and good construction practices. This impact is assessed at moderate.

The embankment process of Rivers or construction of abutment and piers of bridges 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, bridges. Almost, the land acquisition for the construction of the embankment, bridges and adjacent operational roads will be carried out beyond the area of influence (about 10 m distant from the embankment). However, cracked infrastructures of the following works should be taken consideration: embankment of (5) La Tinh river (6) Can river (12) Truong Giang, (14) Kone river (15) Kon river in Vinh Thanh town, (16) Cut river and (17) Phu Ngoc. Thus, the impact magnitude is low and mitigable though proper construction methods for each location.



Figure 4: Landslide status at some embankments

➤ **Impact on waterway traffic activities on the rivers**

During 10 - 12 month of construction, although work items are implemented in a sequencing manner, there will be certain impact to waterway transportation such as obstructing waterway or narrowing width of waterway transport. The works of (1) embankment of La Tinh river section from Vinh Thanh village to Thai Phu village, (7) Thu Tinh embankment and (14) Kon river embankment, section in Lai Nghi village have navigation activities but the flow rate and the transportation frequency is low. Waterway transport activities are transportation of agricultural products with small boats. Thus, this impact is assessed at small level. The mitigation can be made through the collaboration with the local waterway management unit to provide necessitate information on alternative traffic routes for boats.



Figure 5: Transport current status at Thu Tinh embankment

➤ **Impact on agriculture land**

670 households under 11 embankments are affected with agricultural land (cultivation of rice and crops). 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. Construction waste and domestic waste that are not regularly collected can cause sedimentation of agricultural areas. Gathering of raw material at incorrect locations affects the access of local people to farming areas. Uncontrolled emissions will directly affect cultivated households. At the same time, excavation and backfilling of embankments can deteriorate the turbidity of water, affecting irrigation. The impact can be small as it is localized and will cease upon the completion of construction work (short construction time: 10-12 months), at the same time, amount of waste, waste water generated at each construction site is not large and is daily collected. Plans for excavation and backfilling, construction will be notified to affected households and will not be constructed at the time of water collection for irrigation.



Figure 6: Current status of agricultural production

➤ **Impacts on aquaculture**

Aquaculture (mainly shrimp culture) is developed in La Tinh downstream embankment and Lac Moi embankment. About 125 households in My Chanh and My Thanh are affected with land and asset on land by works construction. Activities: (i) embankment construction will

interrupt the water supply for the aquaculture areas; (ii) construction and domestic activities may absorb into aquaculture areas; (iii) Solid waste from the construction activities such as excavation and backfilling, wastes swept by stormwater may be run to aquaculture areas (iv) surface water quality may be contaminated that can't supply to aquaculture (high content of suspended solid).

The impacts are assessed at low and controllable because the construction is mainly taken placed in dry season within about 10-12 months, and only within the construction site. Additionally, solid waste from the construction period, domestic waste from the camps will be managed and collected daily by the construction contractor.



Figure 7: Current status of agriculture

➤ **Impact on groundwater quality during the drilling process**

Piling or drilling activities at the distance from 8-13m in the construction sites of Trang bridge, Dich Nghi, Suoi San, Phu Son and Bu Nu may affect the underground water because:

- Once going through the shallow water aquifers (12 ÷ 20 m), part of the pile body with bentonite containing additives, will be submerged in the water aquifer complex. Bentonite with potentially toxic additives will seep into this complex and intrude into water vessels carrying pollutants from the pile.
- During construction, contaminated surface water will overflow in gaps between the casing and the hole drilled underground. When penetrated, dirt can contaminate the groundwater.

The impacts are assessed at low level because the vast majority of bentonite volume is gathered to reduce impacts on surface water and underground water. In addition the pile driving activities are only carried out in dry season when the water volume and river water use demands are low, short-term (about 1-2 weeks) and local at the construction site.

➤ **Transport interruption**

The impact will end right after completion of the work. The embankment of Thang Cong 2, Nhon Phuc commune will affect the road transportation at the project areas because the embankment is part of the Provincial Road 636B connecting between An Nhon Township and Tay Son district. At the area, transport, material transportation will be interrupted about 10-12 months because of construction activities. These impacts are assessed to be moderate as temporary roads will be arranged to ease the traffic jams. At the same time some vehicles will travel through NH 19 (15km farther in comparison with the road through the construction site)



Figure 8: Current status at the embankment of Thang Cong 2

➤ **Disruption of business activities**

There are 06 households affected with business activities because of Kon river embankment in Vinh Thanh town (households have café business). Besides being a safety risk, noise and dust from road construction activities and equipment might temporarily disrupt business activities (10 - 12 construction months). The contractor should take caution on this matter to avoid accidents and dust impacts to the shops.

Besides negative impacts, there will be positive impact because this affected household can sell goods to construction workers (about 30 – 50 workers), promoting goods consumption. When the embankment is completed, this household will be direct beneficiary. Therefore, the impact on this trading household is minor, local, short-term and mitigable.



Figure 9: Current status of business production at Vinh Thanh town's embankment

➤ **Impact on Ethnic Minority**

Living and earning activities of Ba Na Peoples are affected by land acquisition: for construction of Ta Dinh and Xem stream embankments in Vinh Thuan commune, Vinh Thanh district. There are 150 Ba Na Peoples households will be affected but there is no household must be relocated.

Construction process can generate negative environmental impacts like dust, noise.... Impacts on transport during construction period: The construction affects the travel need of people, especially students go to schools in Ba Na People communities. Besides, HIV/AIDS, drug use, infectious diseases, environmental pollution, violence may increase due to conflicts of workers during construction. During construction time, many workers come and stay in the local, thus the social problems may occur, affecting local security. Ba Na young peoples are particularly at risk.



Ba Na People

Impacts on Ba Na ethnic minorities people in the subproject area is considered insignificant and can be minimized, as: (i) 150 households are only affected with agricultural land and assets on land; (ii) without occupying residential land; (iii) none of household have to relocate; (iv) only 11 households are severely affected by losing 10% or more of productive land area. At the same time, the RPF, EMDF, RAP, and EMDP have been developed to ensure adequate compensation for affected people.

➤ **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, including the inconvenience of access of the people when they want to visit these places; emissions and dust may become a nuisance to the local residents and cultural activities; risks of traffic safety and work related accidents. The survey showed that the subproject construction may not only affect the workers and the neighboring community but along the road of transporting raw materials, some sensitive receptors should be also noted. The impact level is assessed to be medium, temporary and possibly minimized. Details of subjects within radius of 200m surrounding the Subproject site is described as follows:

Table 17: Impacts on sensitive receptors

| TT | Sensitive receptors | Location/ Description | Impacts |
|----|--|--|---|
| 1. | Kindergarten in An Xuyen 3 village  | <ul style="list-style-type: none"> - Located in the end of the embankment of La Tinh river basin, about 10m away from the work. - The Kindergarten serves for about 50 children in An Xuyen 3 village and surrounding villages. - The Kindergarten time of the child is within days in the week, starting time: 7h-8h and ending time 16h30 - 17h30. | <ul style="list-style-type: none"> - Dust, noise, vibration and emissions by trucks and machines. - Impact on living activities officers and pupils - Traffic safety risk. - Impact on health of students and staff due to uncollected garbage and domestic waste water. - Impact on activities of recreation and entertainment of students. |
| 2. | Pump station for agricultural activities in Binh Nghi commune  | <ul style="list-style-type: none"> - Located at the beginning of the embankment of Lai Nghi village, (the Embankment No. 14), about 5 meters from the construction site. - The capacity of 0.2 m³/s. The pump station takes water directly from the Kon River to irrigate the rice paddies of Lai Nghi village (about 50ha) - The pumping station intermittently operates as they depend on the seasons, mainly in the dry season (from January to August). The operation frequency is about 7 days to timely catch up with the crop progress. | <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. - Impact on water supply period for agricultural activities. - Potential risk for landslides, erosion during the construction process. |

| TT | Sensitive receptors | Location/ Description | Impacts |
|----|--|--|---|
| 3. | Ancestral temple in Binh Nghi commune  | <ul style="list-style-type: none"> - Located in the middle of the embankment in Lai Nghi village, about 10m away from the site. - The area of the work is about 1,000 m². - The worship is mainly in the lunar 1st and 15th of the months, festivals and Tet. There is only 1 day of ancestor worship (the descendants of the family are crowdedly gathered together) | <ul style="list-style-type: none"> - Dust, noise and air pollution caused by means of transportation - Obstructing local people's access to ancestral temple. - Risk of community conflict. |
| 4. | Tay Phu 1 Primary school  | <ul style="list-style-type: none"> - Located near Cut river, about 5m away from the work. The Primary School lies next to the road for transportation of materials to the construction site. - The school campus is about 2,500m²; there are 15 classes, more than 30 teachers and 500 students. - The school time of students is within days in the week, about 6h30 – 7h30, 11h-12h, 13h-14h and 16h30-17h30. | <ul style="list-style-type: none"> - Dust, noise and emissions by trucks and machines. - Impact on living activities officers and pupils - Traffic safety risk - Impact on health of students and staff due to uncollected garbage and domestic waste water. - Impact on activities of recreation and entertainment of students. |
| 5. | Sac Tu Tay Thien Pagoda  | <ul style="list-style-type: none"> - Located near the embankment in An Nhon commune, in the area near the beginning of the work. - The area of the temple is about 3,000m². - Buddha worshipping activities are in the lunar 01st and 15th. Additionally, there some special days of worshipping. | <ul style="list-style-type: none"> - Dust, noise and air pollution caused by means of transportation - Obstructing local people's access to pagoda. - Risk of community conflict. |
| 6. | An Nhon amusement park  | <ul style="list-style-type: none"> - Located near the embankment in An Nhon commune, in the area in the middle of the work. - The area of the station is about 4,500 m². - The work is about being put into operation and is water entertainment types, serving for a large number of residents in An Nhon commune, especially in hot weather days. - Opening hours: 8h to 20h all days of the week, estimated number of people: 200 people per day | <ul style="list-style-type: none"> - Dust, noise and emissions by trucks and machines. - Obstructing local people's access to amusement park. - Traffic safety risk |

| TT | Sensitive receptors | Location/ Description | Impacts |
|----|--|---|--|
| 7. | Binh Dinh station  | <ul style="list-style-type: none"> - Located near the An Nhon township embankment, about 10m away from the embankment in Binh Dinh ward, An Nhon township. - S = 10,000 m², used for goods storage and transportation. | <ul style="list-style-type: none"> - Dust, noise and emissions by trucks and machines. - Traffic safety risk. |
| 8. | Ngo May high school  | <ul style="list-style-type: none"> - Located in the side of the PR 635 and about 300 m away from the beginning of the route. - S = 3,500m², with 30 classes, 50 teachers and more than 1.000 students. - School time is all days of the week, starting hour and ending hour 6h30 - 7h30, 11h - 12h, 13h - 14h and 16h30 - 17h30. | <ul style="list-style-type: none"> - Dust, noise and emissions by trucks and machines. - Impact on living activities officers and pupils - Traffic safety risk - Impact on health of students and staff due to uncollected garbage and domestic waste water. - Impacts on activities of recreation and entertainment of students. |
| 9. | Cat Tuong CPC's Head Office  | <ul style="list-style-type: none"> - Located in the position of 100m away from the PR 635 and 1.5km away from the end of the route. - There are about 25 officers working for Cat Tuong CPC and around 100-200 residents/day need to implement administrative procedures. - Cat Tuong CPC works in days within the week (except Saturdays, Sundays and holidays) to deal with socio-economic issues for about 16,975 people in 9 villages. | <ul style="list-style-type: none"> - Obstruct people's approach to the CPC; - Cause dangers to people; - Increase dust, noise, vibration and waste; - Disturb community meeting/ activities. - Traffic safety risk |

4.4. Impacts in 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:

➤ Positive impacts

As 18 embankment works of the sub-project put into operation, contributing to the protection of agricultural land area, houses, transport works and public works and so on, contributing to economic development and stabilizing the life of local people and ensuring sustainable growth, minimizing the negative impacts of natural disasters, flood.

Operation of 05 bridge works and 03 road works will contribute to improving traffic conditions, increasing accessibility to public services, promoting the development of commodity economy in the region, contributing to economic development of the locality.

➤ **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 05 bridges and 03 roads**

Road safety is likely to be the key impacts during operation of *Trang, Dich Nghi, Suoi San, Phu Son, Bu Bu* Bridges and PR.635, PR.639, PR.639B 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.

5. IMPACT MITIGATION MEASURES

5.1. Measures to be integrated into the detailed technical design

The embankment of Kon river, La Tinh river, Can river, Cut river, Queo river, Dai An river, Ta Dinh stream are 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 18 embankments, 05 bridges and 03 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 signsto ensure traffic safety pursuant to the standards, slop stabilization 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 nergy-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 26 work items is 34,861,000,000 VND, equivalent to 1,535,000 USD.

Table 18. The estimated cost for the RAP of Binh Dinh subproject

| TT | Items | VND |
|----|--------------------|-----------------------|
| 1 | Land | 15,714,460,000 |
| 2 | Works, structures | 568,827,000 |
| 3 | Trees, crops | 516,088,400 |
| 4 | Type of allowances | 15,780,880,000 |
| 5 | Management cost | 2,280,617,878 |
| 6 | Cost for IRP | 571,200,000 |
| | Total | 34,860,873,278 |
| | Round | 34,861,000,000 |
| | USD | 1,535,000 |

There are 07 households in 03 communes of My Chanh, Cat Minh and Binh Nghi to be displaced. Following mitigation measures will be taken: (i) on-spot resettlement, (ii) compensation, support for impacts on residential land, (iii) supporting costs for moving, (iv) supporting costs for life stabilization, (v) supporting costs for procedures relating to land use documents. Besides, displaced households will participate in programs on livelihood recovery, concessional loan, etc. Details about mitigation measures will be provided in RAP of the subproject.

The estimated cost for land clearance and resettlement is calculated based on provisions set by People Committee of Binh Dinh 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 RAP of the subproject.

➤ Mitigation of UXO Risks

The subproject owner (PMU) will sign a contract with the military civil engineering agency or Binh Dinh Provincial Military Base for UXO detection and clearance at the construction sites. Unexploded ordnance must be cleared prior to construction activities. The order of steps to clear mines and explosives must be strictly carried out. Ensure that activities taking place at the construction site locations will be implemented after the PMU has confirmed that the work's unexploded ordnance has been demolished.

Unexploded ordnance is implemented following the steps:

- Determine UXO areas
- Clear the ground
- Detect by detector with a depth of 0.3m
- Mark, check and signal processing to a depth of 0.3m
- Detecting by bomb detector to 5m depth (placed at high sensitivity level)
- Digging, testing and signal processing to a depth of 3m

- Digging, testing and signal processing to a depth of 5m

Notes: When detecting UXO at fields, ponds with a depth of less than 0.5m, it should create bank and drain water, then detection of mines and unexploded ordnance in order not to leave them out. In case exploded ordnance is implemented on terrestrial area, it should place warning signs, arrange guard forces to prevent people, animals and vehicles from crossing the construction site to avoid accidents.

Collection, classification, transportation management and disposal of exploded ordnance is detected in accordance with the safety standards on preservation, transportation and use of explosive materials as Standard of Vietnam 02: 2008 / BCT National Technical Regulation on safety in preservation, transportation, use and destruction of industrial explosive materials, the regulations on explosion by the Engineering Command, and other current regulations.

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) Restoration of affected areas (9) Worker and public Safety; (10) Communication with local communities about subproject environmental issues; (11) Health and Safety for workers and the public; (12) Chance finding procedures, (13) Fire hazard due to accident.

Table 19: 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: National technical regulation on ambient air quality - 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; - It is not allowed to burn 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: National technical regulation on ambient air quality - 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 | <ul style="list-style-type: none"> - QCVN 26:2010/BTNMT: National technical regulation on noise - QCVN 27:2010/BTNMT: National technical regulation on vibration | Contractor | PMU, CSC |

| Environmental and social issues | Mitigation measures | Applicable National Regulations, Standards | Responsibility | |
|---------------------------------|--|--|----------------|-------------|
| | | | Implementation | Supervision |
| | <ul style="list-style-type: none"> silencers, mufflers, acoustically dampened panels or placement of noisy machines in acoustically protected areas. Avoiding or minimizing transportation through or processing material in community areas (like concrete mixing). | <ul style="list-style-type: none"> EHS Guidelines | | |
| 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: National technical regulation on domestic wastewater | 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 must 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 | <ul style="list-style-type: none"> Decree No. 38/2015/ND-CP on solid waste management EHS Guidelines | Contractor | PMU, CSC |

| Environmental and social issues | Mitigation measures | Applicable National Regulations, Standards | Responsibility | |
|---------------------------------|---|---|----------------|-------------|
| | | | Implementation | Supervision |
| | <p>facilities.</p> <ul style="list-style-type: none"> - 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 environment and sanitation companies. - 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. - PMU, CSC and 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 | <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 |

| Environmental and social issues | Mitigation measures | Applicable National Regulations, Standards | Responsibility | |
|---|---|--|----------------|----------------------------|
| | | | Implementation | Supervision |
| | 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. | | | |
| 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 construction plan before approved. Routings, especially of heavy vehicles, need to take into account sensitive sites such as schools, hospitals, and markets. - 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"> - Law on traffic and transport No. 23/2008/QH12; - 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 | Contractor | PMU, CSC |
| 8. Restoration of affected areas | <ul style="list-style-type: none"> - Temporary acquired areas to make warehouse, cable pulling site, etc. are used for a short period of time, site facilities, workers' camps, stockpiles areas, working platforms and any areas temporarily occupied during construction of the subproject works must be restored using landscaping, adequate drainage. - All affected areas must be landscaped and any necessary remedial works shall be undertaken without delay. These works may be green-spacing, roads, bridges and other works to original existing etc. - Soil contaminated with chemicals or hazardous substances must be | <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 | Compliance reported by CSC |

| Environmental and social issues | Mitigation measures | Applicable National Regulations, Standards | Responsibility | |
|---|---|---|----------------|-------------|
| | | | Implementation | Supervision |
| | removed and transported and buried in waste disposal areas in accordance with regulations; - Restore all roads caused by the subproject activities to their original state or better. | | | |
| 9. 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 warning signs, lighting system against traffic accidents as well as other risk to people and sensitive areas | <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 |
| 10. 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, | <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 issues | Mitigation measures | Applicable National Regulations, Standards | Responsibility | |
|---|---|--|----------------|-------------|
| | | | Implementation | Supervision |
| | <p>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;</p> <ul style="list-style-type: none"> - 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. | | | |
| 11. Health and Safety for workers and the public | <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. | <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: | Contractor | PMU, CSC |

| Environmental and social issues | Mitigation measures | Applicable National Regulations, Standards | Responsibility | |
|---------------------------------|--|--|----------------|-------------|
| | | | Implementation | Supervision |
| | <ul style="list-style-type: none"> - 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) must 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. - Install night lights system when carrying out construction activities at night. - Locate noise-generating sources and concrete mixing plants far enough from and downwind of residential areas and camps. - 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. | <p>Technical regulation on safety in construction</p> <ul style="list-style-type: none"> - EHS Guidelines | | |

| Environmental and social issues | Mitigation measures | Applicable National Regulations, Standards | Responsibility | |
|---|---|--|--|-------------|
| | | | Implementation | Supervision |
| | <ul style="list-style-type: none"> - 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. - | | | |
| <p>12. 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 must 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 would require a preliminary evaluation of the findings to be performed. The significance and importance of the findings must be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values; - Decisions on how to handle the finding must be taken by the responsible | <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. | <ul style="list-style-type: none"> - Contractor, supervising consultant cooperates to implement - Cultural Information Department - Contractor, Owner and local Authority | PMU, CSC |

| Environmental and social issues | Mitigation measures | Applicable National Regulations, Standards | Responsibility | |
|--|--|--|----------------|-------------|
| | | | Implementation | Supervision |
| | 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; <ul style="list-style-type: none"> - 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 Subproject's Owner will need to make necessary design changes to accommodate the request and preserve the site; - Decisions concerning the management of the finding must 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. | | | |
| 13. 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 20 presents site-specific impacts and mitigation measures for each work item of Binh Dinh 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.

➤ **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 must 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 project, 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;

Provide warning signs at dangerous areas, for example, underflows, erosion points, or deep excavation;

Specified safety equipment such as lifebuoys are 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 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:

Table 20: Site-specific mitigation measures in the construction phase

| Site-specific impacts | Specific mitigation measures | Responsibility | Supervised |
|--|--|----------------|------------|
| Impacts on water environment (10 new embankments and 05 bridges) | <ul style="list-style-type: none"> - The dredging operation is conducted only during the dry season; - Create sedimentation traps and maintain them periodically to ensure that most solids in surface runoff are retained in the traps before entering the existing drains or water sources surrounding the sites; - Leachate from sediments must be first deposited in sedimentation hole/trap before entering the river. - Strictly prohibit contractors to discharge waste into river - Collection of redundancy material on site is implemented daily. Upon forecasted stormy weather, suspend all the construction activities, tidy up the sites, brace and protect the materials and construction machines. - Do not gather construction materials as well as machinery and equipment near the river. Gathering small | Contractor | PMU, CSC |

| Site-specific impacts | Specific mitigation measures | Responsibility | Supervised |
|---|---|----------------|------------|
| | quantities of materials, fit with the schedule. Materials must be covered with tarpaulin, avoiding the upwind location, near the river. - Strictly prevent hazardous waste, waste oils or particularly greasy rags from entering the flow. | | |
| Erosion, soil subsidence (10 new embankments and 05 bridges) | <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. - Ensure that land acquisition and house relocation at the site boundary is completed prior to commencing construction work. - Use appropriate construction methods with each construction site location, it should pay attention to works locations: (5) La Tinh river downstream embankment, (6) Can river embankment, (12) Truong Giang river embankment, (14) Kone river embankment, Lai Nghi hamlet, (15) Kone river embankment, Vinh Thanh town, (16) Cut river embankment and (17) Phu Ngoc embankment. - 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. - 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 |
| Impact on waterway traffic activities on the Rivers (18 embankments and 05 bridges) | <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; - 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. - Place warning boards along the construction route, both on land and water surface (arrange the road and waterway traffic guide). | Contractor | PMU, CSC |
| Impact on agriculture land and aquaculture (18 embankments) | <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. | Contractor | PMU, CSC |

| Site-specific impacts | Specific mitigation measures | Responsibility | Supervised |
|--|---|----------------|------------|
| | <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. | | |
| Impact on groundwater quality during the drilling process (05 bridges) | <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; - 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. - Place warning boards along the construction route, both on land and water surface (arrange the road and waterway traffic guide). | Contractor | PMU, CSC |
| Transport interruption (Thang Cong 2 embankment) | <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 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 | Contractor | PMU, CSC |

| Site-specific impacts | Specific mitigation measures | Responsibility | Supervised |
|--|--|----------------|------------|
| | sediment transfer site. | | |
| Disruption of business activities (06 households) | <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 |
| Impacts on EMs (Living of Ba Na Peoples) New construction of Ta Dinh and Xem stream embankment, Vinh Thuan commune. | <ul style="list-style-type: none"> - To mitigate impacts on the Ba Na people communities and to maximize benefits for the community, an Ethnic Minority Development Plan (EMDP) was prepared for Binh Dinh subproject. The main content of this EMDP is summarized below. - Living and earning activities of Ba Na peoples are affected by land acquisition: Design for limiting land acquisition by social assessment survey, consultation with Ba Na peoples and reasonable compensation for affected households. - Supply information about subproject components and summarize decisions of Ba Na peoples through confirmation of the subproject. - Raise awareness of contractors, workers and Ba Na peoples of social problems and protection measures HIV/AIDs, drug use, infectious diseases, environmental pollution, violance increased due to conflicts of workers during construction. - Monitoring environmental protection during construction. | Contractor | PMU, CSC |

➤ **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 21.

Table 21: Impact mitigation measures on sensitive receptors at the construction site

| TT | Sensitive receptors | Impacts | Specific mitigation measures | Responsibility | Supervised |
|----|---|---|--|----------------|------------|
| 1. | Kindergarten in An Xuyen 3 village  | <ul style="list-style-type: none"> - Dust, noise, vibration and emissions by trucks and machines. - Impact on living activities officers and pupils - Traffic safety risk. - Impact on health of students and staff due to uncollected garbage and domestic waste water. - Impact on activities of recreation and entertainment of students. | <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. - 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: 7h00-8h00; 16h30 - 17h30). | - Contractor | - PMU, CSC |
| 2. | Pumping station for agricultural activities in Binh Nghi commune  | <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. | <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 water collection points of Pumping station. - Regularly check the affected on-field Pumping station to ensure they are not blocked by construction spoil or waste and if they are affected, provide alternative water collection points from Kon river to the locations the local people request. - Immediately rehabilitate water collection points if they are | - Contractor | - PMU, CSC |

| TT | Sensitive receptors | Impacts | Specific mitigation measures | Responsibility | Supervised |
|----|--|--|--|----------------|------------|
| | | <ul style="list-style-type: none"> - Impact on water supply time for agricultural activities. - Potential risk for landslides, erosion during the construction process. | <ul style="list-style-type: none"> - 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. | | |
| 3. | <p>Ancestral temple in Binh Nghi commune</p>  | <ul style="list-style-type: none"> - Dust, noise and air pollution caused by means of transportation - Obstructing local people's access to ancestral temple. - Risk of community conflict. | <ul style="list-style-type: none"> - Inform the pagoda manager of the detailed construction schedule, activities, and associated impacts at least one month before start of the construction. - Prepare a proper construction schedule to avoid negative impact on the pagoda activities. - Stockpile of construction materials, storage of wastes and maintenance of construction equipment and machineries must be in places not affecting access to the pagoda. - Contractors will implement measures to mitigate dust, noise and vibration impacts on the pagoda as agreed with the pagoda manager. - Worker camps must be located at least 200 meters far from the pagoda. - Workers are required to have a good behavior with local culture and respect for local belief | - Contractor | - PMU, CSC |
| 4. | <p>Tay Phu 1 Primary School</p>  | <ul style="list-style-type: none"> - Dust, noise and emissions by trucks and machines. - Impact on living activities officers and pupils - Traffic safety risk - Impact on health of students and staff due to uncollected garbage and domestic waste water. | <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 | - Contractor | - PMU, CSC |

| TT | Sensitive receptors | Impacts | Specific mitigation measures | Responsibility | Supervised |
|----|--|--|--|----------------|------------|
| | | <ul style="list-style-type: none"> - Impact on activities of recreation and entertainment of students. | <ul style="list-style-type: none"> school. - 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 6h30 - 7h30, 11h - 12h, 13h - 14h and 16h30 - 17h30). | | |
| 5. | <p>Tay Thien Ancestral temple (Pagoda)</p>  | <ul style="list-style-type: none"> - Dust, noise and air pollution caused by means of transportation - Obstructing local people's access to pagoda. - Risk of community conflict. | <ul style="list-style-type: none"> - Inform the pagoda manager of the detailed construction schedule, activities, and associated impacts at least one month before start of the construction. - Prepare a proper construction schedule to avoid negative impact on the pagoda activities. - Stockpile of construction materials, storage of wastes and maintenance of construction equipment and machineries must be in places not affecting access to the pagoda. - Contractors will implement measures to mitigate dust, noise and vibration impacts on the pagoda as agreed with the pagoda manager. - Worker camps must be located at least 200 meters far from the pagoda. - Workers are required to have a good behavior with local culture and respect for local belief | - Contractor | - PMU, CSC |
| 6. | <p>An Nhon entertainment area</p>  | <ul style="list-style-type: none"> - Dust, noise and emissions by trucks and machines. - Obstructing local people's access to amusement park. - Traffic safety risk | <ul style="list-style-type: none"> - Notify amusement area management unit on construction activities, potential impacts such as emissions, dust, and noise, transport, and construction progress at least 2 weeks prior to commencement of construction. - Equipped with signposts, instruction signs around the amusement park. - Spray enough water to suppress dust during dry and windy days at least two times a day on the route. - Arrange traffic guide workers in the process of transporting construction materials and waste during the operation of the | - Contractor | - PMU, CSC |

| TT | Sensitive receptors | Impacts | Specific mitigation measures | Responsibility | Supervised |
|----|---|---|--|----------------|------------|
| | | | amusement area. - The drivers should limit use horns when moving through the An Nhon amusement area | | |
| 7. | Binh Dinh station  | - Dust, noise and emissions by trucks and machines. - Traffic safety risk. | - Inform the Binh Dinh station 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, especially speed limit sign when coming across Binh Dinh station - 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 Binh Dinh Station. | - Contractor | - PMU, CSC |
| 8. | Ngo May High School  | - Dust, noise and emissions by trucks and machines. - Impact on living activities officers and pupils - Traffic safety risk - Impact on health of students and staff due to uncollected garbage and domestic waste water. - Impact on activities of recreation and entertainment of students. | - 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. - 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 6h30 - 7h30, 11h - 12h, 13h - 14h and 16h30 - 17h30). | - Contractor | - PMU, CSC |
| 9. | Cat Tuong CPC | - Obstruct people's approach to the CPC; | - Inform the CPC of the construction activities and their potential impacts such, waste, dust, and noise, traffic, and construction | - Contractor | - PMU, CSC |

| TT | Sensitive receptors | Impacts | Specific mitigation measures | Responsibility | Supervised |
|----|---|---|--|----------------|------------|
| |  | <ul style="list-style-type: none"> - Cause dangers to people; - Increase dust, noise, vibration and waste; - Disturb community meeting/ activities. - Traffic safety risk | <ul style="list-style-type: none"> - 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 CPC 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 CPC. - Do not load construction materials within 20m from the CPC 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 CPC. | | |

5.4. Mitigation measures during operation phase

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

Table 22: Specific impact mitigation measures description

| Site-specific impacts | Specific mitigation measures | Person in charge | Monitoring unit |
|--|--|--------------------------------|--------------------------------|
| Incident of falling into rivers, streams, drowning on Kon river, La Tinh river, Can river, Cut river, Queo river, Dai An river, Ta Dinh stream | <ul style="list-style-type: none"> - 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 18 embankments, 5 bridges and 3 roads | <ul style="list-style-type: none"> - 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 | <ul style="list-style-type: none"> - 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 (Binh Dinh 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.

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

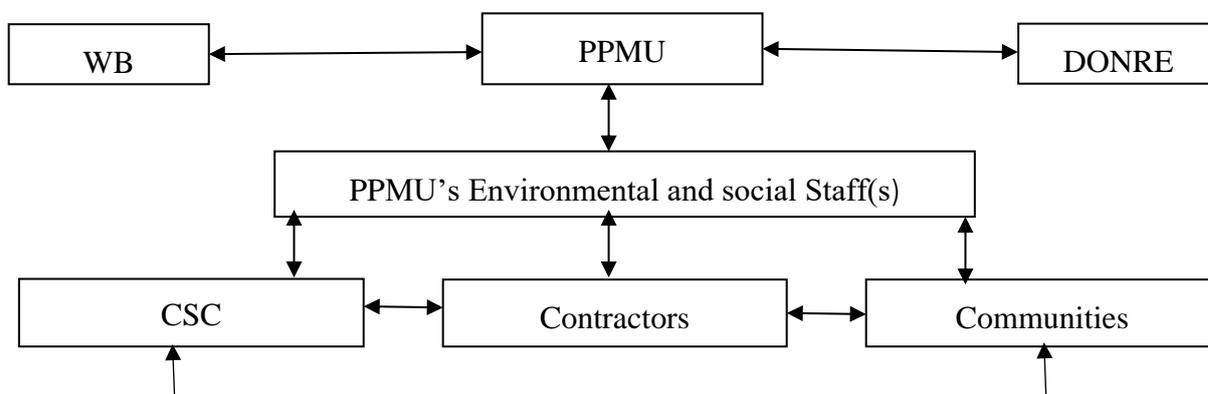


Figure 10: ESMP implementation structure

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 23: 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 | <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 |

| Community/ Agencies | Responsibilities |
|--------------------------------------|---|
| Consultant (CSC) | <p>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.</p> <ul style="list-style-type: none"> - The CSC will also assist the PPMU in reporting and maintaining close coordination with the local community. |
| 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 Safety and Environment Officer (SEO) 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. |
| Binh Dinh 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 must 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; and

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.

Table 24: 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 |

| No. | Report Prepared by | Submitted to | Frequency of Reporting |
|-----|---|--------------|--|
| | | | 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 and social monitoring program

Implementation plan of monitoring program is divided into 2 phases: Design phase is the preparation phase; 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. 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 are submitted PPMU 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 plan

➤ Monitoring of compliance with mitigation measures

Compliance monitoring will be done regularly by PPMU and its construction supervision consultant (CSC). PPMU and its CSC will be responsible for daily monitoring contractor's compliance with agreed mitigation measures. Results will be reflected in the monthly progress reports.

Local authority and community will be undertaking the monitoring task in accordance with the GoV's regulations, i.e. Decree 80/2005/ND-CP - Regulation on community's investment monitoring.

In addition, contractors' ES officer will be responsible for daily monitoring labor safety and environmental hygiene on site and reporting to PPMU and CSC.

Detailed monitoring plan will be prepared during detailed design phase. The cost estimates for monitoring shall be included in the ESMP implementation cost.

➤ **Ambient Environmental Quality Monitoring**

Environmental quality monitoring is the most important task of environmental management. Environmental monitoring requires scientific methods, techniques, technologies, and organizations to aim at closely/systematically controlling and monitoring of changes in environmental quality. The ambient environmental quality monitoring will be carried out by the subproject owner/PPMU. Details are shown in the table below.

Table 25: Environmental Monitoring Plan during construction phase

| Environment | Location | Frequency | Parameters to be monitored | Applicable National Technical Regulations |
|--|---|---------------------|---|---|
| Air quality | In each construction site measure 01 locations (26 locations) | Every six-months | SO ₂ , CO, NO ₂ , TSP | QCVN 05:2013/BTNMT |
| Noise | Similar to air sampling locations | Every six-months | Equivalent noise (dBA) | QCVN 26:2010/BTNMT |
| Excavated soil | 01 locations within each site (26 locations) | Once | As, Cd, Cu, Pb, Zn, Cr | QCVN 03-MT:2015/BTNMT |
| Surface water quality | In each construction site measure 01 locations (26 locations) | Every three-month | pH, DO, COD, BOD ₅ , TSS, NO ₂ , NO ₃ , Total N, Total P, total Coliforms | QCVN 08-MT: 2015/BTNMT |
| Monitoring of erosion, subsidence, cracking | All construction sites | During construction | Monitoring excavation and backfilling locations | - |
| Monitoring of an environmental incident/risk | All construction sites | During construction | The event of an environmental incident (i.e. should there be accidental discharge of sewage to a water course or oil to an aquifer) | |

Proposed construction period: 10 – 12 months

➤ **Social monitoring plan**

Social monitoring plan during construction is showed in the Table 26 below:

Table 26: Social monitoring plan during construction

| No. | Form | Site | Frequency | Basis |
|-----|-----------------------|---|-------------------|--|
| I | Health monitoring | | | |
| 1 | Environmental hygiene | - Construction site - Worker camping area - Material mobilization areas | 3 months/ time | - Quantity and conditions of cleaning tools - First aid box |

| | | | | |
|---|--------------|---|-------------------|---|
| | | | | <ul style="list-style-type: none"> - Medical works - Number of infectious and contamination cases - Communication plan on community health |
| 2 | Labor safety | <ul style="list-style-type: none"> - Construction site - Worker camping area - Material mobilization areas | 3 months/ time | <ul style="list-style-type: none"> - 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 DEVELOPMENT AND TRAINING

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 27 below provides examples of the basic trainings for safeguards during subproject implementation. The training programs will be developed and delivered by the 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 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 sub subproject/contracts.
- *Training frequency:* The basic training programs proposed in Table 27 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 27. Training programs for capacity building on environmental supervision and management

| I. Objects | Provincial Subproject Management Unit (PPMU) |
|--------------------|---|
| 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 | - 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 |
| 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 Binh Dinh subproject is stated in the table below:

Table 28. Cost for samples and analysis during construction phase

| No | Name of analysis index | Unit | Quantity | Price (VND) | Sub-Total | |
|----|------------------------|------|----------|-------------|----------------------|-----|
| | | | | | (1 USD = 22,700 VND) | |
| | | | | | VND | USD |
| | | | | | | |

| No | Name of analysis index | Unit | Quantity | Price (VND) | Sub-Total | |
|----|------------------------|--------|----------|-------------|----------------------|---------------|
| | | | | | (1 USD = 22,700 VND) | |
| | | | | | VND | USD |
| 1 | Air, noise | sample | 52 | 2,000,000 | 104,000,000 | 4,581 |
| 2 | Surface water | sample | 52 | 3,500,000 | 182,000,000 | 8,018 |
| 3 | Soil | sample | 26 | 2,000,000 | 52,000,000 | 2,291 |
| 3 | Preparing report | Report | 2 | 15,000,000 | 30,000,000 | 1,322 |
| | TOTAL | | | | 368,000,000 | 16,211 |

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 29. Cost for capacity building training

| Training content | Trainee | Unit | Quantity | Price | Sub-Total (1 USD = 22,700 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 |
| Implementation of mitigation measures | CSC; construction engineers, site construction field manager, etc | course | 2 | 30,000,000 | 60,000,000 | 2,643 |
| 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 30. Cost for ESMP implementation

| Content | Items of Binh Dinh sub-project (USD) | Funded by |
|---|---|-------------------|
| (a) Mitigation during construction | As a part of the contract | WB |
| (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 | 16,211 | 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; the involvement was required during subproject preparation to some extent and regularly recommended as a part of implementation.

12.2. Time, location and number of participants

The sub-project is implemented in 26 communes/wards of Binh Dinh province. The subproject implementation will have local socio-economic and environmental impacts. Therefore, the subproject management unit chosen to carry out public consultation with representatives of mass 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 as follows:

Table 31: Community consultation process

| No. | Time | Location | Invested items under subproject | No of participants |
|-----|-----------|--------------------------|--|--------------------|
| 1. | 13/3/2017 | Office of Cat Tai CPC | Embankment of La Tinh river (Vinh Thanh – Thai Phu section) | 10 people |
| 2. | 13/3/2017 | Office of Cat Thanh CPC | Embankment of Quang dam downstream Chanh Hung embankment | 13 people |
| 3. | 03/4/2017 | Office of Cat Son CPC | Embankment of Hoi Son lake downstream Dich Nghi bridge | 14 people |
| 4. | 13/3/2017 | Office of My Chanh CPC | Embankment of La Tinh river downstream Can river embankment | 18 people |
| 5. | 13/3/2017 | Office of My Hiep CPC | Embankment of La Tinh river downstream | 12 people |
| 6. | 03/4/2017 | Office of Cat Minh CPC | Thu Tinh embankment | 18 people |
| 7. | 03/4/2017 | Office of My Thanh CPC | Lach Moi drainage embankment | 15 people |
| 8. | 04/4/2017 | Office of Nhon Phuc CPC | Thang Cong 2 embankment Phu Ngoc embankment | 15 people |
| 9. | 13/3/2017 | Office of Vinh Thuan CPC | Ta Dinh and Xem stream embankment | 17 people |
| 10. | 03/4/2017 | Office of Cat Nhon CPC | Dai An river embankment | 20 people |
| 11. | 04/4/2017 | Office of Phuoc Son CPC | Truong Giang embankment | 17 people |
| 12. | 14/3/2017 | Office of Binh Tan CPC | Queo river embankment | 14 people |
| 13. | 14/3/2017 | Office of Binh Nghi CPC | Embankment of Kon river (Lai Nghi section) | 14 people |
| 14. | 14/3/2017 | Office of Binh Hoa CPC | Embankment of Kon river (Lai Nghi section) | 15 people |
| 15. | 04/4/2017 | Office of Vinh Thanh CPC | Embankment of Kon river (Vinh Thanh section) | 18 people |
| 16. | 14/3/2017 | Office of Tay Phu CPC | Cut river embankment | 13 people |
| 17. | 04/4/2017 | Office of Binh Dinh CPC | Embankment of An Nhon township | 12 people |

| No. | Time | Location | Invested items under subproject | No of participants |
|-----|-----------|--------------------------|---------------------------------|--------------------|
| 18. | 04/4/2017 | Office of Cat Lam CPC | Trang bridge PR.639B | 15 people |
| 19. | 04/4/2017 | Office of Tam Quan CPC | Suoi San bridge | 20 people |
| 20. | 04/4/2017 | Office of Hoai Hao CPC | Phu Son bridge | 22 people |
| 21. | 04/4/2017 | Office of An Nghia CPC | Bu Nu bridge | 18 people |
| 22. | 03/4/2017 | Office of Ngo May CPC | PR.635 | 27 people |
| 23. | 03/4/2017 | Office of Cat Trinh CPC | PR.635 | 22 people |
| 24. | 03/4/2017 | Office of Cat Tuong CPC | PR.635 | 20 people |
| 25. | 03/4/2017 | Office of Hoai Huong CPC | PR.639 | 18 people |
| 26. | 03/4/2017 | Office of Hoai Thanh CPC | PR.639 | 19 people |

12.3. Method of public consultation

Meeting was held with the aforesaid respondents, including: The People's Committee of the Commune, Vietnam Fatherland Front, Veteran association, Women's association, Youth association, households to be directly affected by the subproject; PPMU and Consultant. 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.

12.4. 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 26 communes/ward are showed in Table 32.

Table 32. Public consultation results and feedback of the subproject owner

| Opinion of participants | PMU's feedback |
|--|---|
| 1. General opinions for all works items | |
| - 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, bridge and road 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 |

| Opinion of participants | PMU's feedback |
|---|--|
| | worker camp area. |
| <ul style="list-style-type: none"> - There should be place to gather materials, place for worker's accommodation. Workers should register temporary residence. | <ul style="list-style-type: none"> - Subproject owner will ask construction contractor to submit list of workers and register temporary residence with CPCs. |
| <ul style="list-style-type: none"> - Affected land area mostly is the riverbank land, so the resettlement is negligible. | <ul style="list-style-type: none"> - Compensation and support, resettlement will be implemented in accordance with Government policies and Binh Dinh province |
| <ul style="list-style-type: none"> - Subproject owner needs to apply mitigation measures for environmental protection during construction process like: watering for dust reduction, covering transport vehicles ... | <ul style="list-style-type: none"> - Subproject owner commits to strictly implement environmental protection measures as mentioned in the ESMP 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. |
| <ul style="list-style-type: none"> - Construction wastes after being collected need to be transported to leveling area for reuse; | <ul style="list-style-type: none"> - Construction wastes will be reused for leveling at low-lying area |
| <ul style="list-style-type: none"> - Construction site needs to be covered/shielded, not affecting people in surrounding area; | <ul style="list-style-type: none"> - Subproject owner will ask construction contractor to build fence/barrier of 2m high surrounding subproject area, ensuring safety for people |
| <ul style="list-style-type: none"> - 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; | <ul style="list-style-type: none"> - Subproject owner will request construction contractor to arrange at least 2 personel to regulate traffic flow at peak hours. Signboard and signal lights will be installed at the entrance of construction site. |
| <ul style="list-style-type: none"> - There should be temporary system for collecting wastewater to prevent water stagnant and pollution of water source | <ul style="list-style-type: none"> - During construction process, temporary ditches and sedimentation pits will be constructed for wastewater drainage, avoiding water pollution |
| <ul style="list-style-type: none"> - To restore affected works to be former state | <ul style="list-style-type: none"> - Subproject owner commits to restore the site as former state after completing the subproject. |
| <ul style="list-style-type: none"> - Compensation for land and structures should be carried out in accordance with current regulations to ensure that people can restore their life equal to or better than pre-project. | <ul style="list-style-type: none"> - The subproject owner will provide compensation for the people in accordance with provincial and donor policies. |
| 2. Specific comments for each construction site location | |
| <p>(1) Chanh Hung embankment</p> <ul style="list-style-type: none"> - Rehabilitation of the inter-communal concrete roads of Chanh Thang and Chanh Hung villages is necessary if the works cause damage to the roads. | <ul style="list-style-type: none"> - Provisions for rehabilitation of damaged works at locality in the contract with the contractor will be included by the Project owner. |
| <p>(2) Hoi Son lake downstream embankment</p> <ul style="list-style-type: none"> - Ensure irrigation water supplying from Hoi Son lake to downstream areas in which works are not interrupted. | <ul style="list-style-type: none"> - Main construction activities occur during the dry season. At the same time, only construction of embankment should be constructed, thus, the flow will not be affected. However, the contractor will |

| Opinion of participants | PMU's feedback |
|---|--|
| | arrange suitable water supplying lines, ensuring flow into downstream of the works (if needed). |
| <p>(3) La Tinh river downstream embankment</p> <ul style="list-style-type: none"> - Compensation for households should strictly comply with policy framework of Binh Dinh province. Particular attention should be paid to relocated households - Ensure that construction should not be carried out at the rest time of pupils at An Xuyen 3 Kindergarten | <ul style="list-style-type: none"> - Compensation and assistance will be implemented in accordance with the RAP report approved by the Donor and Binh Dinh Provincial People's Committee - The Project owner commits to require the contractor not to construct the student's rest time. |
| <p>(4) Lach Moi embankment</p> <ul style="list-style-type: none"> - Ensure that water supply for aquaculture activities is uninterrupted and water resource is not polluted by construction activities. | <ul style="list-style-type: none"> - Contents related to ESMP will be included into contracts with contractors in order to ensure construction activities not pollute water resource. |
| <p>(5) Thang Cong 2 embankment</p> <ul style="list-style-type: none"> - Ensure uninterrupted transport activities as it is part of provincial road 636B. | <ul style="list-style-type: none"> - The subproject owner will require the contractor to arrange a temporary road for uninterrupted traffic activities. |
| <p>(6) Kon river embankment, Lai Nghi village</p> <ul style="list-style-type: none"> - Ensure the construction not affect pumping water of the pump station near the works | <ul style="list-style-type: none"> - The Project owner ensures that the construction activities do not affect the pumping of the pump station. |
| <p>(7) Kon river embankment, Vinh Thanh township</p> <ul style="list-style-type: none"> - Ensure that transportation of materials will be covered, and at the same time, waste should be collected immediately, especially through the area of the coffee business households. | <ul style="list-style-type: none"> - The Project owner ensures watering, covering materials during the material transportation process. - The Project owner requires contractor to arrange workers to collect dropping waste. |
| <p>(8) Cut river embankment</p> <ul style="list-style-type: none"> - Regulate traffics and ensure no transportation activities during after school hours in Tay Phu 1 primary school - Do not work at rest time of students and use equipment with low noise during school hours at the same time | <ul style="list-style-type: none"> - The Project owner requires contractor to arrange workers to regulate transportation. - The Project owner commits to require contractor not to construction at rest time of students. |
| <p>(9) Phu Ngoc embankment</p> <ul style="list-style-type: none"> - Ensure the strict implementation of measures to reduce dust, noise, waste, waste water for households living along the embankment. Fence can be erected to isolate from the works area (if needed) | <ul style="list-style-type: none"> - Requirement of mitigation measures and environmental management plan will be included in contract of contractor. - Arrangement of fencing if needed |
| <p>(10) An Nhon township's center embankment</p> <ul style="list-style-type: none"> - Ensure that traffics regulation does not cause traffic jams, arrange the traffic signs, and increase the responsibility of the driver because the area of the subproject has many residents. | <ul style="list-style-type: none"> - The Project owner requests the contractor to regulate transport, equip with traffic signs at the intersection locations. - Training, improving the capacity of the drivers |
| <p>(11) For bridges: Arrangement of temporary roads for local people to travel during the construction period.</p> <ul style="list-style-type: none"> - At the same time, reinstatement of temporary bridges is implemented upon the works | <ul style="list-style-type: none"> - The Project owner requests the contractor to arrange temporary bridges at all bridge construction locations to ensure no traffic interruption. - Reinstatement of temporary bridge |

| Opinion of participants | PMU's feedback |
|---|--|
| completion | positions is part of the contract with the contractor |
| <p>(12) The provincial road 635</p> <ul style="list-style-type: none"> - Regulate traffics and ensure no transportation activities during and after school hours in Ngo May high school - Do not work at school's break time and use equipment with low noise during school hours at the same time | <ul style="list-style-type: none"> - The Project owner requests the contractor to arrange the traffic regulator. - The Project owner commits to request the contractor not to carry out the construction in the school break time. - Use of low noise equipment or low noise construction activities during school hours. |

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:



Meeting in Binh Hoa commune



Meeting in Cat Thanh commune



Meeting in My Chanh commune



(7) Meeting in Tam Quan Town

Figure 11: Consultancy meeting in the subproject

12.5. Information disclosure

The first draft ESMP in Vietnamese had been published at the offices of 26 communes/ward and the Binh Dinh 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 of the Subproject. The final draft ESMP in Vietnamese language was published at the offices of 26 communes/ward and the Binh Dinh PPMU on June 9th, 2017. The final draft ESMP in English will be disclosed at the World Bank's internal and external websites on June 20th, 2017.

APPENDIX



Note: A: Air, noise; SW: surface water; S: soil

Figure 12: Map of environmental monitoring locations of the Binh Dinh Subproject