INITIAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

VINH LONG URBAN DEVELOPMENT AND CLIMATE RESILIENCE PROJECT

VINH LONG - APRIL, 2020
VINH LONG PROVINCIAL PEOPLE’S COMMITTEE
Vinh Long ODA Project Management Unit (PMU)

INITIAL ENVIRONMENTAL
AND SOCIAL IMPACT ASSESSMENT

VINH LONG URBAN DEVELOPMENT
AND CLIMATE RESILIENCE PROJECT

PROJECT OWNER
VINH LONG ODA PROJECT
MANAGEMENT UNIT

CONSULTANT
INTERNATIONAL ENGINEERING
CONSULTANT JOINT STOCK COMPANY

VINH LONG - APRIL, 2020
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### ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AHs</td>
<td>Affected Households</td>
</tr>
<tr>
<td>CC</td>
<td>Climate change</td>
</tr>
<tr>
<td>AC</td>
<td>Asphalt concrete</td>
</tr>
<tr>
<td>CeC</td>
<td>Cement concrete</td>
</tr>
<tr>
<td>CMC</td>
<td>Construction monitoring consultant</td>
</tr>
<tr>
<td>DED</td>
<td>Detailed engineering design</td>
</tr>
<tr>
<td>DOC</td>
<td>Department of Construction</td>
</tr>
<tr>
<td>DOF</td>
<td>Department of Finance</td>
</tr>
<tr>
<td>DONRE</td>
<td>Department of Natural Resources and Environment</td>
</tr>
<tr>
<td>DOT</td>
<td>Department of Transport</td>
</tr>
<tr>
<td>DPI</td>
<td>Department of Planning and Investment</td>
</tr>
<tr>
<td>MKD</td>
<td>Mekong Detal</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental impact assessment</td>
</tr>
<tr>
<td>ESIA</td>
<td>Environment and Social Impact Assessment</td>
</tr>
<tr>
<td>ESCOP</td>
<td>Environmental and Social Code of Practice</td>
</tr>
<tr>
<td>EMC</td>
<td>External Monitoring Consultant</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
</tr>
<tr>
<td>EMS</td>
<td>Environmental monitoring system</td>
</tr>
<tr>
<td>FS</td>
<td>Feasibility study</td>
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<tr>
<td>MOC</td>
<td>Ministry of Construction</td>
</tr>
<tr>
<td>MUDP</td>
<td>Management of Urban Development under Urban Development Agency</td>
</tr>
<tr>
<td>NUUP</td>
<td>National urban upgrading program</td>
</tr>
<tr>
<td>ODA</td>
<td>Official Development Assistance</td>
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<tr>
<td>PPMU</td>
<td>Project Management Unit</td>
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<tr>
<td>PPU</td>
<td>Project Preparation Unit</td>
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<tr>
<td>PSC</td>
<td>Project Steering Committee</td>
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<tr>
<td>RAP</td>
<td>Resettlement Action Plan</td>
</tr>
<tr>
<td>RPF</td>
<td>Resettlement Policy Framework</td>
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<tr>
<td>RP</td>
<td>Resettlement Plan</td>
</tr>
<tr>
<td>P/CPC</td>
<td>Provincial/City People’s Committee</td>
</tr>
<tr>
<td>URENCO</td>
<td>Urban Environment Company</td>
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<tr>
<td>WB</td>
<td>World Bank</td>
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EXECUTIVE SUMMARY

Project Background
The Vinh Long Urban Development and Climate Change Resilience Project (UDCR) will improve access to infrastructure; Improve transportation connectivity and reduce flood risks in the central urban area of Vinh Long City. The project’s specific objectives are to: (i) Control flooding in the urban core area of Vinh Long city with an area of 2,060 ha to gradually adapt to climate change; (ii) Improve the living conditions of people in the urban core area through improvement of infrastructure in residential areas and conducting wastewater collection and treatment for the areas; (iii) Construct transport connecting urban core areas with developing areas and create motivation for the city to expand urban space through the East, West and South directions; (iv) Combining the investment of buildings with the development of green infrastructure systems, increasing the water surface area to create more bases for Vinh Long city in adapting to climate change as well as towards a green, sustainable city. The estimated duration of the UDCR project is 5 years, from 2021 to 2025. The total project implementation cost is USD 219.8 million.

UDCR includes 04 components including: Component 1 - Flood risk management and environmental sanitation: (1) Building drainage systems in the urban core area; (2) Building wastewater collection and treatment systems for urban core areas; (3) Flood control in urban core areas; (4) Building and operating a flood risk management system; (5) Construction supervision and management. Component 2 - Development of urban corridors: (1) Construction of a connection road between ward8 and Ward 9, with a length of 3.0 km; (2) Construction of the main urban trunk road No. 1, with a length of 5.5 km; (3) Construction of urban main road No. 2, length of 5.8km; (4) Provide equipment for intelligent traffic system management; (5) Construction supervision and management. Component 3 - Compensation and resettlement: Building technical and social infrastructure for the resettlement area of 12.5ha. Component 4 - Strengthening urban management to adapt to climate change.

Legal and technical basis for ESIA
The environmental assessment carried out during project preparation confirmed that the project’s environmental risks were classified as Susstantial. The environmental and social standards (ESS) applied to the project are as follows: ESS 1: Assess and manage environmental and social risks and impacts; ESS10: Participation of stakeholders and information disclosure; ESS2: Labor and working conditions; ESS3: Effective use of resources and pollution prevention and management; ESS4: Health and community safety; ESS5: Land acquisition, restrictions on land use and involuntary resettlement; ESS6: Conservation of biodiversity and sustainable management of living natural resources; ESS8: Cultural heritage. The Environmental and Social Impact Assessment (ESIA) document is prepared according to ESF. ESIA includes the proposed works for Component 1, 2 and 3 of the project.

Project description
UDCR includes the following items: new construction, upgrading and renovation: (1) Construction of drainage system in the urban core area: Investing a circular system from D400-D1200 for roads in the urban core area. with a length of 26.3km; Improve sidewalks of roads associated with planting trees and investing in lighting systems with an area of 240,000m²; Improving the main drainage canals system: dredging, protection embankments with a length of 22.0km; (2) Establish a wastewater collection and treatment system for the urban core area: connecting 26,000 households and a network of tertiary service pipelines; Building a wastewater pumping station with a capacity of 300-15,000m³/day; Building a wastewater treatment station with an estimated capacity of 15,000 m³/day; (3) Flood control in the urban...
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core area: Long Ho river embankment + 5m operating road along embankment with a length of embankment of 6.0km; to build 9 tidal sluice gates with sizes of 4.0 to 12.0m; (4) Construction of a connection road between Ward 8 and Ward 9, with a length of 3.0 km; (5) Construction of the main urban trunk road No. 1, with a length of 5.5 km; (6) Construction of the main urban trunk road No. 2, 5.8 km in length; (7) Construction of technical and social infrastructures for the resettlement area of 12.5 ha. Each work item will be constructed within 15 to 24 months (starting from 2021 to 2025).

Social and environmental bases
In February 2020, 8 air samples, 8 surface water samples, 3 groundwater samples, 5 waste water samples, 6 soil samples, and 6 sediment samples were tested and analyzed to evaluate the background environment quality in the project area. Results of field surveys and environmental monitoring show that the quality of the air, surface water, groundwater, soil and sediment is still quite good.

As the project works are built within Vinh Long city, the works are mainly located in residential areas, except for some road sections passing through rice paddies. Some sensitive receptors consist of: Cua market, Tran Phu Secondary School, Van Thanh Mieu Vinh Long, Tran Quoc Toan Primary School, Phap Hai Pagoda, Giac Thien Pagoda, HCM Economics University - Vinh Long, Pho Minh pagoda. No physical cultural resources are affected by the project.

In addition, a new wastewater treatment plant (WWTP) with the capacity of 15,000 m$^3$/day is located in Thanh Duc commune, Long Ho district. The construction area is about 4.5 ha, far from the residential area about 150 m. Currently, the total area of WWTP is the agricultural land for growing rice of local people. There are several sensitive receptors near WWTP such as Thanh Duc market, Thanh Duc C Primary School, about 2.5 km far from the construction site (on the route of transportation materials accessing to the construction site).

Environmental and Social Impacts and Risks
ESIA has identified the negative impacts and potential risks of the project. Most impacts are temporary, local and reversible due to medium scale construction. These impacts can be mitigated by applying appropriate technology and specific mitigation measures, and contractors must closely monitor and consult with local people.

❖ General impacts

Dust, exhaust gas, noise, vibration, wastewater, solid waste from construction activities and daily life of workers. These impacts can be considered as low to moderate for each facility and can be minimized.

❖ Specific impacts

Land acquisition impact: Expectedly, the project will affect 1,800 households, of which 550 households will have to displace. Data on acquisition of land, on-land assets, crops and trees will be updated in the Project’s Resettlement Action Plan.

Impacts on the water environment. the project’s works that cause impacts on the water environment include: embankment of Long Ho river, rehabilitation of 22.0 km of drainage canals in the urban core area, construction of 9 tidal sluice gates and intersections roads with existing canals. Excavation and backfilling for reinforceing embankments, abutments and piers as well as dredging 22 km of canals will contribute to increasing the volume of suspended solid wastes in the downstream area. In addition, overflowing water can wash away the pollutants (construction materials, soil, sand, grease and waste and so one) into aquatic areas (Rach Cai Cam, Cai Sao, Large, Cau Lo and Long Ho rivers), causing water pollution. This impact is assessed from LOW to MEDIUM, temporary and can be minimized.
Impacts due to erosion, subsidence and damage to the existing structure: The process of construction, piling, soil excavation in some locations such as the bridge across roads and Long Ho river embankment may pose the risks of subsidence or damage to surrounding structures. The impact is assessed to be high in case of rain, otherwise it is assessed to be LOW and can be mitigated by suitable construction method and duration.

Impact on waterway transport on the river: caused by the works as embankment of Long Ho river embankment works, dredging and rehabilitation of 22.0 km of canals, bridge across roads. However, the transportation frequency is low with 5-10 round-trip/day; thus, the impact is assessed as LOW to MEDIUM and can be minimized.

Odors from dredged materials: odor will be emitted from dredging and rehabilitation of 22.0km of canals. The total volume of sludge dredged is about 42,000 m³ (the main component is organic mud). The dredging activities will cause the risk of destroying the balance structure, evaporate persistent organic compounds and some other volatile organic substances, causing unpleasant odors that affect workers and local people.

Leachate from dredged materials: It is estimated that the leachate will make up 20% of the total dredged sludge, equivalent to 8,400 m³. However, the leachate will be channeled back to adjacent water bodies. According to the results of sediment monitoring in the project area, there are no sign of heavy metal contamination. The sludge leachate contains high TSS content that affects aquatic specicies of receiving sources. Impact is assessed to be LOW and mitigable.

Impact on agricultural production: will be caused by construction of 3 roads and wastewater treatment plant that require land acquisition. Households will be affected with agricultural cultivation (waste, waste water, construction materials on paddies, damages on rice and vegetables). This impact is rated MINOR and mitigable.

Impact on groundwater quality: due to pile driving of bridges, tidal sluice gates or embankments of Long Ho river. In the process of pile drilling, bentonite with additives will absorb in the aquifer, infiltrate into the water courses and contaminate the water. The impact is assessed to be MINOR and mitigable.

Impacts on sensitive structures: The Project implementation will affect 10 sensitive structures. Dust, noise, vibration, traffic accidents during the construction process will affect the learning, teaching and transportation of students. In addition, spiritual cultural activities of local people in the community hall, pagodas and cemeteries will be affected, especially the risk of conflict between workers and local residents. This impact is assessed to be MINOR and mitigable.

Mitigation measures

Mitigation measures to General Impacts

The detailed environmental and social mitigation measures for each impact source, respectively during project phases, include: (i) general impact mitigation measures (ES COPs); (ii) site-specific impact mitigation measures; and (iii) measures to minimize impacts on sensitive receptors.

Specific impacts

Social impacts: (i) Mitigation measures are taken for impacts from land acquisition in the Project area and shown detail in RAP; and (ii) construction options which require the smallest land acquisition area are prioritized.

Mitigation of impacts on water environment: the dredging activities must be carried out in the dry season; wastewater will be dumped into sediment pits before being discharged into the environment; waste disposal into rivers must be banned, construction materials must be covered with canvas and gathered in the places far from water sources; the dredged materials will be...
transported to Hoa Phu and Phuong Thao landfills.

*Mitigation of impacts due to erosion, subsidence and damage to existing structures:* Local people must be informed of construction schedule; reinforcement before dredging is required; vibration must be closely monitored; Do not conduct dredging in the rainy season, place heavy machines near rivers, canals and ditches.

*Mitigation of impacts on waterway transport:* local people will be informed of the project schedule before construction; Coordinate with waterway management unit to plug flags on the waterway to be used by the project.

*Mitigation of odors from dredged materials:* The progress of each dredging stage will be informed to surrounding people; the dredged materials must be transported to the dumping site by specialized trucks; Dredged materials are not allowed to gathered along canals; use of lime powder is proposed to control odors; the construction activities shall be not conducted in relaxation duration of local people and limited after 18h; Close consultation with local people and communities for appropriate mitigation measures; Provide appropriate personal protective equipment for all workers; Prepare a management plan on dredging materials before construction.

*Mitigation of impacts due to leachate from dredged materials:* Dredging activities will be carried out in the dry season; Leachate from sediment must be deposited in the sediment tank/trap before being channeled back the canals; Dredging materials must use specialized trucks with trunk; the dredging activities must not be carried out in during irrigation for agricultural production; Prepare a dredging materials management plan before construction.

*Mitigation of impacts on agricultural production:* The community must be informed of the construction progress at least two weeks before construction; Arrange drainage around the site to avoid soil and sediment erosion into rice paddies and canals; Regularly check the irrigation canals in the affected fields to ensure that the canals are not clogged by soil or construction wastes and, if affected, provide alternative irrigation water from canals to the place. that people ask for; Immediately repair irrigation canals in case of being affected by construction activities to ensure water supply for rice fields; Close consultation with local communities to ensure appropriate resolution of community issues and concerns related to construction activities is addressed.

*Minimize impacts on groundwater quality:* Coordinate with local authorities to inform people about construction plans before implementation; Coordinate with the waterway management unit to flag the signal system on the inland waterway where the vehicles will pass; Provide appropriate personal protective equipment for all workers and ensure life jackets are used when working near canals. Safety officials must be always ready to rescue promptly in the event of an incident; Installing warning signs along the construction route on the ground and water (arranged instructions for road and waterway traffic).

*Minimize impacts on traffic at the bridge construction area:* Ensuring the contract requires the contractor, before starting construction, to provide a construction plan with a detailed plan related to the areas including health, safety, environment and traffic management for local authorities and approved by Construction Supervision Consultants; Notify local residents in advance (at least one week) of construction schedules and service disruptions, transportation routes. Notify the community of the night plan at least 2 days in advance; Installation and maintenance of the site bulletin, including the following: full name and phone number of the Contractor, Site Manager, Supervision Consultant and the project Owner, duration and scope construction; The Contractor should ensure lighting at all construction sites at night; Security guards at construction sites to inspect vehicles entering and exiting the construction area; Installing construction warning signs at the construction site and keeping signs throughout the
construction period; Sediments will be transported out of the construction area during the day. Do not transport sediment during rush hour; Limit construction areas within designated area boundaries; Designation of traffic control personnel during transportation, loading and unloading, at construction sites and burial sites.

Minimize impacts due to business disruption: Inform street business households of construction activities and potential impacts such as waste, dust, noise, traffic and little construction progress. at least 02 weeks before starting construction; Create safe and easy access for households such as placing thick or thick wooden boards or steel sheets on ditches or pits; Do not collect materials and waste within 20m from the location of business households and shops; Do not use machines that cause loud noise and high vibration levels near business households; Watering enough to remove dust during dry and windy days at least three times a day in areas close to business households; Arrange personnel to guide traffic during construction, transportation, loading and unloading of construction materials and waste, and to protect against high-risk activities; Clear the construction area at the end of the day, especially the construction area in front of the business store; Managing the workforce to avoid conflicts with local people and business households; Compensation for goods and products damaged by construction activities of the project; Immediately address any problems caused by construction activities and caused by household businesses.

Minimize impacts on sensitive structures: Inform people of construction time; Do not transport, use high-noise machinery and build items that emit a lot of dust and noise through the Church area during major religious holidays; Installing fences and barriers for danger warning areas/restricted areas around construction areas with potential risks to the community; Requesting employees to strictly comply with the labor regulations; Recruit local labor.

Environmental and Social Management Plan

The UDCR ESMP includes measures to minimize negative impacts, roles and responsibilities for ESMP implementation, supervisors, environmental compliance framework, reporting organization, and control program. environment, capacity building program and ESMP implementation costs. Estimated cost of USD 164,167.

During the construction process, ESMP requires the participation of a number of stakeholders and agencies, each with a unique role and responsibility, including the provincial PMB, Department of Natural Resources & Environment of Vinh Long Province, Contractor, Construction supervision consultant (CSC), Independent environmental monitoring consultant (IEMC) and local community.

Community consultation and Information dissemination

Community consultation: Public consultation activities were conducted in 2 District/City in 11 wards/communes of Vinh Long city in January 2020. The consultation was conducted with representatives of government agencies and union organizations, such as: Representatives of People's Committee, Vietnam Fatherland Front Committee, Women's Union, households affected by the project. The local authority and people in the commune/ward in the construction area are completely in agreement on the implementation of the project, which will bring about socio-economic and environmental benefits. However, 11 affected wards/communes all require environmental sanitation during construction, especially limiting dust, gas, causing damage to roads and need to be completed quickly to ensure progress. Dissemination of information: The draft ESIA in Vietnamese was published at the offices of 11 wards/communes/towns and the PMU of Vinh Long City in February 2020 to conduct public consultation. The final draft of ESIA in Vietnamese was published at the offices of 11 wards/communes and the PMU of Vinh Long City on February 20, 2020. The final version of ESIA in English will be published on the internal website and widely available in March 2020.
CHAPTER 1. PROJECT INTRODUCTION AND DESCRIPTION

1.1. BACKGROUND AND OBJECTIVES OF THE PROJECT

1.1.1. Background

The Mekong Delta Region is Vietnam's agricultural base and one of the most densely populated and urbanized areas in the country except Hanoi and Ho Chi Minh City. The Mekong Delta Region has an area of 40,604 km² which is equivalent to 13% of the country's area and population of 17.6 million, accounting for 19% of the national population. Thanks to increased investment in industry, tourism, increased productivity in agriculture and strengthened connectivity in the region, the urban areas in the Mekong Delta region have achieved a high annual average economic growth rate from 13-20% in the period of 2006-2010. Despite its impressive economic growth rate, urban areas in the Mekong Delta generally have small or medium areas (except Can Tho City) with financial resources and relatively high poverty rate. Facing these difficulties, cities in the Mekong Delta have made all efforts to meet the changing needs of the population and the social and economic requirements of the people in the urbanization process. Access to basic services such as sanitation, clean water and wastewater treatment remains low compared to other large-scale cities. For example, while the proportion of people having access to the basic sanitation facilities in cities like Hanoi and Ho Chi Minh City reached over 80%, the proportion of small and medium sized cities in the Mekong Delta Region only reached 15%. Only a small portion of cities and urban areas have standardized wastewater collection and treatment systems, and majority do not yet have a collection and wastewater treatment system. In 2016, 14-30% of the population in the Mekong Delta cities belong to the low-income group, of which the proportion of ethnic minorities and the people with disabilities was quite high (over 20% of households with the disabled in Vietnam concentrate in the Mekong Delta Region - According to the 2016 National Survey on People with Disabilities). Many in this group live in low-income areas with shabby homes, lack of basic infrastructure services, serious environmental pollution, poorly constructed tertiary road infrastructure lacking connection with other infrastructure. Most of these residential areas face frequent flooding and the negative effects of climate change.

As one of 13 provinces in the Mekong Delta region, Vinh Long is a strategical location along the economic corridor between Ho Chi Minh City/Southeast Asia and the Mekong Delta region, close to the two national economic development centers which are Ho Chi Minh and Can Tho City - the center of the Mekong Delta region. For Vinh Long province, Vinh Long city is the capital of the province with the provincial headquarters in social - cultural – educational aspects. Vinh Long City with an area of 48.01km², population of 143,135 persons and 11 administrative units was recognized as a Class III city on April 10, 2009. Vinh Long City is located on the economic exchange axis with 04 National Roads passing through NH1A, NH57, NH53, NH80; connecting with the economic regions such as Ho Chi Minh City (130 km away), Vinh Long, Tra Vinh, Dong Thap, Can Tho which is very suitable for the development of small industries, handicrafts, services and tourism. The Mekong Delta region development master plan, which was implemented by the Ministry of Construction and approved by the Prime Minister in 2018, defined the role of Vinh Long as the regional center for agricultural technique, agro-processing industry and support activities and the center for regional trade activities, regional center for training, research, technology transfer and eco-tourism. Ho Chi Minh - Can Tho expressway is currently under construction and Ho Chi Minh - Can Tho railway will continue to open up the economic development potentials of the city and Vinh Long province.

Currently, Vinh Long City is one of the most seriously flooded cities in the Mekong Delta region due to the impacts of climate change. Situated between Tien and Hau Rivers, Vinh Long city has an average elevation of 1.25m, which is quite higher than sea level and frequently flooded when the river water rises or due to heavy rains. Part of the reason is a less efficiency
of the operation of the drainage system resulting from the deposition of canals. Additionally, canals, naturally discharging areas and encroached areas also leads to insufficient capacity to meet the needs of the local people. The people’s encroachment on canals also degrades drainage capacity of the natural canal system. Besides, the sewer system that has been invested for a long time, asynchronously and not enough capacity to meet the urban expansion is also contributing to the increasing serious flooding situation in Vinh Long city.

On the other hand, the urban development lacks control, the technical and social infrastructure are not synchronized and overloaded; environmental pollution is increasingly serious due to untreated garbage and wastewater, which is discharged directly into the environment; the process of urban construction and development also wastes natural resources, consumes a lot of energy and generates a large amount of emissions, causing ecological imbalances and environmental degradation; urban space structure is not reasonable, land for welfare and public works is not much, land for greenery and water storage is still low; Construction work still remains spontaneously towards the trend of "oil slicks" on potential agricultural areas, along traffic routes. Therefore, in long term, there will be negative consequences on the environment, the quality of public services and other social security issues. The spread of development and the lack of clear development drivers make the economy develop slowly; The rapid growth rate of the city has surpassed the management capacity of the local authorities. Therefore, upgrading the wastewater collection and treatment system, increasing investment in infrastructure help reduce the risk of flooding and applying green infrastructure elements to increase water storage capacity and develop targeted infrastructures to connect and expand urban space have become the top priorities of the city in recent years.

Recognizing the shortcomings in the urban development process, in recent years, Vinh Long People's Committee has used many resources to gradually improve the infrastructure in Vinh Long City. In 2018, the World Bank also approved and supported Vinh Long City with an urban infrastructure project, the Vietnam Urban Upgrading Project (SUUP) - Vinh Long City Project. The project has contributed to solving a number of urgent construction items for Vinh Long City in reducing flood and providing essential infrastructure to local people. However, due to limited capital, the project items only account for 15% of the city's demand for infrastructure improvement and urban development. Therefore, Vinh Long City is in urgent need of a comprehensive urban infrastructure project to solve all shortcomings in the central urban area as well as the items of connection and spatial development for the city. This also contributes to helping Vinh Long city achieve the targets of becoming a first class, modern and green city in the future.

The Industrial Revolution 4.0 has impacted many sectors on a global scale. Smart city models show practical effects and are an indispensable trend in the national construction and development of countries in the world, including Vietnam. The successful organization of the seminars on "Building a smart city and improving the capacity to access industry 4.0 for Vinh Long” shows the determination of the province in 4.0 revolution access-oriented socio-economic development and building a smart city in the future. For Vinh Long, orienting and setting specific steps for the roadmap to become a smart city is necessary and of great importance to the cause of construction, sustainable and long-term development of Vinh Long province. However, within the framework of this project, we build a smart city from the perspective of applying IT as a tool, means and innovating IT-based methods to make the City Government smarter, living environment and production and business activities become more complete.

The investment in Vinh Long Urban Development and Climate Resilience Project, therefore, is essential which will contribute greatly to the development of the city, creating premise for building a sustainable city and towards a smart city of Vinh Long in the future. This implementation is fully in line with the Government's urban development plan and planning.
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towards green and sustainable city in the context of climate change adaption. The implementation of the project will simultaneously carry out the 18th task "Implementation of Urban Upgrading and Development Projects in high-risk cities due to climate change impacts" under Program 5, Decision No.2623/QD-TTg of the Prime Minister on Vietnam Urban Development and Climate Change Adaption in the period of 2013-2020 and has gradually implemented solutions on infrastructure investment and development outlined in Decision No.417/QD-TTg dated April 13, 2019 on the issuance of the Master Program to implement the Resolution No.120/NQ-CP of November 17, 2017 of the Government on Mekong Delta Region sustainable development and climate change adaption. With such necessities and urgency, the project will create positive contributions to help Vinh Long City achieve development goals and deserve one of the major socio-economic centers in the Mekong Delta Region.

1.1.2. Project Objectives

Overall objectives: improve access to infrastructure; improve transportation connectivity and reduce flood risks in the urban score area of Vinh Long City.

1.1.3. Project components
The project comprises of 4 components:

❖ Component 1: Flood risk management and environmental sanitation

The objective of this component is to reduce flood related risks and improve environmental sanitation in the urban core of Vinh Long city through investments in drainage, flood protection structures, sewage networks and wastewater treatment. In addition to improving the environmental sanitation conditions in the city, the upgrading of wastewater collection and treatment in Vinh Long will contribute to improving surface water quality. Design of this component will be based on existing national building codes and standards and investment proposals will be selected based on assessment of the flood risks, including flood hazard and the vulnerability of the affected community. Investments will consist of a balance between gray and green infrastructure (or nature-based solutions).

Sub-component 1.1: Flood mitigation and Urban drainage. This sub-component will finance flood mitigation structures such as embankments and tidal sluice gates, rehabilitation and improvement of the canal and drainage system in the city core areas, as well as investments in green infrastructure to retain and infiltrate rainwater. A polder approach will be used for flood mitigation, which can be expressed as a structural system consisting of: i) a closed “ring embankment with tidal sluice gates” to protect areas on the edge of rivers from high water levels (i.e., river and tide floods); and, ii) a drainage system including open canals, sewers, storm rainwater retention, and pumps to facilitate run off of rain water.

In line with city planning, three polders will be established in order to protect Vinh Long’s core urban area (1,788 ha across seven urban wards) from river and tidal flooding. A hydraulic modeling study was completed to assess the city’s flood risk with updated data, analyze the cost benefit of various investment options, and demonstrate how green solutions such as retention areas could play a more important role as part of the overall flood mitigation strategy. The stabilization of the polder embankment will consider green bio-engineering methods. Where possible, the creation of amenities comprising green spaces with native and shade providing tree species and promenades with tracks and boardwalks along the embankment will be provided for both cyclists and pedestrians in order to turn the waterfront into an attractive recreational area.

Urban drainage investments will finance 30 km of new and upgraded drainage pipeline, as well as dredging of 22 km of canals including bank improvements. These investments are critical for enhancing the capacity of rainfall capture, retention, conveyance and infiltration in order to
reduce flood risks and sustain the significant private and public investments in the inner parts of the city. The designs of drainage infrastructure are in compliance with existing national building codes and standards, and are based on up to date climate data. Climate change scenarios produced by MONRE have been incorporated into hydraulic modeling work for resilient measures such as green infrastructure and non-structural approaches. Secondary flow paths for the conveyance of flood water in excess of the drainage system capacity will be considered. Low lying areas in the urban center, often occupied by relatively low income inhabitants, are particular vulnerable and need extra care. The scope and design of investments in these areas will be developed through a participatory process, similar to that used under the SUUP.

Sub-component 1.2: Wastewater collection and treatment system. This sub-component will finance the construction of a separated stormwater and wastewater collection system, including over 60 km of primary and secondary sewers, over 87 km of tertiary sewers, over 16,000 household connections and a sequencing batch reactor (SBR) wastewater treatment plant (WWTP). Wastewater collection and treatment will be prioritized for urban inner areas (covering 7 wards including ward 1, 2, 3, 4, 5, 8 and 9), with an estimated service population of approximately 119,000 people (about 80% of city’s total population), covering a land area of about 2,060 ha. The treatment capacity of the WWTP in 2023 is estimated to be up to 15,000 m$^3$/day-night. To improve monitoring and control, a Supervisory Control and Data Acquisision (SCADA) system will be installed at the WWTP. The project will provide technical assistance to explore options to involve the private sector in the construction and operation of the WWTP, such as a Build Operate (BO) contract with an operation period of 5 years, in order to improve the quality, sustainability and cost effectiveness of wastewater services. The use of renewable energy sources such as solar energy will be explored to meet a portion of the treatment plant’s energy demand. To maximize the public health benefits of the investments under sub-component 1.2, the project will conduct a community-based Information, Education and Communication (IEC) campaign to encourage households to connect to the sewer system and to maintain their connections in good working order.

Sub-component 1.2 will also provide comprehensive capacity building and training for all stakeholders on managing the service contract of the WWTP and the network, including associated facilities, as well as institutional development and strengthening in the areas of: asset management; O&M arrangements including transparency and accountability mechanisms; connecting households to the network; improving septage management; and developing cost-reflective tariff mechanisms.

❖ Component 2: Strategic corridors development

Development of the core urban area is currently segmented by several national roads with the inter-city traffic flow passing through the city, leading to safety concerns and air pollution. This component will finance prioritized investments in roads as identified in the City’s Master plans$^1$, in order to increase regional and intra-city connectivity. Specifically, the project will finance three urban roads: the first two roads run through the existing built-up area, creating important vertical and horizontal links in the urban road network; the third road diverts inter-city traffic from the national roads and future expressway and serves as a development boundary to the south. Two of these three roads in the south also form part of the overall flood control scheme, serving as the boundary of the current and future polder system. The proposed roads will improve traffic safety by providing alternative routes for the inter-city traffic to bypass the city center, provide better accessibility for residents to jobs, education, and other services, and

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$^1$ Draft Adjusted Construction Master Plan of Vinh Long City, and approved Adjusted Transport Development Master Plan up to 2020 with a vision to 2030 dated 2018
allow for mixed land uses and densification in less flood prone areas. Increased accessibility and connectivity as a result of the new and improved transport infrastructure is likely to increase land values and investment opportunities along transport corridors, which is value-creation that the government can capture using a variety of mechanisms. Land use regulations and development control will be carefully considered along the road in the south that forms the city’s development boundary. In doing so, the city has the opportunity to proactively guide urban growth to areas with lower flood risk and densify the urban core area, while minimizing the risk of urban sprawl.

The project will also promote non-motorized transport options as well as consider the future creation of urban public transport networks in the design of main roads. The road width will be based on sound analysis of travel and traffic demand. Traffic safety issues will be thoroughly reviewed and addressed, especially at intersections with major roads and transit roads of national highways/bypasses, as well as pedestrian crossings. To address the potential impacts of climate change, road drainage structures will be designed based on hydrologic analyses that adopt climate change scenarios while the elevation of roads will take into account projected increases in seawater levels. The design will also incorporate international experience in nature-based solutions such as “green roads” comprising pervious pavement and water absorbing tree pits and landscape, as well as universal access criteria to provide a network of accessible pedestrian routes with appropriate tactile pavement and improved sidewalk space and pedestrian crossings, while taking into account appropriate parking spaces for motorcycles to reduce the obstruction to pedestrians.

❖ **Component 3: Resettlement Area Development**

The project will try to minimize resettlement impacts through adopting fit-for-purpose standards and appropriate design, however, significant resettlement impacts are expected due to the proposed investments, particularly under the embankments in Component 1 and the roads in Component 2. An estimated 550 households may have to be relocated under the project. This component will ensure improved living conditions and security of tenure for those target communities who are subject to relocation and resettlement under the project. An investment for technical and social infrastructure at the resettlement site in Ward 8 of Vinh Long City will be proposed with green and nature-based solutions incorporated, such as park connectors, water absorbing tree pits and landscapes, pervious pavements, stormwater detention ponds, raingardens, etc. This resettlement site covers an area of 12.5 hectares which is currently agricultural land and not occupied by any households, easing the compensation process. In addition, the resettlement site is assessed to be appropriate, as it is just 5 km from the city center and close to National Road 53. Services (water, drainage, electricity, access roads) are already present along the proposed resettlement area, which will facilitate the development of the site.

❖ **Component 4: Enhancing Climate Resilience and Leveraging Disruptive Technologies in Urban Management**

This component aims to improve urban management in a climate and risk informed manner and to set the stage for the development of Vinh Long as a smart city through leveraging disruptive technologies. The proposed project will support implementation of Vinh Long’s smart city ICT framework currently being developed, through investments in data and ICT infrastructure including software, in conjunction with counterpart fund from the province. Key investments under Component 4 include: an integrated flood risk management information system; a geospatial data sharing platform to improve data sharing across different departments; and an intelligent transportation system. Component 4 will also provide technical implementation support to the implementing agencies in Vinh Long.
1.2. LEGAL AND TECHNICAL BASIS OF ESIA PREPARATION

Vinh Long Urban Development and Climate Resilience Project will be subject to comply with current Laws on Environmental Protection of the Government of Viet Nam and the World Bank, as follows:

1.2.1. Legal documents and technical standards of GoV

❖ Laws

- Law on Environmental Protection (LEP) No. 55/2014/QH13 passed by the 13th National Assembly of the Socialist Republic of Vietnam on June 23, 2014 and effective from January 01st, 2015;
- The Law on Construction No. 50/2014/QH13 passed by the 7th National Assembly of the Socialist Republic of Vietnam on 18th June 2014 and effective from January 01st, 2015;
- Law on Water Resources No. 17/2012/QH13 passed by the 13th National Assembly of Vietnam, 3rd session dated June 21, 2012;
- Labor Law No. 10/2012/QH13 passed by the 13th National Assembly of the Socialist Republic of Vietnam dated June 18, 2012;
- Law on Biodiversity No. 20/2008/QH12 passed by the 12th National Assembly of the Socialist Republic of Vietnam dated November 13, 2008;
- Law on Children No. 102/2016/QH13 passed by the 13th National Assembly of the Socialist Republic of Vietnam dated April 5, 2016;
- Law on Chemicals No. 06/2007/QH12 passed by the 12th National Assembly of the Socialist Republic of Vietnam dated November 21, 2007;
- Law on Road Transport No. 23/2008/QH12 passed by the 12th National Assembly of the Socialist Republic of Vietnam dated November 13, 2008;
- Law on Complaints No. 02/2011/QH13 issued on November 11, 2011;
- Law on Cultural Heritages No. 10/VBHN-VPQH issued on July 23, 2013;
- Law on Occupational Safety and Health No. 84/2015/QH13 issued on June 25, 2015;
- Law on dykes No. 79/2006/QH11 issued on November 29, 2006;
- Law on plant protection and quarantine No. 41/2013/QH13 issued on November 25, 2013.

❖ Decrees

- Decree No. 18/2015/ND-CP dated February 14th, 2015 of the Government on environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental management plan;
- Decree No. 40/2019/ND-CP dated May 13rd, 2019 of the Government on amendments to decrees on guidelines for the law on environment protection;
- Decree No. 19/2015/ND-CP dated February 14, 2015 of the Prime Minister detailing the implementation of a number of articles of the Law on Environmental Protection;
- Decree No. 59/2015/ND-CP dated June 18, 2015 of the Government on management of construction investment projects;
- Decree No. 42/2017/ND-CP dated April 05, 2017 of the Government on amendment and supplement of a number of articles of the Government’s Decree No. 59/2015/ND-CP dated June 18, 2015 on management of construction investment projects;
- Decree No. 16/2016/ND-CP dated March 16, 2016 of the Government on management and use of official development assistance concessional loans granted by foreign sponsors;
- Decree No. 46/2015/ND-CP dated May 12, 2015 of the Government on quality management of construction works;
- Decree No. 201/2013/ND-CP dated November 27, 2013 of the Government detailing implementation of a number of articles of the Law on Water Resources;
- Decree No. 80/2014/ND-CP dated August 06, 2014 of the Government on wastewater drainage and treatment;
- Decree No. 47/2014/ND-CP dated May 15, 2014 of the Government providing regulations on compensation, support and resettlement when the State recovers land.
- Decree No. 155/2016/ND-CP dated November 18, 2016 of the Government on sanctioning of administrative violations in the field of environmental protection;
- Decree No. 25/2013/ND-CP dated March 29, 2013 of the Government on environmental protection charges for wastewater;
- Decree No. 67/2012/ND-CP of the Government amending and supplementing a number of articles of the Government's Decree No. 143/2003/ND-CP dated November 28, 2003, detailing the implementation of Articles of the Ordinance on exploitation and protection of irrigation works;
- Decree No. 113/2010/ND-CP dated December 03, 2010 of the Government stipulating determination of damages to the environment.

❖ Circulars

- Circular No. 27/2015/TT-BTNMT dated May 29, 2015 of MONRE on strategic environmental assessment, environmental impact assessment and environmental protection plans;
- Circular No. 36/2015/TT-BTNMT dated June 30, 2015 of MONRE on management of
hazardous wastes;
- Circular No. 37/2014/TT-BTNMT dated June 30, 2014 of the Ministry of Natural Resources and Environment detailing compensation, support and resettlement when the State recovers land;
- Circular 30/2014/TT-BTNMT on land allocation, land lease, conversion of land use purpose and land acquisition;
- Circular No. 32/2013/TT-BTNMT dated October 25, 2013 of MONRE on promulgation of national technical regulations on environment;
- Circular No. 19/2016/TT-BYT dated June 30, 2016 of MOH on guidelines for occupational health and safety management;
- Circular No. 22/2010/TT-BXD dated December 03, 2010 of MOC on labor safety in work construction.

❖ Applicable standards and regulations:
- 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 38:2011/BTNMT: National technical regulation on Surface Water Quality for protection of aquatic lives;
- QCVN 05:2013/BTNMT: National technical regulation on ambient air quality.
- QCVN 26/2016/BYT - National technical regulation on microclimate - Permissible value of microclimate in the workplace;
- QCVN 03-MT:2015/BTNMT - National technical regulation on the allowable limits of heavy metals in the soils;
- QCVN 43:2017/BTNMT- National technical regulation on sediment quality;
- QCVN 26:2010/BTNMT - National technical regulation on noise;
- QCVN 27:2010/BTNMT -National technical regulation on vibration;
- TCVN 6705:2009 - Normal solid wastes - Classification;
- TCVN 6706:2009 - Hazardous wastes – Classification;
- TCVN 7957:2008 - Drainage and sewerage - External networks and facilities - Design
standard.
- QCVN 07:2016/BXD: National Technical Regulation on Technical Infrastructure Works
- QCXD VN 01:2008/BXD – Vietnam building code – Building planning;
- QCVN 04-05:2012/BNNPTNT - National technical regulation on hydraulic structures - The basic stipulations for design;
- QCVN 22:2016/BYT - National technical regulation on lighting - Permissible levels of lighting in the workplace;
- QCVN 24:2016/BYT – National technical regulation on noise - Permissible exposure levels of noise in the workplace;
- QCVN 26:2016/BYT - National technical regulation on microclimate - Permissible value of microclimate in the workplace;
- QCVN 27:2016/BYT - National technical regulation on vibration - Permissible levels in the workplace;

❖ Legal documents related to the project
- Decision No. 758/QD-TTg dated June 8, 2009 of the Prime Minister of the National Urban Upgrading Program from 2009 to 2020;
- Decision 1659/QD-TTg dated 07/11/2012 of the Prime Minister on Approving the National Urban Development Program for the period of 2012-2020;
- Decision 445/QD-TTg dated April 7, 2009 of the Prime Minister Approving the adjustment of the overall planning orientation for development of Vietnam's urban system to 2025 and vision to 2050;
- Decision No. 2623/QD-TTg dated December 31, 2013 of the Prime Minister on approving the project on developing Vietnamese cities to cope with climate change 2013-2020;
- Decision No. 403/QD-TTg of the Prime Minister on 2014 approving the National Action Plan on green growth;
- Decision No. 11/2012/QD-TTg dated February 10, 2012 of the Prime Minister approving the transport development planning of key economic regions of the Mekong River Delta up to 2020 and orientations by 2030;
- Decision No. 1397/QD-TTg dated September 25, 2012 of the Prime Minister on approval of the Mekong Delta irrigation plan for the period of 2012-2020 and orientation to 2050 in the context of gas change, climate and sea level rise;
- Decision No. 1581/QD-Ttg October 9, 2009 of the Prime Minister on Approving the Construction Planning of the Mekong Delta region to 2020 and vision to 2050;
- Decision No. 245/QD-TTg dated February 12, 2014 of the Prime Minister on approving the master plan on socio-economic development of key economic regions in the Mekong River Delta region till 2020 and reaching look to 2030;
- Decision No. 939/QD-TTg dated July 19, 2014 of the Prime Minister on approving the master plan for socio-economic development of Mekong Delta region to 2020;
- Decision No. 1723/QD-UB of June 16, 2004, of the People's Committee of Vinh Long
province, approving the construction planning of Vinh Long city.

1.2.2. Relevant International Treaties and Agreements

Vietnam is signatory to a number of international agreements and conventions relating to environmental management, community rights and ethnic minorities. The international conventions are not always translated into national legislation. Some of the key agreements are listed in Table 1.

**Table 1: International Agreements Relevant to Environmental & Social Issues**

<table>
<thead>
<tr>
<th>Agreements/Conventions</th>
<th>Status</th>
<th>Objectives/Relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. ENVIRONMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention), 1982</td>
<td>Joined in 1989</td>
<td>The conservation and sustainable utilization of wetlands, i.e. to stem progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.</td>
</tr>
<tr>
<td>Kyoto Protocol, 1997</td>
<td>Signed in December 1998</td>
<td>Sets international guidelines on restrictions of GHG emissions in order to prevent climate change; Project will emit greenhouse gases from power generation through heavy fuel combustion</td>
</tr>
<tr>
<td>Convention on the International Trade of Endangered Species of Wild Fauna and Flora (CITES), 1973</td>
<td>Joined in 1994</td>
<td>To ensure that international trade in specimens of wild animals and plants does not threaten their survival and it accords varying degrees of protection to more than 33,000 species of animals and plants.</td>
</tr>
<tr>
<td>Stockholm Convention on Persistant Organic Pollutants, 2001</td>
<td>Signed in July 2002</td>
<td>UNEP called for global action to be taken on POPs which is defined as chemical substances that persists in the environment, bio-accumulation in the food chain and cause adverse impact on human health.</td>
</tr>
<tr>
<td>B. SOCIAL AND CULTURAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972 (World Heritage Convention)</td>
<td>Joined in 1987</td>
<td>Promotes cooperation among nations to protect heritage from around the world that is of such outstanding universal value that its conservation is important for current and future generations.</td>
</tr>
<tr>
<td>International Covenant on Economic, Social and Cultural</td>
<td>Joined in 1982</td>
<td>This could protect the rights of minority ethnic groups</td>
</tr>
</tbody>
</table>
Vietnam is signatory to certain ILO Conventions, the details for which are provided in Table 2 Vietnam, which has now ratified 6 out of the 8 ILO Fundamental Conventions, becomes the 167th ILO Member State to ratify Convention No. 98 and the 20th State in the Asia and Pacific region to do so.

Table 2: Vietnam Ratification to ILO Conventions

<table>
<thead>
<tr>
<th>Convention</th>
<th>Date</th>
<th>Status</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>C029 - Forced Labour Convention, 1930 (No. 29)</td>
<td>05 Mar 2007</td>
<td>In Force</td>
<td></td>
</tr>
<tr>
<td>C098 - Right to Organise and Collective Bargaining Convention, 1949 (No. 98)</td>
<td>05 Jul 2019</td>
<td>Not in force</td>
<td>Effective 05 Jul 2020</td>
</tr>
<tr>
<td>C100 - Equal Remuneration Convention, 1951 (No. 100)</td>
<td>07 Oct 1997</td>
<td>In Force</td>
<td></td>
</tr>
<tr>
<td>C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111)</td>
<td>07 Oct 1997</td>
<td>In Force</td>
<td></td>
</tr>
<tr>
<td>C138 - Minimum Age Convention, 1973 (No. 138)</td>
<td>24 Jun 2003</td>
<td>In Force</td>
<td></td>
</tr>
<tr>
<td>C182 - Worst Forms of Child Labour Convention, 1999 (No. 182)</td>
<td>19 Dec 2000</td>
<td>In Force</td>
<td></td>
</tr>
</tbody>
</table>

1.2.3. Environmental and Social Safeguards Policies and Guidelines of WB

The project environmental risks and impacts would mainly be related to the implementation and operation of the investments under Component 1, 2 and 3. The typology of investments included rehabilitation and improvement of existing drainage system, construction of sewers and a wastewater treatment plant, embankments, sluice gates, pumping stations, water retention structures, urban roads and a resettlement site. These moderate scale physical infrastructure investments will be implemented in urban and semi-urban areas. This implies an environmental baseline with low sensitivity that is characterized by varying degrees of modification, ranging from complete surface sealing and absence of vegetation to highly modified patches of intra-urban habitats.

Environment and Social Standards (ESSs) applied

❖ ESSI Assessment and Management of Environmental and Social Risks and Impacts

During project preparation the city prepared an Environmental and Social Impact Assessment (ESIA) in accordance with ESSI. The ESIA described institutional framework, the project and baseline conditions, identified and assessed the potential environmental and social impacts and risks, and proposed mitigation measures. The ESIA identified and assessed the potential direct, indirect and cumulative E&S impacts and risks in the project life cycle, from pre-construction, construction and operation phases.

The projects’ overall potential socio-environmental impacts would be positive as they are expected to bring about: (i) improved environmental sanitation and urban landscape; (ii) increased wastewater collection and urban drainage capacity; (iii) minimize discharge of untreated wastewater into the environment; (iv) reduction of public health risks associated with
water-borne diseases and related healthcare costs; (v) reduction of safety risks and asset loss caused by inundation; (vi) increased accessibility of local people to nearby areas; (vi) additional economic, social, environment and aesthetic benefits from the construction of linear parks along river/canal/lake embankments.

The potential negative environmental and social impacts are assessed as moderate at this stage and associated with the proposed physical investments. These include commonly known construction impacts and risks, such as: (i) disturbance to the habitats of aquatic species; (ii) increased levels of dust, noise, vibration; (iii) pollution risks related to the generation of waste and wastewater, particularly moderate amounts of non-contaminated excavated/dredging materials; (iv) traffic disturbances, and increased traffic safety risks; (v) risks of bank erosion and embankment subsidence as well potential negative impacts to existing weak facilities during the river/canal embankment process; (vi) interruption of existing infrastructure and services such as water and power supply; (vii) disturbance to daily socio-economic activities in the project area; (viii) health and safety issues related to the public and the workers at construction sites; and (ix) social impacts associated with land acquisition and construction disrupting businesses, agriculture and aquaculture activities as well as waterway traffic due to construction related activities and mobilization of workers to the site. Rehabilitation of canals, rivers, lakes, and ponds within the city would generate a moderate total amounts of sediments.

The main issues during the operation of project investments includes the small amount of sludge generated from sewage and drainage systems, the WWTP, management of the small amount of wastewater and domestic solid waste from the upgraded LIAs and resettlement areas; traffic management during the operation of the newly constructed roads and bridge; maintenance to ensure the stability of the embankments and aesthetic values of the rehabilitated canals/rivers/lakes and ponds. These impacts are long-term, moderate and manageable.

An Environmental and Social Management Plans (ESMP) has been prepared as an integral part of the ESIA to: (i) ensure compliance with the applicable provincial and national laws, regulations, standards, and guidelines; (ii) ensure that there is sufficient allocation of resources within the project budget for implementation of ESMP-related activities; (iii) ensure that environmental risks associated with the project are properly managed; (iv) respond to emerging and unforeseen environmental issues not identified in the project ESIA; (v) provide feedback for continual improvement in environmental performance.

The Environmental Social Commitment Plan (ESCP) has been prepared and include a requirement that the city will complete the ESIA including the ESMP in accordance with ESS1 during project preparation and implementation and to the satisfaction of the World Bank. In addition the ESCP set out other activities to be carried out by the city during project implementation and could be adjusted during the project life keeping with the evolution of E&S risk and impacts.

❖ **ESS10 Stakeholder Engagement and Information Disclosure**

The project’s key stakeholders include the project implementing agency, relevant authorities at provincial, city and ward levels, consultants, construction contractors, WWTP operators, and local residents. Interested parties include the Vinh Long ODA Project Management Unit (PMU), provincial authorities and branches (PPC, CPC, WPCs), the agency responsible for monitoring and management of environment and natural resources (DONRE), the agency responsible for monitoring and management of irrigation and flood risk management and natural disasters (DARD), the agency responsible for urban planning and construction management (DOC), the department of transport (DOT) is responsible for planning, design and maintenance of transport system, the department of information and communication (DOIC) is responsible for ICT smart city framework, the department of culture, sport and tourism (DOCST) is responsible for tourist attraction and planning, and the Urban Public Works
Companies (waste water and drainage, water supply, lighting, etc.). In addition, the Provincial Committee for Flood and Storm Control (CFSC) has a mandate to coordinate flood management and emergency response. There is a need to strengthen coordination of these fragmented institutional structures and consolidate the operations and maintenance strategy as part of an integrated flood management system. Also, collaboration with local administrations will be crucial for ensuring project management and implementation to required standards. In addition, other interested parties include mass media, research institutes/academies, local/international NGOs and development partners (ADB) working in the same area, mass organizations such as the Fatherland Front, the Women’s Union and the Farmer’s Union, and private businesses.

Of the key stakeholders who are affected parties, of primary concern are the poor/disadvantaged affected households that make up the residents of the low income areas likely to benefit by the project, but also who are likely to be most affected by the works. A stakeholder engagement plan (SEP) has been developed for this project to ensure transparency and meaningful consultation with the affected and interested parties. Stakeholder engagement and consultations will be conducted throughout the project cycle. Regarding public disclosure, the E&S instruments prepared have been disclosed locally and made available in the Borrower’s website and Bank’s external website.

A project-wide Grievance Redress Mechanism (GRM) has been developed, and will be established in coordination with localized grievance redress processes in order to ensure that concerns are captured and addressed by the project Management Unit. The existing GRM is the already-established mechanism embedded in all administrative levels (e.g. one stop shops at the ward and community level, and inspectorates at the city level), as well as and the people’s courts.

ESS2 Labor and Working Conditions

The project workforce will include direct workers (directly employed by PMU), contracted workers (recruited by third parties such as contractors or as consultants), and primary supply workers. The project is not likely to engage community workers, as civil works will be the responsibility of contractors. As the PMU is a government entity where laws and regulations have been followed, trade unions and official grievance redress mechanisms exist, minimal risks related to ESS2 for direct project workers are foreseen.

With contracted workers, the majority (estimated at 200-250 workers during peak period) would be hired by construction contractors, many of them may come from other localities. The main risks would relate to health and safety at both construction sites and site accommodations where the workers are near or operating with construction machinery and equipment, and possibly some hazardous/flammable materials. The ESMP includes a set of measures for managing these health and safety risks at both construction sites and worker’s accommodation. The project has developed, and where relevant include in the bidding documents, requirements for (ii) a worker’s Grievance Mechanism (GM) which could address all workers complaints; and (iii) sensitization related to the availability of worker’s Grievance Mechanism (GM) and to the respect of code of conduct to prevent and address potential harassment, child labor, gender or GBV/SEA issues, intimidation and/or exploitation during the implementation of the activities financed under this project. The labor management procedures include assessment of OHS risks and impacts related to project activities as they are defined through preparation and proposed measures to manage those risks – in parallel with project ESA instruments.

The main primary supplier of the project would be sand suppliers as stones and other construction materials would be bought from suppliers in Vinh Long or other provinces. The number of project primary workers is expected to be limited, with much of the work being done mechanically. Due diligence review on labor and working conditions of primary suppliers has
been completed as part of the ESIA. Furthermore, ESS2 monitoring requirements, included in the ESMP, will also cover primary supply workers.

❖ **ESS3 Resource Efficiency and Pollution Prevention and Management**

The risks and impacts related to the use of raw construction materials and energy, release of pollutants, waste generation, the management of disposed dredged materials and potential other hazardous wastes, impact on community, have been assessed, and mitigation measures proposed during project preparation. The Environmental and Social Assessment (ESA) process covered the risks and potential impacts on human and the environment, taking into account the standards measures in the World Bank Group Environment, Health, and Safety Guidelines, including an ESMP proposing site-specific mitigation measures to address the site specific impacts during construction and operation. The mitigation measures will be incorporated into construction bidding/contractual documents and C-ESMPs for implementation by the Contractor.

❖ **ESS4 Community Health and Safety**

The aspects of community health and safety that need to be considered include waterway and roadway traffic safety in disturbed areas, community health issues and safety risks at the construction sites, hazardous substances related to the operation of the WWTP, and overall public security and safety, including GBV/SEA related to the influx of workers and security personnel. These risks and issues were assessed as part of the ESA process and mitigation measures developed and incorporated as part of ESMP for application during detail design, bidding, construction or operational phases. The engineering design will apply 100 years repeated waters to structural flood control such as a closed “ring” embankment with tidal sluicegates/valves to protect areas from high water on the edge of rivers and will use 10 years rainfall returns for urban drainage. The design of these flood control measures (which may also include retention ponds) would incorporate design features that minimize waterfowl, mosquitoes, and safety features (especially for children, disable/aged people). Discussion would also be held with municipal government to set aside necessary resources for maintenance and inspection of the structural flood control measures. Regarding traffic safety, the ESIA/ESMP identifies, assess and monitor the risks related to traffic and traffic safety risks that would affect local communities and travelers. Mitigation and risk management measures will be incorporated into the design of roads and the intersections, and cost estimation. In relation to community health issues and safety risks, the ESIA/ESMP considers the treatment process and the requirements regarding the buffer zones of the WWTP and the design of the works will be compliance with applicable national design and construction codes taking into account the potential impacts of climate change, and with reference to ESHS and GIIP in order to ensure safety for community and stakeholders during the construction and operation of the WWTP.

❖ **ESS5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement**

The proposed project includes a combination of structural and non-structural interventions to improve access to infrastructure and to reduce flood risk in the urban core area of Vinh Long city. Considering the scope of the infrastructure to be developed in the Component 1, 2, and 3, substantial land acquisition may be required, leading to the loss of lands, relocation of households, permanent economic impacts, and restrictions to access to livelihood activities. There may also be land acquisition requirements associated with the disposal of sludge and construction materials leading to a permanent loss of crops, trees and land-affixed assets. Permanent acquisition of residential, garden, agricultural, water surface areas and the permanent disruption of business activities will be required. There is also a risk of temporary restrictions in access to residential and commercial establishments, which could affect people’s livelihoods, and temporary land acquisition is also possible.
During the preparation of the project documents, if legacy issues are identified, due diligence review will also be required. At this stage, only rough estimates are available regarding the project footprint and the scale/scope of impacts, therefore, a Resettlement Policy Framework (RPF) has been prepared in line with the requirements of the ESF. The RPF includes provisions to provide compensation for the entire cost, relevant to customary requirements for the relocations of graves. Once the detailed designs are available, a Resettlement Plan (RP) will be developed. The RP will need to take into account the socioeconomic vulnerability of the affected population to avoid the risk of impoverishment, particularly among the people who do not hold property titles to the land they occupy, ensuring that the mitigation measures are adequate to restore their living conditions, including the analysis of options beyond cash compensation. Given there is a risk of restrictions in access to residential establishments and business activities, which could affect people’s livelihoods, the RP will include a livelihood restoration plan.

❖ ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources

The environmental assessment found that the environmental baseline of the project areas is characterized by a low sensitivity with varying degrees of modified habitats, ranging from complete surface sealing and absence of vegetation to highly modified patches of intra-urban habitats. The existing urban green space in Vinh Long city mainly includes small parks and trees planted along streets. There are acacia and eucalyptus plantations near the residential centre and narrow natural vegetation patches left, having some recreational rather than biological values. Among the limited native tree species planted in Vinh Long city (Dâu rái (Dipterocarpus), Sao Đen (Hopea ordorata), Thị (Diospyros mollis), Bằng Lăng (Lagerstroemia speciosa), the Sao Đen is in IUCN’s protection list. In addition, seven introduced invasive floral species, typically grasses, water-hyacinth and mimosa, have been found in Vinh Long city. The number of fauna species observed in Vinh Long is limited, mostly spiral (Callosciurus) and flying-foxes. There are also 18 bird species, 10 reptiles and 3 amphibians. At the provincial level, 117 fish species have been identified. The site survey found that some sections of the proposed road alignment would run through existing agricultural/vacant land in the city. Canal improvement may disturb existing embankments where there may be some patches of vegetation cover. The project’s excavation and dredging works may affect existing green space, vegetation cover and trees, birds and aquatic lives. Given the location and environmental setting of the project, no impact on biodiversity is anticipated. The ESA includes measures to avoid, mitigate, minimize or compensate for the disturbance or negative biological impacts through the siting of the works, engineering design or construction practices.

❖ ESS7 Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities

The social assessment indicates that the project investments take place within Vinh Long city where the majority Kinh people are dominant (99.6%), the remainders are the Chinese (0.3%) and Khmer (0.1%). Because the Khmer population are made up of individual households, residing in mixed neighborhoods with the Kinh majority, and have no collective attachment to the project area, this standard is not relevant.

❖ ESS8 Cultural Heritage

There are known existing temples, pagodas and other cultural heritages in Vinh Long city, particularly the nationally-recognized sites namely the Long Thành, Tân Hoa, Văn Thánh, Thất Phú, Công Thần temples. Siting of the project’s proposed works should normally avoid these existing physical cultural structures, therefore the proposed project does not require land acquisition or relocation of any sites with cultural values. The ESIA has screened to identify
the cultural resources (including graves and cultural heritage) available within the area of influence of the project, preliminarily assessed the extent to which the project interventions may cause impacts to these known existing structures. As the project is expected to involve substantial volume of earth works at the WWTP, along the pipeline, new roads and canal, a chance finds procedure has been included as part of the ESMP.

❖ **Legal Operational Policies**

The project activities take place in Vinh Long city which is located on the Co Chien river which forms part of the Mekong River system, which is an international waterway according to OP 7.50. All related works are located on canals that flow into or tributaries of the Co Chien river, which flow exclusively in Vietnam the lowest downstream riparian. Accordingly, an exception to the notification requirement based on paragraph 7 (c) was approved on March 12, 2020.

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

- World Bank-financed projects 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 project- or site-specific requirements. This project should conform to the EHS Guidelines.

**1.2.4. Gap analysis between the GoV and the WB’s ESF**

The application of environmental assessment policies in Vietnam, as well as various efforts directed to policy harmonization between the GoV and donors, has gradually narrowed the gap between the two systems. However, significant differences remain between the GoV’s environmental policies and the ESF of the World Bank. These differences and proposed gap filling measures are described in the Table 3 below.

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2 The EHS Guidelines can be consulted at www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines.
**Table 3: Summary of the World Bank (WB) ESA and National EIA Processes and proposed gap mitigation for the Project**

<table>
<thead>
<tr>
<th>EA Process Stage</th>
<th>WB (stipulating in the ESF and ESSs)</th>
<th>Viet Nam (stipulating in Decree 40/2019/ND-CP, Circular 25/2019/TT-BTNMT)</th>
<th>Gap Filling Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td>- Starting October 2018, the WB applies the Environment and Social Framework (ESF) describing the 10 Environmental and Social Standards (ESSs) which were designed to avoid, minimize, reduce or mitigate the adverse E&amp;S risks and impacts of projects. The WB will assist Borrowers in their application of the ESSs to projects with WB support.</td>
<td>- Investment projects are required to submit EIA or IEE for approval</td>
<td>- To be eligible for WB financing, the WB ESF will be applied.</td>
</tr>
</tbody>
</table>
| **Screening**    | - The WB will classify all projects into one of four classifications: *high risk, substantial risk, moderate risk* or *low risk*.  
- In determining the appropriate risk classification, the WB will take into account relevant issues, such as the type, location, sensitivity, and scale of the project; the nature and magnitude of the potential E&S risks and impacts; and the capacity and commitment of the Borrower (including any other entity responsible for the implementation of the project) to manage the E&S risks and impacts in a manner consistent with the ESSs.  
- Other areas of risk may also be relevant to the delivery of E&S mitigation measures and outcomes, depending on the specific project and the context in which it is being developed. These could include legal and institutional considerations; the nature of the mitigation and technology being proposed; governance structures and legislation; and considerations relating to stability, conflict or security. The WB will disclose the project’s classification and the basis for that classification on the WB’s website and in project documents. | - Categories are indicated in annexes I and II of Decree 40/2019.  
- Prescriptive, fixed regulated in Annex I and II – List of projects subject to requirements of SEA and EIA report submittal and approval.  
- Normally the project owners self-screen the project based on the categorization indicated in Decree 40/2019 and consult the Provincial Department of Natural Resources and Environment (DONRE) or Vietnam Environment Administration (VEA) for the appropriate classification and EA report requirement of the project, such as:  
  - Project falls into Annex I: SEA is required;  
  - Project falls into Annex II: EIA or EPP required. | - Since the Project is classified as “substantial risk”, use the national laws and specific WB’s ESS as agreed with WB will be applied.                                                                                                                                                                                   |
| **ESA instrument** | - Depending on the project risks and impact, a range of instruments and procedures required to meet the ESSs’                                                                                                                                                                                                                                                                   | - The type of ESA instruments such as SEA, EIA or EPP is decided based on Annex I and II of Decree 40/2019.                                                                                                                                                                       | - Preparation of an ESIA, RPF, RAPs,                                                                                                                                                                                                                                         |
Environmental and Social Impact Assessment
Vinh Long Urban Development and Climate Resilience Project

<table>
<thead>
<tr>
<th>EA Process Stage</th>
<th>WB (stipulating in the ESF and ESSs)</th>
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<th>Gap Filling Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>objectives, these include: ESIA; ESMF; ESMPs, sectoral &amp; regional ESIA; SESA; hazard or risk assessment; environmental and social audit; cumulative impact assessment; and social and conflict analysis. The WB provides general guidance for implementation of each instrument.</td>
<td>Viet Nam (stipulating in Decree 40/2019/ND-CP, Circular 25/2019/TT-BTNMT)</td>
<td>ESCP, SEP, and LMP for the Project will be required to meet the ESSs1, 2, 3, 4, 5, 6, 8, and 10 while an EIA will be prepared to meet GOV requirements.</td>
</tr>
<tr>
<td></td>
<td>- Based on information provided by the Borrower, the WB will conduct E&amp;S due diligence for all projects requesting for WB support.</td>
<td>Viet Nam (stipulating in Decree 40/2019/ND-CP, Circular 25/2019/TT-BTNMT)</td>
<td>ESCP, SEP, and LMP for the Project will be required to meet the ESSs1, 2, 3, 4, 5, 6, 8, and 10 while an EIA will be prepared to meet GOV requirements.</td>
</tr>
<tr>
<td></td>
<td>- The Borrower will be required to prepare, submit, and disclose the Environmental and Social Commitment Plan (ESCP) and the Stakeholder Engagement Plan (SEP) to WB before appraisal.</td>
<td>Viet Nam (stipulating in Decree 40/2019/ND-CP, Circular 25/2019/TT-BTNMT)</td>
<td>ESCP, SEP, and LMP for the Project will be required to meet the ESSs1, 2, 3, 4, 5, 6, 8, and 10 while an EIA will be prepared to meet GOV requirements.</td>
</tr>
<tr>
<td>Scope and clearance</td>
<td>The WB will require the Borrower to carry out appropriate E&amp;S assessment (ESA) of subprojects, and prepare and implement such subprojects, as follows: (a) high risk subprojects, in accordance with the ESSs; and (b) substantial risk, moderate risk and low risk subprojects, in accordance with national law and any requirement of the ESSs that the Bank deems relevant to such subprojects.</td>
<td>Viet Nam (stipulating in Decree 40/2019/ND-CP, Circular 25/2019/TT-BTNMT)</td>
<td>ESCP, SEP, and LMP for the Project will be required to meet the ESSs1, 2, 3, 4, 5, 6, 8, and 10 while an EIA will be prepared to meet GOV requirements.</td>
</tr>
<tr>
<td></td>
<td>- If the WB is not satisfied that adequate capacity exists on the part of the Borrower, all high risk and, as appropriate, substantial risk subprojects will be subject to prior review and approval by the WB until it is established that adequate capacity exists.</td>
<td>Viet Nam (stipulating in Decree 40/2019/ND-CP, Circular 25/2019/TT-BTNMT)</td>
<td>ESCP, SEP, and LMP for the Project will be required to meet the ESSs1, 2, 3, 4, 5, 6, 8, and 10 while an EIA will be prepared to meet GOV requirements.</td>
</tr>
<tr>
<td></td>
<td>- If the risk rating of a subproject increases to a higher risk rating, the WB will require the Borrower to apply relevant requirements of the ESSs in a manner agreed with the WB. The measures and actions agreed will be included in the ESCP, and will be monitored by the WB.</td>
<td>Viet Nam (stipulating in Decree 40/2019/ND-CP, Circular 25/2019/TT-BTNMT)</td>
<td>ESCP, SEP, and LMP for the Project will be required to meet the ESSs1, 2, 3, 4, 5, 6, 8, and 10 while an EIA will be prepared to meet GOV requirements.</td>
</tr>
</tbody>
</table>

- TORs for EIA are not required.
- Normally after consultation with the local DONRE or VEA for the EIA category, the project owner will proceed with EIA report preparation.

- The ESIA, RPF, ESCP, SEP and LMP for the Project will be submitted to WB for clearance.
- To comply with GOV requirements, the EIA or the project will be submitted to GOV for approval.
<table>
<thead>
<tr>
<th>EA Process Stage</th>
<th>WB (stipulating in the ESF and ESSs)</th>
<th>Viet Nam (stipulating in Decree 40/2019/ND-CP, Circular 25/2019/TT-BTNMT)</th>
<th>Gap Filling Measures</th>
</tr>
</thead>
</table>
|                  | - The WB helps Borrower draft the TOR for ESA report and identify the scope of ESA, procedures, schedule and outline of the ESA report.  
- For *high risk* project, the ESS1-10 applied.  
- For *substantial, moderate, and low risk*, the national system can be applied with some specific ESSs as deem necessary by WB.  
- WB prior clearance is required if the implementing agency do not have adequate capacity to ensure effective implementation of the required mitigation measures. | - The project owner shall consult with the People’s Committee of communes, wards and towns (hereinafter referred to as communes) where the project is carried out, with organizations or community under the direct impact of the project; research and receive objective opinions and reasonable requests of relevant entities in order to minimize the negative effects of the project on the natural environment, biodiversity and community health.  
- The People’s Committee of the commune where the project is carried out and the organizations under direct impact of the project shall be consulted. The project owner shall send EIA reports to the People’s Committee of the commune where the project is carried out and organizations under the direct impact of the project together with the written requests for opinions. Within 15 working days, from the date on which the EIA reports are received, the People’s Committee of the commune and organizations under the direct impact of the project shall send their responses if they do not approve the project. | - Conduct ESIA and RPF consultation as per GOV regulation taken into account the WB requirements regarding the ESIA, RPF, ESCP, SEP, and LMP during consultation. The results from consultation will be incorporated into the ESIA, RPF, SEP, LMP, and ESCP. |
|                  | - During the ESA process, the Borrower consults project affected groups and local NGOs about the project’s environmental aspects and takes their views into account.  
- In line with ESS10, preparation of a Stakeholder Engagement Plan (SEP), information disclosure, and establishment and operations of a GRM are required to ensure adequate consultation and transparency.  
- ESS2 also require the preparation of the labor management procedures (LMP) and an establishment and operation of a GRM for project workers.  
- If ethnic minority is presence and adversely impacts, free, prior, and meaningful consultation (FPIC) is required.  
- For meaningful consultations, the Borrower provides relevant project documents in a timely manner prior to consultation in a form and language that are understandable and accessible to the group being consulted.  
- Minutes of the public meetings are included in the reports. | | |

**Public consultation, stakeholder engagement, and grievance redress mechanism (GRM)**
### Environmental and Social Impact Assessment
**Vinh Long Urban Development and Climate Resilience Project**

<table>
<thead>
<tr>
<th>EA Process Stage</th>
<th>WB (stipulating in the ESF and ESSs)</th>
<th>Viet Nam (stipulating in Decree 40/2019/ND-CP, Circular 25/2019/TT-BTNMT)</th>
<th>Gap Filling Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>- The consultation with the community under the direct impact of the project shall be carried out in the form of community meeting co-chaired by project owner and the People’s Committee of the commune where the project is carried out together with the participation of representatives of Vietnamese Fatherland Front of communes, socio-political organizations, socio-professional organizations, neighborhoods, villages convened by the People’s Committee of the commune. All opinions of delegates attending the meeting must be sufficiently and honestly stated in the meeting minutes.</td>
<td></td>
</tr>
<tr>
<td>Disclosure</td>
<td>- The WB will disclose documentation relating to the E&amp;S risks and impacts of high risks and substantial risks projects prior to project appraisal. Once the WB officially receives the report, it will make the EA report in English available to the public through the World Bank external website.</td>
<td>- After an EIA report is approved, the project owner shall formulate, approve and publicly display its EMP at the office of the commune-level People’s Committee of the locality in which consultation of the community is made for people’s information, examination and oversight. (Article 16, Decree 40/2019).</td>
<td>- Follow GoV requirements and WB requirements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- The ESIA, RPF, RPs, ESCP, SEP, and LMP will be publicly disclosed as per requirements on the relevant ESSs.</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td></td>
<td>- Not regulated in Vietnam policies.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Project owner shall make, or hire an institution meeting the conditions provided in Clause 1, Article 13 (Decree 18/2015) to prepare an EIA report. Project owner or consulting service provider must fully meet the following conditions: (i) Having staff members in charge of EIA must obtain at least Bachelor’s degrees and Certificate in EIA consultancy; (ii) Having specialist staff members related to the project obtaining at least Bachelor’s</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Risk of the proposed Project substantial and dam safety will not be involve. The Project will not require any independent experts.</td>
<td></td>
</tr>
</tbody>
</table>

- For high risk and complex project, the Borrower may be required to retain independent ESA experts not affiliated with the project to carry out ESA.
- For high risk projects, especially those related to dam safety, the Borrower should also engage an advisory panel of independent, internationally recognized environmental specialists to advise on aspects of the project relevant to ESA.
- Experts/consulting firm will be selected through bid process under strict observation of the WB.
- Follow GoV requirements and WB requirements.
- The ESIA, RPF, RPs, ESCP, SEP, and LMP will be publicly disclosed as per requirements on the relevant ESSs.
### Environmental and Social Impact Assessment
**Vinh Long Urban Development and Climate Resilience Project**

<table>
<thead>
<tr>
<th>EA Process Stage</th>
<th>WB (stipulating in the ESF and ESSs)</th>
<th>Viet Nam (stipulating in Decree 40/2019/ND-CP, Circular 25/2019/TT-BTNMT)</th>
<th>Gap Filling Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clearance procedure</strong></td>
<td>- Review responsibility is internal to the WB. If the ESA report is satisfactory, the WB will issue its clearance memo. If the ESA report needs to be improved the WB will issue a conditional clearance with the understanding that the Borrower will revise the EA to satisfy the WB for the final clearance.</td>
<td>- The Ministry of Natural Resources and Environment shall assess and approve the EIA reports on projects prescribed in Appendix III of this Decree, except for projects subject to national defense and security secrets. - Ministries, ministerial agencies shall assess and approve the EIA reports on projects under their competence in approval for investment, except for projects in Appendix III of this Decree; - The People’s Committee of the province shall assess and approve EIA reports on projects in the province, except for projects prescribed above. - The appraisal will take place no later than working 45 days at MONRE level and 30 working days at DONRE level and 5 working days at district level for after receipt of a full eligible EIA or EPP.</td>
<td>- GoV’s approval of the EIA and RPF will be required. - WB’s review and clearance of the ESIA, RPF, RPs, ESCP, SEP, and LMP will be required prior to project appraisal</td>
</tr>
<tr>
<td><strong>Number and language of ESIA required for appraisal</strong></td>
<td>- Number of copies not specified. - Language requirement: English for Vietnam - No requirement for feasibility survey: the WB does not advance discussions on any investments without the preparation by the Borrower of the minimum required technical studies that prove the investments are feasible from socio-economical and technical point of view.</td>
<td>- The project owner has to submit at least seven copies of EIA report (depend on the number of appraisal council members) and one copy of the Feasibility Study or the Economic-Technical argument for the proposed project.</td>
<td>- Follow the GoV requirements and WB requirements</td>
</tr>
</tbody>
</table>

Number of copies not specified.
Language requirement: English for Vietnam
No requirement for feasibility survey: the WB does not advance discussions on any investments without the preparation by the Borrower of the minimum required technical studies that prove the investments are feasible from socio-economical and technical point of view.

degrees; (iii) Having physical-technical foundations and special-use devices for measuring, taking, processing, and analyzing environmental samples, which meet technical requirements. In case of unavailability of qualified special-use devices, having a contract to hire a capable institution.
## EA Process Stage

<table>
<thead>
<tr>
<th>Content of ESIA report</th>
<th>WB (stipulating in the ESF and ESSs)</th>
<th>Viet Nam (stipulating in Decree 40/2019/ND-CP, Circular 25/2019/TT-BTNMT)</th>
<th>Gap Filling Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>- According to the ESS1</td>
<td>- Due attention will be given address labor and working conditions as well as community health and safety</td>
<td>- EA report should be in line with Circular 25/2019/TT-BTNMT</td>
<td>- Prepare 2 documents: one follow GOV requirement and one follows WB requirement.</td>
</tr>
</tbody>
</table>

## ESA Supervision

- During project implementation, the WB supervises the project’s environmental aspects on the basis of the environmental provisions and the Borrower’s reporting arrangement agreed in the loan agreement and described in the other project documentation, to determine whether the Borrower’s compliance with environmental covenant (primarily with EMP) is satisfactory. If compliance is not satisfactory, the WB will discuss with the Borrower action necessary to comply.

- The local DONRE is entrusted to supervise the environmental compliance of the project.

- By the end of project construction stage, the Environmental Management Agencies will coordinate with Construction Management Agencies to supervise the compliance of environmental management activities stated in EIA study.

- Follow the ESCP and the approved ESIA, RPF, RPs, SEP, and LMP of the Project.
1.3. PROJECT DESCRIPTION

1.3.1. Location of project items

The project is implemented in Vinh Long city with 7 central wards including Ward 1, 2, 3, 4, 5, 8 and 9 with an area of 20.59 km$^2$ and population of 109,124.

![Figure 1: Location of project area](image)

**Table 4: Summary of the project’s scale**

<table>
<thead>
<tr>
<th>No.</th>
<th>Component/work items</th>
<th>Investment scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Component 1: Flood risk management and environmental sanitation</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Construction of drainage system</td>
<td>Investment in construction of rainwater drainage system combined with rehabilitation of sidewalks and trees in low-lying areas in core wards with an area of 2,060 hectares and a population of about 112,000 people.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Invest in round culvert system from D400-D1200: L = 26.3km.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rehabilitate sidewalks in combination with planting trees: S = 240,000 m$^2$.</td>
</tr>
<tr>
<td>2</td>
<td>Wastewater collection and treatment system</td>
<td>Connection to households: 26,000 households.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Construct main wastewater collection pipeline DN300 -DN800: L = 58.3km.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Construct of service wastewater collection system DN160-DN225: L = 105.7km.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Construct 02 sewer lines across Cau Lo and Long Ho rivers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Construct 30 combined sewer overflow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Construct 08 pumping stations.</td>
</tr>
<tr>
<td>No.</td>
<td>Component/work items</td>
<td>Investment scale</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Treatment plant: Construct 01 WWTP, capacity 15,000 m³/day using biological technology.</td>
</tr>
<tr>
<td>3</td>
<td>Flood control in urban core area</td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Long Ho river embankment</td>
<td>Works include: Embankment by vertical gravity concrete wall system, construction of walkway combined with operation management. 3km-long of both sides of Long Ho canal, L = 6km</td>
</tr>
</tbody>
</table>
| 3.2 | Construction of tidal sluicegate              | - Quantity: 9.  
- Width: 4.0m -12.0m.                                                                                                                                                                                        |
| 3.3 | Improvement of the main drainage canal system | - L = 22km.  
- Works include: Dredging, soft embankment with precast concrete combined with ecological sacks with the slope 1:1.5.                                                                                  |

**II Component 2: Strategic corridors development**

|     |                                              |                                                                                                                                                                                                                       |
| 4   | Construction of connection road between ward 8 and 9 | - L=3km.  
- Width: 6m+8m+2m+8m+6m=30m.  
- Associated technical infrastructure: rainwater drainage, waste water drainage, lighting electricity, water supply, technical trenches, relocation of domestic electricity grids and trees. |
| 5   | Construction of main road No.1               | - L=5.5 km.  
- Width: 6m+8m+2m+8m+6m=30m.  
- Associated technical infrastructure: rainwater drainage, waste water drainage, lighting electricity, water supply, technical trenches, relocation of domestic electricity grids and trees. |
| 6   | Construction of main road No.2               | - L=5.8 km.  
- Width: 7.5m +7m+1m+7m+7.5m =30m.  
- Associated technical infrastructure: lighting electricity, trees.                                                                                     |

**III Component 3: Compensation and Resettlement**

| 7   | Construction of infrastructure for resettlement area in Ward 8 | - Area: 12.5 ha.  
- Works: Leveling, building roads, water supply and drainage, domestic electricity, lighting, greenery, parks, kindergartens, markets and elementary schools. |
Figure 2: General layout of investment items
### 1.3.2. Detailed Description on Vinh Long project investments

**Table 5: Detail description of work items**

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Description</th>
<th>Investment scale</th>
<th>Land acquisition, resettlement</th>
<th>Figures</th>
</tr>
</thead>
</table>
| I   | Component 1: Flood risk management and environmental sanitation | - Location: Wards 2, 3, 4 and 5, Vinh Long City  
- Current status of use: rainwater drainage system drains naturally, run-off on the surface and exit to surrounding canals.  
- Technical conditions: drainage ditches are open, made of soil or cement, degraded.  
- Current residential situation: The population density is high in rehabilitated areas | - Invest in construction of rainwater drainage systems in combination with rehabilitation of sidewalks and trees in low-lying areas in the urban core area with area of 2,060 hectares and population of about 112,000 people.  
- Invest in round culvert system from D400-D1200 for roads in urban core: L = 26.3 km.  
- Rehabilitate sidewalks in combination with planting trees and investing in lighting system: Area = 240,000 m². | - Number of affected HHs: 130 HHs  
- Resettlement HHs: 25 | ![The basin with rehabilitated drainage system](image1)  
[Rehabilitated residential area](image2) |
<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Description</th>
<th>Investment scale</th>
<th>Land acquisition, resettlement</th>
<th>Figures</th>
</tr>
</thead>
</table>
| 2   | Construction of wastewater collection and treatment system           | - Current status of use: Rainwater and wastewater drainage systems of households are combined system, naturally discharge and exit to surrounding canals.  
- Technical conditions: built by local residents, rudimentary, asynchronous and not collected for treatment. Most are seriously damaged and degraded.  
- Current population: high density | - Household connection: 26,000 households.  
- Construct of main collection system DN300-DN800: L = 58.3km  
- Constructing of service wastewater collection system DN160-DN225: L = 105.7km.  
- Construct 02 pipelines across the bridges of Cau Lo and Long Ho rivers  
- Construct 30 wastewater overflow chambers  
- Construct 8 pumping stations.                                                                 | - Number of affected HHs: 0  
- Number of resettled HHs: 0 | ![Scope of wastewater collection](image)  
- ![Diagram of household wastewater collection](image)  
- ![Rehabilitated households](image) |
<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
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<th>Land acquisition, resettlement</th>
<th>Figures</th>
</tr>
</thead>
</table>
|     |      | - Location: Thanh Duc commune, Long Ho district  
- Current status of use: agricultural land of local people (rice).  
- Current residential situation: There are about 10 households living away from the project site about 150m to the west.  
- About 3.1 km from Co Chien river. | - Treatment: Construct 01 WWTP capacity 15,000m³/day using biological technology. | - Number of affected HHs: 200  
- Number of resettled HHs: 30 | ![Location of WWTP of the project](image1)  
![WWTP area](image2) |
<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td>Flood control in urban core area</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 3.1 | Long Ho river embankment | - Location: Ward 4 and 5 - Vinh Long City  
- Current status of use: The land area along Long Ho river bank is mainly residential land, a part is vacant land and land for local people's business activities.  
- Technical conditions: No embankment, river banks are in soil or households are living near the river banks.  
- Current residential situation: The population is densely concentrated along 02 banks of Long Ho river. | - $L=6.0$ km; works include: embankment by vertical gravity wall system, construct walkway system combined with operation management | - Number of affected HHs: 600  
- Number of resettled HHs: 280 | ![Location of Long Ho river embankment](image1)  
![Cross-section of Long Ho river embankment](image2)  
![Existing banks of Long Ho river](image3) |
### No. 3.2 Constructing tidal gate system

- **Location:** Ward 1, 2, 3, 4, 5, 8 and 9 - Vinh Long City  
  - **Current status of use:** the areas of intersections of canals and water area.  
  - **Current residential situation:** Most of the households live >30m from tidal gate area. However, the location of sewers 6, 7 and 8 is 10m far from the population.

- **Quantity:** 9 sewers.  
- **Width:** 4.0m-12.0m.  
- **RC sewer M300.**

- **Number of affected HHs:** 0  
- **Number of resettled HHs:** 0

#### Land acquisition, resettlement

- [Location of tidal gates](#)
- [Front view and cross-section of tidal gate B=12m](#)
- [Illustration picture of tidal gate area](#)
### Improvement of the main drainage canal system in the inner city

- **Location**: Ward 1, 2, 3, 4, 5, 8 and 9 - Vinh Long City
- **Current status of use**: Surface water drainage canals of Vinh Long city but have been filled and encroached. Plants and water hyacinth grow much on the main stream of canals causing obstruction of the flow.
- **Current residential situation**: People live along 02 banks of canals.

**Investment scale**
- **L** = 22km, including Nga Cay, Tan Huu and Binh Lu canals.
- **Works include**: Dredging, soft embankment with precast concrete combined with ecological sacks with the slope of 1: 1.5.
- **Dredging elevation**: -2.0m.
- **The width of the channel bottom is 8 - 18m.**

### Figures

- **Typical section of embankment**
- **Typical section of vertical riprap stone embankment**
- **Canals in the project area**
<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
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<th>Investment scale</th>
<th>Land acquisition, resettlement</th>
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</thead>
<tbody>
<tr>
<td>II</td>
<td>Component 2: Urban strategic corridor development</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 4   | Construction of roads connecting ward 8 and 9 | - Location: Ward 8 and 9 - Vinh Long City  
- Current status of use: The route mainly goes through bare land, agricultural cultivation land.  
- Technical conditions: This is a new route, the terrain is mostly flat land, interlaced by residential areas  
- Current residential situation: People live scatteredly along the route, however, they are concentrated at the beginning and the middle of the route with a distance of about 10-20m. | - L = 3km.  
- Bbase = 30.0m, B surface = 16.0m.  
- B sidewalk = 12.0m.  
- B separator 2.0m  
- Associated technical infrastructure: rainwater drainage, waste water drainage, lighting electricity, water supply, technical trenches, relocation of domestic electricity grids and trees. | - Number of affected HHs: 150  
- Number of resettled HHs: 65 | |
### Construction of the main road No.1

- **Location:** Ward 3, 8 - Vinh Long City; Phuoc Hau, Tan Hanh Commune - Long Ho District
- **Current status of use:** The route mainly goes through bare land, agricultural cultivation land.
- **Technical conditions:** This is a new route, the terrain is mostly flat land, interlaced with residential areas, in addition, there are intersections of canals in the area.
- **Current residential situation:** The population are concentrated at the beginning of the route, close to the provincial road 53, in addition scattered at the intersections with the canals. The nearest distance from the project to the residents' houses is about 5-10m.

### Investment scale

- **L**: 5.5 km.
- **B<sub>base</sub>**: 30.0m, **B<sub>surface</sub>**: 16.0m.
- **B<sub>sidewalk</sub>**: 12.0m.
- **B<sub>separator</sub>**: 2.0m.
- Associated technical infrastructure: rainwater drainage, waste water drainage, lighting electricity, water supply, technical trenches, relocation of domestic electricity grids and trees.

### Land acquisition, resettlement

- Number of affected HHs: 300
- Number of resettled HHs: 70

### Figures

- Location of main road No.1
- Cross-section of main road No.1
- Intersection with NH53
### Construction of the main road No 2

- **Location:** Ward 3, 8 - Vinh Long City; Phuoc Hau, Tan Hanh Commune - Long Ho District
- **Current status of use:** The route mainly goes through bare land, agricultural cultivation land.
- **Technical conditions:** This is a new route, the terrain is mostly flat land, interlaced with residential areas, in addition, there are intersections of canals in the area.
- **Current residential situation:** The population is concentrated at the beginning of the route, close to the provincial road 53, and scattered at the intersections with the canals. The nearest distance from the project to the residents’ houses is about 5-10m.

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Description</th>
<th>Investment scale</th>
<th>Land acquisition, resettlement</th>
<th>Figures</th>
</tr>
</thead>
</table>
| 6   |      | - L = 5.8 km.  
- Bbase = 30.0m, B surface = 14.0m.  
- Reserve land margin width: 15.0m.  
- Width of separator: 1.0m.  
- Associated technical infrastructure: electric lighting, trees. | - Number of affected HHs: 300  
- Number of resettled HHs: 80 | [Location of main road No.2](#)  
[Cross-section of main road No.2](#)  
[Intersection with NH53](#) |
## Component 3: Compensation and Resettlement

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Description</th>
<th>Investment scale</th>
<th>Land acquisition, resettlement</th>
<th>Figures</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>Component 3: Compensation and Resettlement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 7   | Construction of infrastructure for resettlement area of ward 8 | - Location: Ward 8 - Vinh Long City  
  - Current status of use: The planned resettlement area is the area of agricultural cultivation land.  
  - Current residential situation: People living around the resettlement area, the nearest distance to households is about 10-30m. | - Area: 12.5 ha.  
  - Works: Leveling, building roads, water supply and drainage, electricity, lighting, trees, parks, kindergartens, markets and elementary schools. | - Number of affected HHs: 120  
  - Number of resettled HHs: 0 | ![Location of resettlement area](image1.jpg)  
![Resettlement area](image2.jpg)  
![Resettlement area](image3.jpg) |
1.3.3. Construction methods

Vinh Long UDCR is a multidisciplinary project with diverse works items. Therefore, the construction plan and technologies will be based on each type of works item, specifications, construction conditions at the site and requirements on constructions. Designs and construction activities must closely comply with construction standards, regulations and practices of Vietnam and refer to international standards, regulations and practices applicable in Vietnam. The project’s works construction methods which are excerpted from the project’s “Feasibility Study” are presented below.

Construction methods: Before construction, a notice to stakeholder is required so that the stakeholders can work closely together in the course of construction. This is an important and complicated stage that requires good cooperation of the project Owner and Construction Unit to ensure schedule and timeframe, promptly handle arising problems (if any).

Prior to construction commencement, it should identify of the project boundary, prepare of service roads, determine of material supplying sources, prepare material and equipment gathering yards and human resources, etc.

1. Embankment

Slope embankment with bank revetment
- Excavate talus as designed, slope coefficient m=2.
- Spread filter fabric flatly and pin tightly.
- Pave macadam lining layer (1x2) with a thickness of 10cm, conduct dry rubble masonry to tighten the embankment foot.
- Pour cement mortar, small-size gravel M50 with thickness of 5cm at frame of beams, 20m/frame.
- Pour reinforced concrete M250 for the embankment slope frame with a dimension described in the design drawing.
- The settlement between two reinforced concrete frames M250 is made of asphalt paper soaked with asphalt, 20m/settlement.
- Pave macadam lining layer (1x2) with a thickness of 10cm to flatten the embankment slope
- Arrange components in revement cells in a row, from bottom to the top. Install components at positions bordering with longitudinal and horizontal beams. If lacking component cells, it must pour on-spot concrete M250 with a thickness of 15 cm, the permissible space between two components is <0.5 cm.

Construction of road on the embankment peak:
- Clean of road bed: create a mold for flattening and compaction.
- Pour cement mortar, small-size gravel M50 with thickness of 5cm.
- Pour concrete M200 stone (2x4) width of B=1m, thickness of 15cm.
- The settlement between two reinforced concrete slab is made of asphalt paper soaked with asphalt toward the longitudinal direction, 5m/settlement

Construction of steps:
- Pave macadam lining layer (1x2) with thickness of 10cm.
- Stone masonry with cement grout M100.

2. Construction of roads

Preparation
- Site preparation: relocation of civil works, handing over the site to the construction Contractor.
- Mobilization of human resources, construction equipment; agreement, application for
permit for construction.
- Cleaning: demolition of all types of obstacles and structures in the construction site.
- Installation of temporary culverts for irrigation.

Construction of normal roadbed: Combination of manually and mechanically excavation of bulldozers, excavators, trucks, and graders and workers to excavate organic soil, sludge and clay to transport to regulated disposal site. The construction can be applied with each half of the road bed. It requires gathering the excavated soil volume that is not usable for backfilling of the other half of the road. Soil must be embanked layer-to-layer and compacted in compliance with the existing construction process to ensure the required tightness.

Construction of culverts across the road
- For normal road bed: Culverts across the road will be constructed at the same time with construction of road bed. Place temporary culverts to ensure drainage in the area. The road bed will be built at the elevation of bottom foundation, then the culvert will be installed.
- Construction of foundation and installation of culverts across the road before embankment of road bed. The culverts are structured of centrifugal casting pipes which are manufactured at and transported by local factories.
- Backfilling of soil on both sides of culverts with a min thickness of 50cm before construction of road bed to avoid cracks of the culverts.

Construction of wastewater sewer
- Excavation of foundation. Due to great depth, sheet piles will be used to stabilize the foundation wall.
- Foundation of the sewers is paved by a macadam lining layer with 10cm thick
- Sewer pipes are made of HDPE,
- Manhole for drainage is structured of at-place cement concrete C16.
- Backfilling soil on the sewer pipes.

Construction of longitudinal culverts
- Construct the road bed to the bottom elevation of the culvert foundation. Apply a lining layer.
- Install support blocks.
- Install culvert pipes, joints.
- Construct manhole by on-sport reinforced concrete.
- Install curb inlets, curb, slabs.

Construction of horizontal and longitudinal technical tunnels
- Tunnels are constructed at the same time with construction of road bed
- Excavate road bed to the bottom of the foundation.
- Construct tunnels by a lining macadam layer and on-spot poured concrete.
- Precast tunnels are transported to the site. Construction of tunnel manhole by on-spot poured concrete.
- Install slabs of technical components inside the tunnels.

Construction of road surface: Repair and complete the road mold, compaction should be carried out to ensure that 30cm of road base under the pavement reaches the tightness $K \geq 0.98$.
- For road pavement of asphalt concrete:
  + Apply each class-II lower graded aggregate base layer under the Specifications on construction and acceptance of TCVN 8859-2011
  + Apply each class-I lower graded aggregate base layer under the Specifications on
construction and acceptance of TCVN 8859-2011

+ Apply prime coat 1kg/m² on the surface of the graded aggregate base layer.
+ Apply hot mix asphalt concrete with medium-size-particle, thickness of 7cm. The construction orders of the asphalt concrete pavement must be in compliance with the Specifications on construction and acceptance of TCVN8819:2011.
+ Apply the tack coat 0.5kg/m² on the surface of the graded aggregate base layer.
+ Apply hot mix asphalt concrete with small-size-particle, a thickness of 5cm. The construction orders of the asphalt concrete pavement must be in compliance with the Specifications on construction and acceptance of TCVN8819:2011.

- For the option of cement concrete pavement:
  + Apply each class-II lower graded aggregate base layer under the Specifications on construction and acceptance of TCVN 8859-2011
  + Apply each cement-reinforced graded aggregate base layer 5% with a thickness of 15cm under the Specifications on construction and acceptance of TCVN8858:2011.
  + Pave a thick paper layer for flatenning
  + Install connection steel bars at connecting joints
  + Construction of concrete pavement layer by a specialized paver. SP-500 paver or equivalent is recommended
  + Fulfill joints between cement concrete slabs

- Construction of sidewalks
  + Manually apply a concrete layer C20 close to the edge of cement concrete slabs to the height of curb bottom.
  + Install curbs
  + Apply concrete on slope of ditches (30cm width) close to the curb to create a slope between two manholes toward the surface inlet.
  + Apply lining gold sand layer on the sidewalks
  + Pave block bricks
  + Construct on-spot poured concrete C20 at the outer edge of sidewalk

- Completion
  + Install power posts and signs.
  + Plant grass on the slope.
  + Apply road paint.

3. Construction of bridges on roads

Construction of abutments and piers on land

- Step 1: Site leveling.
  + Site leveling at the designed elevation.
  + Gather materials and equipment for construction.
  + Identify centerline of piles.

- Step 2: Construction of bored piles.
  + Identify exact position of piles.
  + Sink the casing
  + Drilling to create holes and install and sink reinforced casing
  + Install concrete pouring pipe + hopper.
**Environmental and Social Impact Assessment**
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- **Step 3: Construction of foundation**
  - Pour concrete for bored piles.
  - Combine mechanical and manual excavation by machines and workers.
  - Drain water in the foundation, dam the pile head, clean the foundation.
  - Pave macadam on the bottom and concrete layer for flattening.

- **Step 4: Construction of foundation footing**
  - Dam the pile head, clean the foundation.
  - Erect scaffolding, reinforced formwork, pour concrete for abutment footing.

- **Step 5: Construction of body**
  - Backfill of soil in the foundation.
  - Erect scaffolding, reinforced formwork.
  - Pour concrete.
  - After reaching concrete’s strength, remove the scaffolding, formworks and completion.

**Construction of pier under water**

- **Step 1: Construction of bored piles cọc khoan nhơi**
  - Identify exact position of piles, install guide frame and sink the steel casing by working platform and vibrohammer.
  - Drilling to create holes and install and sink reinforced casing
  - Install concrete pouring pipe + hopper
  - Pour concrete for bored piles.

- **Step 2: Foundation**
  - Use crane and vibrohammer on the floating system to drive the sheet piles surrounding the foundation.
  - After finishing the sheet piles, excavate the foundation at the elevation of the fouilk.
  - Pour the concrete for the fouilk.

- **Step 3: Construction of foundation footing**
  - After the concrete of fouilk reaches the required strength, drain water in the foundation, insert support frame, ham the pile head, clean the foundation.
  - Pour concrete layer for flattening.
  - Erect scaffolding, reinforced formwork, pour concrete for pier footing.

- **Step 4: concrete pouring for pier body**
  - After concrete of the pier footing reaches required strength, pump water in the foundation
  - Remove the supporting frame of pier body
  - Pour concrete for the pier body into stages.
  - Erect scaffolding, reinforced formworks, pour concrete for pier body.

**Construction of continuous box girder for cantilever balanced bridge by prestressed concrete**

- Erect scaffolding for constructing the main pier body;
- Install formworks, pour reinforced concrete;
- Erect temporary piers, scaffolding at the adjacent piers;
- Stretch the prestressed cable, block K0;
Cast remaining segments by cantilever balanced method.
- Stretch prestressed cable upon completion of each pair of casted segments;
- Construct enol blocks next to adjacent piers;
- Construct closer section of the bridge;
- Stretch prestressed cable of closer section for spans.

Construction of approach span
- Step 1: Installation of beam launcher
  + Beam launcher is transported to the site
  + Transport components of the beam launcher to the approach roads of the bridge
- Step 2: Beam erection
  + Transport beams from the gathering yard, put beams into the beam launcher, use the beam launcher to erect beams in bearing positions
  + Install beam slabs
- Step 3: Completion
  + After finishing beam launching for bridge spans, construct bridge deck, expansion joints, hand rail and completion

Construction of main span
- Step 1: Construct casted segments on the piers T3, T4
- Step 2: Construct close section of the bridge
- Step 3: Completion

Construction site: Based on the workload, the construction schedule as well as the topography of the construction area, overall site is described as follows:
- The area of construction sites, warehouses, offices and shelters is planned to be arranged on both banks, specifically:
  + The bank toward Ninh Kieu: Arrange a site for construction of approach bridge, main bridge on the bank toward Ninh Kieu
  + The bank toward Cai Rang: Arrange a site for construction of approach bridge, main bridge on the bank toward Cai Rang.
- Transportation of equipment to the site by waterway and roads.
  + Power from national grid, and back-up generator.
  + Water for domestic and construction activities: use water for domestic activities; also treated water from drilled well can be used.

Construction schedule
- For the above-mentioned construction schedule, it should ensure good preparation of compensation for site clearance, UXO clearance, preparation of construction sites, gathering of machines and equipment, interleaved construction of works items.
- Construction of piers underwater in dry seasons.

4. Dredging and rehabilitation of canals
Dredging of urban drainage system will use dredge pumps, specialized machines for dredging sludge, soil, wastes and insoluble solid objects. The processes are as follows:
- Collect all wastes to specialized vehicles, cover by slabs, clean the constructed area, reinstate the area.
- Coordinate with specialized agencies to transport all collected wastes to the approved disposal site and comply with set forth process.
Soil excavation and sludge dredging in canals must be both mechanically and manually implemented. Canal bed will be dredged by excavators with bucket of 0.8 m³. At the sections where the flow has been already formed, the dredging depth must be 0.8m. Meanwhile, for the designed routes which require creating flow, the dredged depth is at 1.5m. The dredged materials must be manually transported to the gathering site along the canal to be collected and transported to landfills. At the positions where the dredged volume is small and where the machines cannot access as well as the at the position repairing the talus, manual activities will be conducted. The landfills and borrow pits (if additional volume is required) will be discussed with local authorities and accepted by the supervision consultant before conducting follow-up steps.

5. Construction of culverts

Transportation of materials and equipment: The site is situated in the area which is convenient in both roads and waterway. However, with large-volume of materials and equipment, transportation by waterway is recommended thanks to economical factor.

Conditions for construction

- Embankment materials: Some works items will use soil for backfilling, including: pavement of roads, approach roads to the bridge, both sides of culverts, parks, etc. However, as the soil volume for backfill is not large, the soil excavated from the culvert foundation and canal can be enough.
- Other materials:
  + Sand, stone and gravel: bought from Can Tho, Dong Thap or other suppliers in Vinh Long city.
  + Hollow brick, solid brick, tiles: bought in Vinh Long city, Can Tho and neighboring provinces.

Power supply

- Power is supplied to serve for construction, management and operation of works items in the operation phase.
- The main power supply source is from the national grid. Install 120 kVA transmission lines and transformer stations to get electricity from the 22 kV medium voltage grid in the region, lowering to 0.4 kV to serve for construction and management activities.
- In addition, a back-up 33 kVA generator is arranged for construction and operation of works items in case of power outage.
- Water for construction: use water for domestic activities of local people or water from drilled wells.

Construction method: General regulations: The construction process and quality control must strictly comply with existing construction regulations of the State.
- Water diversion for construction: As the bridge is constructed in the river in various phases, water flow will be diverted through the remaining section of the river and the narrow-down section must ensure the required drainage flow (frequency of flow diversion P = 10%). Based on the general diagram, the flow diversion is as following:
  + Phase 1: the water flow is diverted through the remaining natural river bed to construct nozzles near the shore and locks.
  + Phase 2: The flow is diverted through 02 constructed nozzles; and the remaining flow will be blocked to construct the main nozzles.
  + Phase 3: Water is diverted through 03 constructed nozzles.
Water drain in the foundation: sheet pile will be erected to prevent water from overflowing in the foundation and water in the foundation will be drained. Then, water must be gradually pumped to avoid slipping and falling of the sheet piles. Normally, every 0.5m water level pumped, a suspension of 2÷3 will be applied to check the stability of the sheet piles. Also, it should observe the situation of the pile in the course of pumping in order to take prompt handling (if any).

6. Construction of wastewater treatment plant

Removal of the weathered soil layer, ground leveling in layers at the thickness of 200mm, compacted with K=0.95.

Reinforced concrete: precasted, construction by pre-boring method.

Construction and manufacture of reinforced concrete: on-spot poured concrete, the depth of the foundation is > 3m, constructed by excavation and use lasen sheep pile.

Construction of road:

- Construction of Graded Aggregate Layer:
  
  + Before paving materials on the roadbed, it requires to watering to the most suitable humidity for compaction. If the humidity is not suitable, it should carry out both watering and paving at the same time: Use Stec truck with with a hand-held nozzle, which is slanted toward the sky to create rain to avoid washing away small particles while ensuring evenly watering. Use a watering tank to spray in narrow spaces.
  
  + In the course of leveling and material paving, if there are waving, stratification or other abnormal signs recorded, immediate remedies must be proposed. For stratification situation, the materials must be re-mixed manually or replaced by new materials until satisfying the requirements.

- Construction of asphalt concrete: Compaction of the mixture of asphalt concrete: Where the asphalt concrete is paved, it must be immediately compacted when the material conditions are suitable. Besides, material cracks and pushing must be avoided.

- To prevent the mixture from sticking to the roller, the roller’s wheels moist must be provided by spraying adequately water mixed with a little detergent.

After compaction, if the locally damaged parts are realized (discrete, too much asphalt, peel, cracking, etc.) are detected, the mixture which has not been cooled completely, must be removed; then applying the liquid asphalt layer at the bottom and surrounding the edge, and finally pouring a good quality concrete mixture and make compaction again.

7. Construction of resettlement site in Ward 8

Subgrading:

- Designing the subgrading of each land lot with the subgrading slope of I = 0.003-0.004 to ensure automatic drainage and the organic relationship between the masonry and the roads surrounding the land.

- For the compaction density of the embankment: the entire compacted sand area with the compaction K = 0.90.

- The volume of subgrading is calculated separately for each lot by the square grid method of size 20x20 m.

- Before subgrading, the demarcation of the roadway section must be marked, and the current status of the roadway elevation must be checked to completely remove the organic layer so that the depth of the compacted sand layer is at least 80 cm thick including 30 cm K98 and 50 cm K95. Remove only 30 cm of the organic soil if the actual elevation is low.
Traffic system:

- Because the natural terrain of the area is a plain one, the longitudinal section of design is not very steep and is controlled by the general elevation of the city center. Besides, the design consultant also considers the local specific conditions to make the elevation suit the surface water drainage demand of the entire neighboring residential area.

- Structure of the road surface: designed according to the standards of the main urban road in the area with high-grade road surface A1, $E_{yc} = 1530$ daN / cm$^2$.

  + 5-cm fine-grained concrete road
  + The bituminous tack coat with the standard of 0.5kg/m$^2$
  + 5-cm dry granulated concrete
  + The bituminous tack coat with the standard of 1.0 kg/m$^2$
  + 18-cm crushed aggregate base course
  + 35-cm crushed aggregate subbase course
  + 30-cm-thick compact, black sand (K98)

Drainage system

- The drainage system in the area is designed with brick masonry system of size $B*H = 1*1.2m; B*H = 0.8*1.0m; B*H = 0.6*0.8m; B*H = 0.5*0.7m$ runs along the sidewalk, then connects to QL53.

- At the intersections, designing the precast road culverts. Similarly, for drain-ditches, constructing appropriately sized sewers including B1200, B1000, B800 culverts. The structure of the drain from the bottom should be made of 2-meter-long bamboo piles with a density of 20 piles/m$^2$, a 10-cm-thick crushed stone base course (1x2cm), 20-cm-thick concrete base-course M150 - stone 2*4, reinforced concrete culvert pipe M250 – stone 1*2.

- Arranging a manhole system to collect water directly from the road surface and carrying out the maintenance services with a distance of 30-40m/manhole, the top of the manhole cover the pavement surface

Power supply and lighting systems: Based on the project practical conditions, technical and aesthetic requirements of residential areas, services, resettlement and public works, resettlement areas, fully using 10kV wire sets, 24kV XLPE insulated underground cable with an armored steel tape, vertical waterproofing with a cross-section of 3x50mm$^2$, cable symbol: Cu/XLPE/PVC/DSTA/PVC 3x50-W-24kV.

Water supply system: This residential area is connected to a D200 pipe on National Highway 53. Water supplied to the residential areas is for domestic use, and the fire protection water systems use the PVC DN10; HDPE DN63; HDPE DN50 systems.

1.3.4. List of equipment, machines use for project

Table provides a list of key equipment deployed for construction work. Depending on the nature of work, contractor capacity, and weather conditions the use of equipment may vary.

<table>
<thead>
<tr>
<th>No.</th>
<th>Machines</th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Excavators with one bucket, bucket capacity of 0.8 m$^3$</td>
<td>1</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>Bulldozers 108 CV</td>
<td>1</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>Self-propelled graders 108CV</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>4.</td>
<td>Excavator 2m$^3$</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>
1.3.5. Demand for Raw Materials, Fuels and Disposal Sites

❖ Construction materials:

According to the feasibility study report of the project, the demand for raw materials used for the construction project are presented in the following table:

*Table 7: The list and quantity of raw materials used for projects*

<table>
<thead>
<tr>
<th>No.</th>
<th>Work items</th>
<th>Volumn</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cement (kg)</td>
</tr>
<tr>
<td>1.</td>
<td>Upgrading drainage system</td>
<td>544,067</td>
</tr>
<tr>
<td>2.</td>
<td>Wastewater collection and treatment</td>
<td>481,960</td>
</tr>
<tr>
<td>3.</td>
<td>Flood mitigation</td>
<td>900,095</td>
</tr>
<tr>
<td>4.</td>
<td>Ward 8-Ward 9 road</td>
<td>1,134,833</td>
</tr>
<tr>
<td>5.</td>
<td>Urban main road 1</td>
<td>1,365,732</td>
</tr>
<tr>
<td>6.</td>
<td>Urban main road 2</td>
<td>1,274,372</td>
</tr>
<tr>
<td>7.</td>
<td>Resettlement site</td>
<td>2,176,380</td>
</tr>
</tbody>
</table>

(Source: FS, 2020)

❖ Supply sources

Materials such as sand, earth materials and gravel will be purchased from suppliers in Can Tho
city, Dong Thap province or from suppliers in Vinh Long city.


All the materials shall be tested for the quality according to the current regulations. If the materials do not meet the technical standards, the contractor shall change to the other qualified sources. Demands for materials and technical supplies will be in accordance with the construction progress. The material supply will take into account the depreciation due to transport and unloading.

**Table 8: Locations of potential stone and sand sources**

<table>
<thead>
<tr>
<th>Item</th>
<th>Sand sources</th>
<th>Stone sources</th>
<th>Earth Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier/Companies (Will be identified at later stage)</td>
<td>Vinh Long city, Can Tho city, Dong Thap province</td>
<td>Dong Nai, An Giang</td>
<td>Nearby</td>
</tr>
<tr>
<td>Location</td>
<td>10-60</td>
<td>150</td>
<td>10-20</td>
</tr>
<tr>
<td>Distance from project (km)</td>
<td>2,000 m³ to 5,000 m³</td>
<td>2,000 m³ to 5,000 m³</td>
<td>2,000 m³ to 5,000 m³</td>
</tr>
<tr>
<td>Capacity (m³)</td>
<td>Domestic Waterway</td>
<td>Domestic Waterway</td>
<td>Road/waterway</td>
</tr>
<tr>
<td>Transportation</td>
<td>Obtained by supplier</td>
<td>Obtained by supplier</td>
<td>Obtained by supplier</td>
</tr>
<tr>
<td>Environmental License</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Source: FS, 2020)

Sand, stone quarries and soil pits are operational since 2009 with permission granted by Dong Nai, An giang, Hau Giang PPC. Their supplies are not only for infrastructure projects in Hau Giang but also Dong Nai and An Giang Province. The Vinh Long project does not involve large-scale extraction of sand, stone and earth materials, therefore, does not require opening of any new quarry. None of those quarries is an exclusive source for the project.

❖ **Fuel and Power Supply**

Power will be supplied via the national grid, which is an easy access to the project area. Back-up power generator will be also in place to make sure the construction work will be not disrupted in case of power outages. Fuel, oil and gas are supplied from the local oil and gas company whose fuel station network is accessible to all.

❖ **Water Supply**

Water sources for work execution will mainly come from Co Chien and Long Ho rivers. For construction areas that are afar from the water sources or the water is under quality, water tank trucks shall be used for transferring water to the construction sites.

For domestic water use, depending on conditions of given sites, water can be supplied from the available centralized water supply schemes or the permitted groundwater wells at the construction sites. Where water schemes are not accessible, water from wells will be purified through an on-site simple filter system and/or clean water in tanks is supplied to ensure the hygienic/clean water is available for use.

❖ **Wastes and Waste Treatment**

The construction works in Vinh Long project include roads, canal embankment, sewage
installation, waste water treatment station thus the waste generated during the construction work will be typically solid waste, sludge and domestic waste and wastewater. There is no hazardous waste generated as according to the quality test of sludge, metals are under acceptable limits but organic content is higher. Thus, sludge is classified as organic contaminated sludge.

- Excavated soils: The amount of excavated soil estimated to be 128,378 m$^3$ from the constructions of connecting roads, sewage installation, waste water treatment station, among others. This soil is reused for leveling where needed or disposed at Hoa Phu landfill.

- Dredged sediments: The estimates of sludge is about 42,000 m$^3$ from the canals. According to the analyses on sediment/soil at the construction site (implemented by Tan Huy Hoang Environment Consulting Service Trading Company Limited VIMCERTS 076, the sediments from the canals contain levels of heavy metals. The sediments could then be used for perennial crops or planting tree for urban landscape purpose, based on the actual needs of local people. Otherwise, dredged sludge will be transported and disposed at Hoa Phu and Phuong Thao landfill.

- Hazardous waste: will be collected and temporarily stored in the repository located in the construction area before being transported out for treatment at an appropriate waste treatment facility as according to the contract between the contractor and waste facility.

- Domestic Waste: This waste generated from the activities of workers on site. It is estimated about 192 kg/day and added up to total about 5.76 tons/month.

❖ Waste Treatment Facilities and Disposal Sites

Vinh Long currently has 2 waste facilities: Hoa Phu landfill and Phuong Thao Waste Treatment Plant (WTP). Both facilities are located in Hoa Phu commune, Long Ho District of Vinh Long City, 13 km far from Vinh Long City.

Waste from canal dredging and other solid waste from the project will be transported to these sites for treatment or landfiling. The contractor should make an assessment on the capacity and treatment technology of the facilities to make sure the waste to be treated appropriately and compliantly with the regulations. Positions and capacity of wastes treatment sites must be discussed and agreed with the local authorities. The sites will be selected on cost-effective analysis and get agreements by the local authorities. Information about the disposal sites are summarized as follows:

Hoa Phu Disposal/ Landfill Site:

Hòa Phú disposal site (18.36 ha) receives the solid waste and domestic waste from Vinh Long City and 5 districts of Mang Thit, Long Ho, Tam Binh, Bình Tsn and Vung Liem of Vinh Long province. The site managed by One Member Vinh Long Public Utility Ltd and operated since 2012 with total landfilling capacity of 86,000 tons. Currently, it received 70,000 tons already while the daily load is about 120 tons.

The sludge will be physically screened to remove garbage before being dumped to waste cells, sprayed with biological enzyme and covered with 20 cm layer of sand to minimize bad odor. After 2-3 months the sludge is dried out then can be used for leveling the disposal site.

The leachate from the landfill is stored in a lagoon next to the sanitized landfill. The leachate is often pumped back to the landfill to increase the moisture, accelerating the biological degradation processes. Water level in the lagoon is measured and controlled to avoid overflow, especially in the rainy season. The treatment of leachate in the pond follows chemical and biological treatment, disinfection and being discharge to the natural lake.

Phuong Thao Waste Treatment Plant:

Phuong Thao WTP (8 ha) deploys a treatment technology from Germany (300 tons/day),
destroying the original waste volume by 93%. The investment started in 2009 however the plant was closed in 2013 after 9 months of operation due to lack of input waste, low treatment fee and other legislation obstacles. The WTP resumes to work since September 2016 after 2 years of closing with the support from the province authority in renovating the equipment and leveraging the treatment fee so the company can make a return. Currently, it receives daily load of 215 tons/day from different districts in the province such as from Vinh Long City (120 tons), Long Ho (26 tons), Binh Minh (17 tons), Mang Thit (8 tons), Binh Tan (10 tons), Tam Binh (19 tons) and Vung Liem (15 tons). The WTP can treat domestic waste, medical waste and industrial waste. It is understood that the SWP does not recover the heat generated from waste incineration. The contractor/province authority should check on whether the emitted smoke is toxic to the environment.

Transportation dredged sediments and other waste from construction site to the waste treatment plant and landfill needs to be in good cover to ensure the waste does not leak along the transportation route.

❖ **Demand on workers**

The number of workers for each construction site is 50 - 100. In order to reduce cost, create jobs for local people and limit social-environment impacts due to labor influx, local workers will be prioritized.

**Table 9: Expected number of workers at the sites**

<table>
<thead>
<tr>
<th>No.</th>
<th>Works</th>
<th>Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Urban drainage system</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>Wastewater collection and treatment system</td>
<td>70</td>
</tr>
<tr>
<td>3</td>
<td>Flood control in urban core area</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>Road between Ward 8 and ward 9</td>
<td>80</td>
</tr>
<tr>
<td>5</td>
<td>Urban main road 1</td>
<td>50</td>
</tr>
<tr>
<td>6</td>
<td>Urban main road 2</td>
<td>70</td>
</tr>
<tr>
<td>7</td>
<td>Infrastructure of resettlement site in Ward 8</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>480</strong></td>
</tr>
</tbody>
</table>

*(Source: FS, 2020)*

Expectedly, the number of workers will make up about 60%-70% of total labor at each site. Their age ranges from 18 to 35; their is a small number of qualified workers or managed (about 5%) at aged 35-50. At each construction site, the percentage of male and female workers is 75% and 25%, respectively.

1.3.6. **Project Implementation Arrangements**

❖ **General information**

a) **Line Agency: People’s Committee of Vinh Long province**
- Address: No. 88, Hoang Thai Hieu Street, Ward No. 1, Vinh Long city, Vinh Long province
- Telephone: 02703.823100 Fax: 02703.823774

b) **Project’s owner: People’s Committee of Vinh Long city**
- Address: No. 79; 30/4 street, Ward No. 1, Vinh Long city, Vinh Long province
- Telephone: 02703 822143 - 02703 824383 Fax: 02703.834951
Project’s management and implementation: Project’s owner directly manages the implementation of the project.

❖ Implementation arrangements

People’s Committee of Vinh Long province

- Coordinate with the Ministry of Planning and Investment, relevant ministries, branches and agencies in formulating strategies and planning to attract and use concessional loans; formulating policies, measures to coordinate and improve the efficiency of the use of concessional loans in the areas of provinces and towns;

- Coordinate with the Ministry of Planning and Investment in submitting to the Government on the signing of specific international treaties on concessional loans for programs and projects in their respective fields;

- Ensuring the quality and efficiency of using concessional loan directly managed and implemented by localities;

- Responsible for land acquisition, site clearance, implementation of compensation and resettlement policies for programs and projects in the area in accordance with law;

- Organizing and directing the effective implementation of projects according to the approved plans;

- Approving the feasibility study reports for the project in Vinh Long city;

- Acting as the project Owner in accordance with the provisions of law, international treaties on ODA;

- Coordinating with provincial departments to propose and implement the project from the project preparation step to the end of project implementation;

- Organizing acceptance and handover of the ground and hand over of the project when it is completed;

- Organizing site clearance activities and handing over the completed construction work within the permitted scope.

Project’s Owner – Vinh Long ODA Project Management Unit (PMU)

- Carrying out the bidding in accordance with the current law on bidding;

- Providing relevant information and documents for contractual parties and consultants to formulate and implement programs and projects; taking responsibility for the legal basis and reliability of the information and documents provided; archiving files and documents on programs and projects according to the provisions of law;

- Taking comprehensive and continuous responsibility for the management and use of investment capital sources from the preparation of investment, implementation of investment and putting programs and projects into operation;

- Monitoring, evaluating projects, managing and exploiting programs and projects;

- Taking full responsibility for mistakes in the process of managing programs and projects that cause adverse consequences to the economy, society, environment and national reputation;

- Responsible under the provisions of law, may have to compensate for economic losses or have to change the project owner, for the slow implementation, not in accordance with the investment decision and the decision on approval of the documents of technical assistance programs and projects, causing loss, waste and corruption, affecting the overall objectives
and efficiency of programs and projects;
- Take responsibility for receiving and solving (arrangement of suitable personnel) issues related to the community’s complaints on safety, health, environment, labor and other issues regarding compensation and resettlement upon land acquisition;
- Other rights and responsibilities as prescribed by law.

1.3.7. Total investment

The total investment of the project is: USD 219,800,000. In which:
- WB fund: 141,800,000 USD, accounting for 64.5%.
- Counterpart fund: 78,000,000 USD, accounting for 35.5%.
Table 10: Total investment fund of project

1 USD = 23,400 VND

<table>
<thead>
<tr>
<th>No.</th>
<th>Costs</th>
<th>Sign</th>
<th>Amount</th>
<th>Before tax</th>
<th>VAT</th>
<th>After tax</th>
<th>USD equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>SITE CLEARANCE</td>
<td>Ggpmb</td>
<td>609,250,000.000</td>
<td>609,250,000.000</td>
<td>26,036,325</td>
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<tr>
<td>1</td>
<td>Mitigation of urban flooding and drainage</td>
<td></td>
<td>1,485,893,710.293</td>
<td>148,589,371.029</td>
<td>1,634,483,081.323</td>
<td>69,849,704</td>
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</tr>
<tr>
<td>1.1</td>
<td>Embankment of Long Ho river</td>
<td>G1</td>
<td>540,000,000.000</td>
<td>54,000,000.000</td>
<td>594,000,000.000</td>
<td>25,384,615</td>
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<tr>
<td>1.2</td>
<td>Construction of tidal sluice gate</td>
<td>G2</td>
<td>313,600,000.000</td>
<td>31,360,000.000</td>
<td>344,960,000.000</td>
<td>14,741,880</td>
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</tr>
<tr>
<td>1.3</td>
<td>Rehabilitation of main drainage canal system</td>
<td>G3</td>
<td>400,000,000.000</td>
<td>40,000,000.000</td>
<td>440,000,000.000</td>
<td>18,803,419</td>
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<tr>
<td>1.4</td>
<td>Rehabilitation of drainage culverts in the wards within the core urban area</td>
<td>G4</td>
<td>232,293,710.293</td>
<td>23,229,371.029</td>
<td>255,523,081.323</td>
<td>10,919,790</td>
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<tr>
<td>2</td>
<td>Construction of wastewater collection and treatment for urban core area</td>
<td></td>
<td>578,701,155.081</td>
<td>57,870,115.508</td>
<td>636,571,270.589</td>
<td>27,203,900</td>
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<tr>
<td>2.1</td>
<td>Connections to households</td>
<td>G5</td>
<td>122,350,000.000</td>
<td>12,235,000.000</td>
<td>134,585,000.000</td>
<td>5,751,496</td>
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<tr>
<td>2.2</td>
<td>Serviced collection network</td>
<td>G6</td>
<td>67,345,534.375</td>
<td>6,734,553.438</td>
<td>74,080,087.813</td>
<td>3,165,816</td>
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<tr>
<td>2.3</td>
<td>Main collection network</td>
<td>G7</td>
<td>271,750,620.706</td>
<td>27,175,062.071</td>
<td>298,925,682.777</td>
<td>12,774,602</td>
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<tr>
<td>2.4</td>
<td>Wastewater pumping station</td>
<td>G8</td>
<td>32,880,000.000</td>
<td>3,288,000.000</td>
<td>36,168,000.000</td>
<td>1,545,641</td>
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<td>2.5</td>
<td>Construction of wastewater treatment plant</td>
<td>G9</td>
<td>84,375,000.000</td>
<td>8,437,500.000</td>
<td>92,812,500.000</td>
<td>3,966,346</td>
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<tr>
<td>3</td>
<td>Urban connection corridor development works</td>
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<td>801,807,500.000</td>
<td>80,180,750.000</td>
<td>881,988,250.000</td>
<td>37,691,806</td>
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<tr>
<td>3.1</td>
<td>Construction of connection road between ward 8 and 9</td>
<td>G10</td>
<td>167,875,000.000</td>
<td>16,787,500.000</td>
<td>184,662,500.000</td>
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<td>3.2</td>
<td>Construction of urban main road 1</td>
<td>G11</td>
<td>399,468,000.000</td>
<td>39,946,800.000</td>
<td>439,414,800.000</td>
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<td>3.3</td>
<td>Construction of urban main road 2</td>
<td>G12</td>
<td>234,464,500.000</td>
<td>23,446,450.000</td>
<td>257,910,950.000</td>
<td>11,021,835</td>
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<tr>
<td>4</td>
<td>Construction of technical infrastructure and basic infrastructure for resettlement site.</td>
<td></td>
<td>87,500,000.000</td>
<td>8,750,000.000</td>
<td>96,250,000.000</td>
<td>4,113,248</td>
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<tr>
<td>4.1</td>
<td>Construction of technical infrastructure and infrastructure for resettlement site</td>
<td>G13</td>
<td>87,500,000.000</td>
<td>8,750,000.000</td>
<td>96,250,000.000</td>
<td>4,113,248</td>
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### Costs Table

<table>
<thead>
<tr>
<th>No.</th>
<th>Costs</th>
<th>Sign</th>
<th>Amount</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Before tax</td>
<td>VAT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>186,045,000,000</td>
<td>18,604,500,000</td>
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<td></td>
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<td>21,920,000,000</td>
<td>2,192,000,000</td>
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<td></td>
<td>103,125,000,000</td>
<td>10,312,500,000</td>
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<td></td>
<td></td>
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<td>21,000,000,000</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>20,000,000,000</td>
<td>2,000,000,000</td>
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<td></td>
<td>30,789,473,654</td>
<td>30,789,473,654</td>
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<td>277,105,262,884</td>
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<td>153,947,368,269</td>
<td>15,394,736,827</td>
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<td>123,157,894,615</td>
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<td>15,394,736,827</td>
<td>1,539,473,683</td>
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<td></td>
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<td>652,930,762,209</td>
<td>65,293,076,221</td>
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<td>407,248,683,874</td>
<td>40,724,868,387</td>
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<td>245,682,078,335</td>
<td>24,568,207,834</td>
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<td>4,725,417,600,948</td>
<td>408,537,812,729</td>
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<tr>
<td></td>
<td></td>
<td>219,400,000</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

(Source: FS, 2020)
1.3.8. Implementation Progress of the project

**Table 11: Project Schedule**

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Completion date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Preparation of Project Proposal</td>
<td>06-2019</td>
</tr>
<tr>
<td>2</td>
<td>Approval of Project Proposal by the Government</td>
<td>03-2019</td>
</tr>
<tr>
<td>3</td>
<td>Pre-FS preparation</td>
<td>12-03/2020</td>
</tr>
<tr>
<td>4</td>
<td>Pre-FS approval by the Government (Investment Policy)</td>
<td>04/2020</td>
</tr>
<tr>
<td>5</td>
<td>Investment Preparation (Consultant for FS preparation and component reports)</td>
<td>05/2020</td>
</tr>
<tr>
<td>6</td>
<td>FS appraisal by World Bank</td>
<td>05/2020</td>
</tr>
<tr>
<td>7</td>
<td>Approval of FS and component reports by PPC</td>
<td>06/2020</td>
</tr>
<tr>
<td>8</td>
<td>Negotiation of Loan Agreement with WB</td>
<td>06/2020</td>
</tr>
<tr>
<td>9</td>
<td>Project approval by World Bank</td>
<td>08/2020</td>
</tr>
<tr>
<td>10</td>
<td>Signing Financial Agreement</td>
<td>10/2020</td>
</tr>
<tr>
<td>11</td>
<td>Financial Agreement enters into effects</td>
<td>12/2020</td>
</tr>
<tr>
<td>12</td>
<td>Investment implementation</td>
<td>2021-2025</td>
</tr>
</tbody>
</table>

(Source: FS, 2020)

1.4. ENVIRONMENTAL AND SOCIAL ASSESSMENT METHODS

In order to conduct environmental and social impact assessment, various methods and techniques were deployed in the ESIA as follows:

**Checklist:** this method is a common approach which is widely applied for defining the study area, sampling sites, identifying influence/impact areas, sensitive areas may be affected by the project’s activities during pre-construction and construction phases.

**Rapid assessment:** Empirical emission factors and coefficients were applied for calculating fugitive exhausts and dust (TSP) emission; predict noise and vibration generation spreading over nearest settlements; greenhouse gas emission; solid and hazardous wastes; etc. For air emissions, Sutton model,…. was adopted to modeling emissions of dust and exhausted gases as a rapid assessment for the project’s activities. Further, WHO’s rapid inventory source techniques (1993), including Environmental Assessment Sourcebook (Volume II, Sectoral Guidelines, Environment, World Bank, Washington D.C 8/1991) and Handbook of Emission, Non-Industrial and Industrial source, Netherlands) were deployed for these rapid assessments.

**Expert adjustment:** This method was deployed with the experts’ knowledge and experience, in association with site investigation, on socio-economic development situation, inhabitants’ life, cultural and religious asset; natural environment (current status of baseline conditions on air, water and soil quality); regional and local climate characteristics such as hydro-meteorology, geology, geography, topology, and landscape; and ecology (flora and fauna characteristics); etc.

**Matrix:** This technique was applied for the prediction of potential impacts caused by the project activities. This matrix is set up based on sources causing impacts and potential objects affected by the project.

**Comparison:** Results of survey on natural environment and laboratory analysis were compared
with national technical regulations on the physical environment components to assess the baseline conditions of the environments in the project area.

**GIS mapping:** Use GIS, coordinate to available maps (such as topographical map) and special soft-wares (such as MapInfo, AutoCAD) to create comprehensive maps serving ESIA process, including: maps of sampling sites for flora and fauna survey; maps of sampling sites for air quality and surface water quality.

**Field investigation and survey:** Based on available environmental data and maps (topographical map, existing land use map of Vi Thanh city, etc), the implementation of on-site measurements, sampling, investigations and field surveys on natural environment components (air, water, soil and flora and fauna) in the project area was conducted throughout the year both in dry and rainy seasons.

**Sample analysis:** All water, air and soil samples collected in the field were stored and brought the laboratory for analyzing.

**Public consultation:** Public consultation is used to help identify opportunities and risks, improved project design and implementation, and increase project ownership and sustainability. Public consultation is specifically required by the World Bank’s environmental and social safeguard policies. A meaningful public consultation will be used. This is a two-way process in which beneficiaries provide advice and input on the design of the proposed project that affect their lives and environment, promotes dialogue between governments, communities, and implementing agencies to discuss all aspects of the proposed project. The feedbacks from consultation will be incorporated into the project ESIA and design. Those affected by the project include those resettled and those in the nearby communities affected by project impacts, intended beneficiaries of the project, key interest groups – depends upon the project, local mass organizations, including women’s unions, local, state and central governments, other donor and development agencies, and other stakeholders.

**Disclosure of information:** Disclosure of the project information including the project safeguards and instruments will allows the public access to information on environmental and social aspects of the projects. Disclosure is mandated by policies for the WB’s Environmental Assessment, Involuntary Resettlement, and Indigenous Peoples. The project safeguards and instruments will be disclosed in country and in local languages and at the World Bank Infoshop, like all consultations, it is an ongoing process during the project preparation and supervision process.

**Statistical and data processing:** All statistical data and documents acquired from local levels (Commune, Ward and City levels), as well as on-site measurements were processed and expressed in tables, figures and charts for interpretation. This data is systematized according to time, adjusted to serve the determination of natural and socio-economic environment situation; the analysis of trend in environmental change in the project area. These data are very crucial to make the basis of environmental impact assessment and prediction when implementing the project, as well as proposing countermeasures.
CHAPTER 2. NATURAL, ENVIRONMENTAL AND SOCIO-
ECONOMIC CONDITIONS OF THE PROJECT AREA

2.1. NATURAL CONDITIONS

2.1.1. Geography

Vinh Long City is the economic, political and cultural center of Vinh Long province. The city has 11 administrative units with a total land area of 47.82 km$^2$, bordering with:

- Long Ho district in the East, South and North;
- Chau Thanh district of Dong Thap province and Cai Be district of Tien Giang province in the West;

There are 4 national highways running through Vinh Long city, including: NH 1A connecting Vinh Long city with Can Tho city and Tien Giang province; NH 53 connecting Vinh Long city with Tra Vinh province; NH 57 connecting Vinh Long City with Ben Tre province and NH 80 connecting Vinh Long City with Dong Thap Province. With just over 130 km distanced from Ho Chi Minh City, it is very convenient for transportation from Vinh Long city to the southern key economic region.

2.1.2. Topography

Vinh Long City has a flat terrain which is slightly tilted in different directions: high in the Northeast, low in the southwest, high from Co Chien River and lower inward to the field. This area has a network of rivers and canals interlaced with elevation ranging from 1 to 1.5 m above sea level (Hon Dau national landmark). Inner areas include wards 1, 2, 3, 4, 5, 8 and 9 with base elevation ranging from 1.4 to 2.5 m, while Tan Ngai, Truong An, Tan Hoi, Tan Hoa communes have base elevation of 1.0 to 1.5 m and that of fields of 0.5 - 1.0 m.

Main types of geomorphology

Land strip along Tien River: This area is alluvial enriched annually during flood season. Its terrain is 0.3 to 0.6 m higher than common elevation of the inland fields. Its surface is mainly used for agricultural production (fruit gardens, paddy rice field) and development of housing, ports, public facilities and roads.
Inner area: Land surface has been leveled for public works, housing, offices, roads with elevation +1.5 to +2.5 m concentrated in wards 1, 2, 4 and 9, ward and commune facilities, and some residential areas. Low density of construction, non-synchronous construction period has led to some high land parcels and some low land parcels (causing temporary flooding when there is high tide).

Delta: This is the remaining part of the city, used for agriculture production (rice fields, fruit gardens). To protect agriculture during flood season, canals were constructed with elevation +2.0 to +2.2m to function as containing ponds with area of 100-300 ha.

2.1.3. Geological condition

Like many other areas in Mekong Delta, Vinh Long province has Kanozoi loose sedimentary soil located on Mezoic bedrock, with considerable thickness, around 800-1,000 m. Sediment types can be classified into the following main layers:

- Holocene layer (QIV): located on surface to depth of about 35-48m. This is young sediment, including sand and clay. Grain components are from fine to medium.
- Pleistocene layer (QII-III): The depth from 88 to 207m, containing sand and gravel and clay with marine sediments.
- Pliocene layer (N2): The thickness from 304 to 359m, containing sandy clay with medium particles.
- Miocene layer (N 1): The thickness from 420 to 440m, containing sandy clay with medium particles.

Irrigation and infrastructure facilities are mainly built on Holocene layer which has soft sediments. This layer has a high clay content with lots of organic impurities, usually in water-saturated status, so it has poor load-bearing capacity. According to the survey documents of...
drilling lake in My Thuan and some geology documents, it has soft soil with poor load-bearing capacity so when implementing construction, foundation treatment is necessary. For canals, their banks contain soils with high content of dust and clay, usually in condition of water saturation. Therefore, during design, construction and operation management, it is necessary to have protection and treatment measures to prevent erosion along canals. Materials used for construction are only river sand and clay, and other materials must be transported from other places, such as Ha Tien or from the Southeastern.

**Table 12: Geological properties of soil in the project area**

<table>
<thead>
<tr>
<th>Layer</th>
<th>Thick (m)</th>
<th>Soil consistency (B)</th>
<th>C (kg/cm2)</th>
<th>Friction angle</th>
<th>HST (mm/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layer 1</td>
<td>18</td>
<td>0.7 – 1.0</td>
<td>0.075</td>
<td>9 – 13</td>
<td>10</td>
</tr>
<tr>
<td>Layer 2</td>
<td>4- 13</td>
<td>1.65</td>
<td>0.03</td>
<td>26</td>
<td>10</td>
</tr>
<tr>
<td>Layer 3</td>
<td>3 -7</td>
<td>0.5</td>
<td>0.02</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Layer 4</td>
<td>-</td>
<td>0.7 -1</td>
<td>0.05</td>
<td>29</td>
<td>10</td>
</tr>
</tbody>
</table>

(Source: EIA - SUUP Vinh Long approved by DONRE, 3/2018)

Note: H.S.T is the permeability coefficient (mm/day.night), C is the cohesion coefficient

### 2.1.4. Climate condition, hydrographic and oceanographic

**a) Climate conditions**

Vinh Long City is located in the tropical monsoon zone with annual hot and humid, high temperature base and little change during the year, the number of high hours of sunshine and rain distinguishes into two distinct seasons. Every year, the whole region is affected by two monsoons which are North-East monsoon, taking place from November, December to March, April of the next year. South-West monsoon occurs from May, June to October - November. South-West monsoon plays an important role in climate variability in the entire region due to high humidity, causing continuous heavy rains during rainy season. Duration and intensity of monsoons decides climate pattern in seasons each year. In general, the rainy season coincides with the South-West monsoon, from May to November, lasting 6-7 months, and dry season coincides with the northeast monsoon season, from December to April of the next year, lasting 5 months.

Research results of the Climate Change Research Joint Venture (under the Institute of Meteorology, Hydrology, Oceanology and Environment) in December 2016 showed that there have been significant changes in some factors of meteorology, hydrology and natural disasters in Vinh Long province. More and more extreme weather, meteorological phenomena and natural disasters such as heavy rains, tornadoes, landslides of rivers, canals, droughts and saline intrusion have occurred.

**b) Temperature**

Mekong Delta in general, Vinh Long province in particular has high annual temperatures, ranging from 27.1 – 27.6°C. April is the hottest month with average temperature from 27.7-29.4°C, the highest average temperature varies from 35.7 to 38°C. January is the coldest month with average temperature from 26.0°C, the lowest average temperature is from 17.0-19.0°C. Average temperature among different months varies between 2.7°C.

According to the Climate Change scenario approved by Vinh Long PPC in late 2016, in the average-case scenario, by 2020, the annual average temperature will be 27.64°C, corresponding to an increase of 0.44°C compared to the baseline period 1980-1999. The average-case scenario also forecasts that, by 2030, the annual average temperature will be 27.87°C, corresponding to an increase of 0.67°C compared to the baseline period 1980-1999.
A day usually has the highest temperature at 1-2 pm and the lowest temperature usually at 3-4 am. The biggest daily amplitude is in dry season (7-8ºC) and the lowest is in rainy season (6-7ºC), the absolutely lowest is 16.2ºC for a short time during the day. Average temperatures above 35°C lasts 4-5 days in dry months. 206 days/year has an average temperature of 26.0 - 28.0°C.

c) **Humidity**

In Mekong Delta, humidity pattern is closely related to and decided by rain pattern. Based on the statistical data of Vinh Long province from 2013 to 2018, annual average humidity is from 83 to 86%. September and October have the highest average relative humidity, ranging from 87.0 to 90.2%. February and March have the lowest average relative humidity, ranging from 77.0 to 77.7%.

d) **Evaporation**

Annual average evaporation amount (Piche) in Vinh Long is 930 mm, which is lower than that of the entire Mekong Delta which is about 1000 mm and some neighboring provinces such as Tra Vinh: 1,137 mm, Can Tho: 1,148 mm. In dry season, because of much sunshine and low air humidity, evaporation amount is high. The highest is in March of about 115 mm. In rainy season, evaporation amount is lower compared to that of dry season, September and October have the lowest evaporation amount which is 51-53 mm.

e) **Wind**

Two windy seasons are made of the northeast and the southwest monsoon. The former usually starts from November in the northeast and a little bit later in the Southwest, ending in April in the area near East Sea and a little bit earlier in West Sea. The main component is eastern wind accounting for 50 ÷ 70% of all occurrences during the month.

The latter normally starts from May in West Sea, a little bit later in East Sea, usually ending in early October in West Sea and a little bit earlier in East Sea. The main component is western wind which makes up 40 ÷ 50% of all occurrences during the month. The average wind speed is 1.2 ÷ 2.5 m/s, the highest wind speed varies from 20 ÷ 24 m/s.

f) **Sunshine**

Based on statistical data from 2013 to 2018, Mekong Delta in general and Vinh Long province in particular has high number of sunshine hours. The total number of sunshine hours per year is from 2,196.7 to 2,689.9 hours/year. February, March and April have the highest number of sunshine hours (average 7.8 hours/day). June, July and August have the lowest number of sunshine hours (average 5.05 hours/day). High number of sunshine hours per day is favorable characteristics for plant growth and development. It’s a good condition for intensive cultivation of short-day crops.


g) **Rainfall**

Monsoon pattern gives Vinh Long province in general and Vinh Long City in particular a rainy season and a dry season which are considerably contrary. Rainy season starts from May to the end of November, coinciding with the period of the southwest monsoon, the rainfall during rainy season accounts for 93-96% of annual rainfall. Dry season begins in December and end in April of the next year, coinciding with the northeast monsoon with total rainfall making up 14-17% of annual rainfall.

The annual average number of rainy days in Vinh Long is relatively high (on average 103-127 days/year). Similar to annual rainfall, the number of rainy days in a year tends to decrease gradually from the southwest to the northeast of the province.

Based on statistical data of Vinh Long province in 2018, during rainy season in 2016-2017,
rainfall increased from May (154-216 mm) and reached the highest level in September-October (208-424mm; however, in 2018, the rainfall reached its highest level in June-July (233-296mm), then gradually decreased, then by November the average rainfall reached only about 72-93 mm (in 2017-2018). During dry season, except for the first and the last months of the season (December and April), rainfall was around 34.6 mm per month with approximately 3-8 rainy days. During months at mid dry season, rainfall was approximately 5-6 mm. The lowest rainfall was found in February with 5 mm.

According to the Department of Natural Resources and Environment of Vinh Long Province, in recent years, Vinh Long has experienced complicated climate changes. In the period from 2010-2018, the average annual rainfall ranged from 1,017 - 1,963mm (if in 2015, the rainfall reached the lowest level, in 2016 the rainfall reached its highest level then increased and decreased over the remaining years). There were changes in the highest and lowest water level monitored at My Thuan station over the years (the water level hit the lowest record in 2015 and the highest record in 2018). Following the province’s climate change scenario approved by the PPC in late 2016, by 2020 (in the average case scenario), the average annual rainfall will be 1,491mm, reflecting an increase of 1.33% compared to the baseline period. This average case scenario also forecasts that the annual average rainfall will continue to increase, reaching 1,501mm by 2030.

2.1.5. Hydrological characteristics

Vinh Long city is under the irregular semi-diurnal regime from the East sea via 2 major rivers of Tien and Hau, Mang Thit river and a system of canals. Water level and amplitude of tide in the rivers are relatively high, tide spreading high, in flood season, the tide amplitude is around 70 - 90 cm in rainy season and in dry season, the tide amplitude varies from 114 – 140cm. Of which:

- Tien river is the second major branch of Mekong River running through Vinh Long with one branch is Co Chien river. Tien river has the flow rate in dry season is from 14,500 - 15,800 m³/s and 20,500 - 28,400 m³/s in rainy season at My Thuan station in Vinh Long province (see the table 10 below).

- Co Chien river is one branch of Tien river, has a total length of 90km, with length of 59km running through Vinh Long with average width ranging from 800-2,500 m, depth 20 – 40m, flow rate in dry season from 1,530 – 5,800 m³/s and from 12,000 to 19,000 m³/s in rainy season.

- Hau river is the second major branch of Mekong River running through Vinh Long with length of 46km, with average width ranging from 1,500 - 3,000m; depth 15 – 30m, flow rate in rainy season from 20,000 to 32,000 m³/s.

- Mang Thit river connecting Tien river (at Co Chien river) and Hau rivers with estuary at the Tien river greater than that of the Hau river, has a total length of 47km, the average width of 110 - 150m, the maximum flow rate is 1,500 - 1,600 m³/s toward the Co Chien river and 525 - 650 m³/s toward the Hau river.

- Besides, the system of canals in the city is quite intricate, the average density of canals reaches 67.5 m/ha.
Figure 4: Hydrological network diagram of the project area

Table 13: Water level and flow of Tien river (at My Thuan station)

<table>
<thead>
<tr>
<th>No.</th>
<th>Years</th>
<th>Maximum water level Hmax (cm)</th>
<th>Minimum water level Hmin (cm)</th>
<th>Maximum flow rate (m³/s)</th>
<th>Minimum flow rate (m³/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2016</td>
<td>192</td>
<td>-157</td>
<td>22,500</td>
<td>-14,500</td>
</tr>
<tr>
<td>2</td>
<td>2017</td>
<td>199</td>
<td>-139</td>
<td>25,100</td>
<td>-15,300</td>
</tr>
<tr>
<td>3</td>
<td>2018</td>
<td>207</td>
<td>-155</td>
<td>28,400</td>
<td>-15,000</td>
</tr>
<tr>
<td>4</td>
<td>2019</td>
<td>212</td>
<td>-163</td>
<td>20,500</td>
<td>-15,800</td>
</tr>
</tbody>
</table>

(Source: My Thuan station - Vinh Long province, February 2020)

Due to impacts of high tide from Co Chien river and Hau river, Mang Thit river flows 2 ways in and out the estuaries, specifically, in high tide, water runs in from Quoi An and Tra On estuaries and when tide descends, water runs out to the sea via these two estuaries, the water adjacent area of these two directions is Ba Ke estuary (Thay Hanh intersection) 17km from Hau river. Mang Thit river is not affected by salinity so it always has fresh water to supply for agricultural, industrial activities and daily activities of people in the area. However, due to the low-lying terrain of the land in northern area of Mang Thit river, it is very difficult for water drainage.

Water level and amplitude of tide in the rivers are relatively high, tide spreading high, in flood season, the tide amplitude is around 70 - 90 cm and in dry season, the tide amplitude varies from 114 – 140cm and in combination with the inner canal system, it can be provided self-irrigation for the cultivated lad, help the crops and plant grow well.

The project will construct 9 tidal sluices on the canals in the city with the location and current parameters as described in the figure and table below.
Climate and weather condition are very favorable for agriculture in intensive crops and for development of natural biodiversity. However, the rainfall only concentrating in 6 months of rainy season and with alluvial flood from the upstream of the Mekong creates localized
inundated area, affecting agricultural production and living condition of people as well as biological environment of the area.

2.1.6. **Natural Resources**

❖ **Soil**

The land is formed by the deposit of retrogradation sea during the Holocene period (5,000 – 11,200 years ago) under impacts of the Mekong River. Soil type of Vinh Long city is categorized as alluvium sedimentation, sand ridge soil; soil from river dredging.

❖ **Surface water resources**

Most of the boundary of Vinh Long with other provinces is surrounded by Hau Giang and Tien Giang rivers so the city has an abundant fresh water source all over the year (Tien river has flow rate in dry season is from 14,500 - 15,800 m³/s and 20,500 - 28,400 m³/s in rainy season at My Thuan station; Hau river has the maximum flow rate in rainy season from 20,000 to 32,000 m³/s and Mang Thit river has the maximum flow rate is 1,500 - 1,600 m³/s toward the Co Chien river and 525 - 650 m³/s toward the Hau river). In the rainy season (August - October), the river water carrying about 0.25 - 0.31 kg/m³ alluvium can run 15 - 25 km deep into the field, facilitating people’s cultivation and aquaculture production. With a fairly dense network of rivers and canals, Vinh Long has advantageous water conditions for agriculture and convenient waterway and road network connecting Vinh Long with Mekong Delta provinces and the whole country. Thanks to these favorable natural conditions, Vinh Long’s agriculture has developed with all-year-round agricultural production activities, the countrysides are relatively proporous, population is crowded and the garden economy is the province’s tradition economy. Mang Thit river connecting Tien river - Hau river is an important waterway of the province and the Mekong Delta region and it is also a development zone for sugar industry.

Surface water sources in Vinh Long city are plentiful and varied. In the city, there are 2 large rivers flowing through Hau and Co Chien rivers, so it is directly affected by the hydrological regime of these 2 rivers. In addition, the city also has a dense network of canals, connected to large and small rivers and canals, creating favorable conditions for providing water for production and daily life of the local people.

❖ **Groundwater resources**

Vinh Long is also rich in groundwater with exploitable amount of 183,657 m³/day. Groundwater found in 7 layers in which the shallow layer distributed within 100 - 150 m depth and deep layer is at 350 m depth.

❖ **Mineral resources**

Vinh Long province is poor in terms of mineral resources. River sand is distributed mainly in the rivers of Co Chien, Tien, Pang Tra, Hau, with a total reserve of 129.8 million m³. Clay, the raw material for production of brick, tiles, and ceramic products, has a reserve of 200 million m³ of good quality.

❖ **Forest resources**

Situated in the center of the Mekong Delta, Vinh Long is the only province that does not have forest. There are about 140,00 ha of land planted with scattered trees. The flora here has been replaced by the agriculture ecosystem and planted trees. Vinh Long is famous for its fruit tree orchards in islands where there are many specially fruits which are valuable for both agriculture economy and ecotourism. The fauna comprises mainly domestic animal and aquatic species. The fresh water fishery resources in the rivers of Tien and Hau, ponds, lakes, and streams are a great potential for capture and aquaculture. There are precious and rare animals such as weasel, viper, squirrel, boucal, crocodile, etc. and some imported animals such as ostrich, guinea-fowl,
and monkey.

❖ Biological resources

a. Terrestrial ecosystems

Terrestrial ecosystems in Vinh Long include agroecosystems, urban ecosystems and industrial zones. These ecosystems are artificial ones with poor and unsustainable living organism composition.

According to results of the report “Basic study, overall environmental assessment, studying and building guidelines and regulations on environmental protection for prioritized manufacturing and business sectors in Vinh Long” of the Institute of Environmental and Sustainable Development (2002), higher flora and fauna were recorded in Vinh Long as follows:

- Higher plants: 218 species with their 65 families, 30 orders, 2 phylums (Polypodiophyta and Magnoliophyta).
- Fauna (birds, mammals, reptilia, amphibian): 103 species with their 50 families, 20 orders in four classes of fauna (mammal, bird, reptilia, and amphibian classes).

The fauna recorded in Vinh Long province include:

- Stork, birds, sparrow, spotted doves, swamp hen, ducks, chickens, geese, ...
- Cats, dogs, cows, buffaloes, goats and pigs.
- Amphibia amphibians (frogs): Represented by Kaloula pulchra, Microhyla, Bufo melanostictus, Rhacophorus leucomystax, Rana rugulosa, ...
- Reptilia: Represented by Hemidactylus frenatus, Mabuya multifasciata, Acanthosaura lepidogaster, Elapidae, Trimeresurus steinegeri, Columbridae), ...

At the project area

The Project area has very limited natural flora and fauna due to its high level of urban development. Ecologically, the proposed Project location is not in an area of special concern such as areas designated as having local, national, or international importance (e.g., world heritages, wetlands, biosphere reserve, wildlife refuge, or protected areas). Consultation with the local communities and site survey results show that the Project area is home to no endemic animals listed in the Red Book. The Project area is mainly residential and agricultural land, household gardens, and bare land which are heavily affected by human activities. The current vegetation area mainly includes brushwood, acacia, malabar almond trees, and coconut trees. The fauna in the area mainly include domestic animals such as chickens, ducks, dogs and cats. The flora along the bank of Long Ho and Cau Lo rivers, Cau Lau, Kinh Cut, Cai Sao Lon canals are mainly coconut trees, nipa palms, and bamboos owned by local residents.

b. Aquatic ecosystems

Aquatic ecosystems are river ecosystems and pond ecosystems. River ecosystems have medium and relatively stable biodiversity. Pond ecosystems have poor biodiversity.

- According to report “Assessment of fishery resources, protection measures and aquatic resources development in Vinh Long” of the Aquaculture Research Institute No.II and Sub-Department of Fisheries Resources Protection, there are 132 species of algae, 93 species of zooplankton, 69 benthic species. Most of them are freshwater species.

According to the ESIA report of SUUP project - Vinh Long city Project, the species composition survey results in the identified project area include:

- Phytoplankton: 75 species of algae have been identified in which Chrysophyta (24
species) dominates, followed by Cyanophyta (22 species), Chlorophyta (20 species), the Euglenophyta (8 species), Dinophyta (1 species). Average algae density reaches 2,100 individuals/liter.

- **Ephemera**: 52 species have been identified in which Rotatoria dominates with 27 species, followed by plankton (10 species), Copepoda (7 species), Lavar (4 species), Cladocera (3 species), Ostracoda (1 species). Average density reaches 74,000 individuals/m$^3$.

- **Benthic fauna**: 26 species of 13 families, 6 classes and 4 phylums. Mollusca dominates species composition.

- The number of identified species varies from 15 - 20 species. At the sampling point in Tien river (in Vinh Long City) 20 species are found and at Hau river (Tan An Thanh commune - Binh Tan district) 15 species are found. In other places, the number of species varies from 16 - 18 species.

According to Resolution No. 21/NQ-HDND dated 03 August 2016 on adoption of biodiversity conservation planning in Vinh Long province 2015-2020 and vision to 2030, Co Chien river corridor; Hau river corridor located in Vinh Long is one of six routes planned for biodiversity corridors. In the project area, there are no protected areas, national parks nor planning area for biodiversity protection.

**At the project areas**

There have been no official research studies on aquatic flora and fauna in Long Ho and Cau Lo rivers, Cau Lau, Kinh Cut, Cai Sao Lon canals. Consultation with the local communities does not reveal any records on the appearance of rare fish or other aquatic species of concerns in Long Ho and Cau Lo rivers, Cau Lau, Kinh Cut, Cai Sao Lon canals. Wastewater from domestic activities along Long Ho and Cau Lo rivers, Cau Lau, Kinh Cut, Cai Sao Lon canals has been directly discharged into the rivers/canals. The river banks have been seriously encroached by shops and residential houses built along the river. Therefore, this area is not a major natural habitat of aquatic species and there are no species under threat which need to be protected in the area. There has been no recorded information on fish species which need to be protected or migrating fishes in the rivers of Vinh Long city.

The project’s works are located within the Vinh Long city where the socio-economic activities are dynamic. The WWTP is built in Thanh Duc commune, Long Ho district, about 3.1km away from Co Chien river. Therefore, the Project’s works are not situated within the bio-diversity corridor which is planned for Co Chien and Hau river.

**2.2. ENVIRONMENTAL QUALITY IN THE PROJECT AREA**

**2.2.1. Air quality, noise and vibration**

a) **Sampling locations**: Air samples were collected from 8 different locations in the project area and the surroundings on 20th February 2020, following guidelines from technical regulations on QCVN 05:2013/BTNMT: National technical regulation on Ambient Air Quality; QCVN 26:2010/BTNMT - National technical regulation on noise and QCVN 27: 2010/ BTNMT - National technical regulation on vibration. The sampling map is presented in Figure 6. The air samples are analyzed for common air pollutants, including total suspended particles (TSP), SO$_2$, NO$_2$ and CO gases and the results are presented in Table 14.
Figure 6: The sampling map of ambient air quality

<table>
<thead>
<tr>
<th>Code</th>
<th>Sampling locations</th>
<th>Coordinates</th>
<th>Work items</th>
</tr>
</thead>
<tbody>
<tr>
<td>KK1</td>
<td>The starting point of road P8 connects P9 on Vo Van Kiet street</td>
<td>1133 900</td>
<td>Ward 8-Ward 9 road</td>
</tr>
<tr>
<td>KK2</td>
<td>The intersection of DT axis road No. 1 with Dinh Tien Hoang street</td>
<td>1130 341</td>
<td>Urban main road 1</td>
</tr>
<tr>
<td>KK3</td>
<td>Intersection of P8 road connecting P9 on NH53 (near the 12ha resettlement area)</td>
<td>1132 665</td>
<td>Ward 8-Ward 9 road; Resettlement site</td>
</tr>
<tr>
<td>KK4</td>
<td>The intersection of DT 2 road with Dinh Tien Hoang street</td>
<td>1129 720</td>
<td>Urban main road 2</td>
</tr>
<tr>
<td>KK5</td>
<td>At Lau bridge, near the starting point of embankment of Long Ho river (near sewer 6)</td>
<td>1133 827</td>
<td>Embankment of Long Ho river, Tidal sluices 6</td>
</tr>
<tr>
<td>KK6</td>
<td>On Tran Phu street, near the end of Long Ho river (near Cho Cua bridge)</td>
<td>1131 937</td>
<td>Embankment of Long Ho river, Tidal sluices 8</td>
</tr>
<tr>
<td>KK7</td>
<td>The end of DT2 road on Dinh Tien Hoang street</td>
<td>1131 577</td>
<td>Urban main road 2</td>
</tr>
<tr>
<td>KK8</td>
<td>On the way near the Wastewater Treatment Plant</td>
<td>1132 783</td>
<td>Wastewater collection and treatment</td>
</tr>
</tbody>
</table>
b) Analysis results

**Table 14: Measurement results of ambient air environment in the project area**

<table>
<thead>
<tr>
<th>No</th>
<th>Parameters</th>
<th>Unit</th>
<th>KK1</th>
<th>KK2</th>
<th>KK3</th>
<th>KK4</th>
<th>KK5</th>
<th>KK6</th>
<th>KK7</th>
<th>KK8</th>
<th>QCVN 05:2013 BTNMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Temperature</td>
<td>°C</td>
<td>31.2</td>
<td>31.3</td>
<td>32.1</td>
<td>32.0</td>
<td>31.9</td>
<td>31.8</td>
<td>32.0</td>
<td>32.1</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Humidity</td>
<td>%</td>
<td>69.2</td>
<td>68.7</td>
<td>66.5</td>
<td>67.6</td>
<td>63.7</td>
<td>68.2</td>
<td>69.3</td>
<td>70.1</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Wind speed</td>
<td>m/s</td>
<td>0.5</td>
<td>0.6</td>
<td>0.5</td>
<td>0.4</td>
<td>0.6</td>
<td>0.5</td>
<td>0.4</td>
<td>0.5</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Wind direction</td>
<td></td>
<td>South-east</td>
<td>South-east</td>
<td>South-west</td>
<td>South-east</td>
<td>South-west</td>
<td>South-west</td>
<td>South-west</td>
<td>South-west</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Suspended dust</td>
<td>mg/m³</td>
<td>0.283</td>
<td>0.214</td>
<td>0.263</td>
<td>0.211</td>
<td>0.251</td>
<td>0.345</td>
<td>0.194</td>
<td>0.208</td>
<td>0.3</td>
</tr>
<tr>
<td>6</td>
<td>CO</td>
<td>mg/m³</td>
<td>3.80</td>
<td>3.60</td>
<td>3.90</td>
<td>3.50</td>
<td>4.00</td>
<td>4.10</td>
<td>3.60</td>
<td>3.70</td>
<td>30</td>
</tr>
<tr>
<td>7</td>
<td>SO₂</td>
<td>mg/m³</td>
<td>0.057</td>
<td>0.041</td>
<td>0.046</td>
<td>0.040</td>
<td>0.050</td>
<td>0.053</td>
<td>0.031</td>
<td>0.035</td>
<td>0.35</td>
</tr>
<tr>
<td>8</td>
<td>NO₂</td>
<td>mg/m³</td>
<td>0.04</td>
<td>0.032</td>
<td>0.040</td>
<td>0.035</td>
<td>0.042</td>
<td>0.042</td>
<td>0.038</td>
<td>0.039</td>
<td>0.2</td>
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<tr>
<td>9</td>
<td>Noise</td>
<td>dBA</td>
<td>60.1</td>
<td>61.2</td>
<td>58.9</td>
<td>59.1</td>
<td>56.2</td>
<td>59.3</td>
<td>58.9</td>
<td>60.1</td>
<td>70(1)</td>
</tr>
<tr>
<td>10</td>
<td>Vibration</td>
<td>dB</td>
<td>37.1</td>
<td>36.2</td>
<td>37.6</td>
<td>34.4</td>
<td>36.4</td>
<td>36.7</td>
<td>34.2</td>
<td>39.1</td>
<td>75(2)</td>
</tr>
</tbody>
</table>

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The results of air, noise and vibration monitoring in all project location are lower than the allowable standards of QCVN 05:2013/BTNMT, QCVN 26:2010/BTNMT and QCVN 27:2010/ BTNMT. This proves that the air, noise, vibration quality in the subproject areas is quite good and has no sign of pollution generated from construction, industrial, services activities, etc in the area.

2.2.2. Surface water quality

a) Sampling location: Surface water is sampled in canals, rivers near the project’s civil work and of the surroundings on 20th February 2020. There are 8 locations of surface water quality sample and the sampling map are presented respectively in Figure 7.

![Figure 7: The sampling map of surface water quality](image)

<table>
<thead>
<tr>
<th>Code</th>
<th>Sampling location</th>
<th>Coordinates</th>
<th>Work items</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM1</td>
<td>Cau Lo River construction section to prevent tides No. 1</td>
<td>X: 1108 161  Y: 587 232</td>
<td>Tidal sluices 1</td>
</tr>
<tr>
<td>NM2</td>
<td>The canal is near the sluice gate No. 2</td>
<td>X: 1132 209  Y: 548 063</td>
<td>Tidal sluices 2, Canal upgrading</td>
</tr>
<tr>
<td>NM3</td>
<td>The canal is near the sluice gate No. 3 and the location to build a bridge across the canal on the Urban main road 1</td>
<td>X: 1130 889  Y: 548 767</td>
<td>Tidal sluices 3, Canal upgrading, Urban main road 1</td>
</tr>
<tr>
<td>NM4</td>
<td>Kenh Cut canal at tidal gate 3</td>
<td>X: 1132 588  Y: 550 538</td>
<td>Tidal sluices 4, Canal upgrading, upgraded residential area</td>
</tr>
<tr>
<td>NM5</td>
<td>The canal at the location to build a bridge across the canal on the Urban main road 1</td>
<td>X: 1130 898  Y: 552 524</td>
<td>Canal upgrading, Urban main road 2</td>
</tr>
<tr>
<td>NM6</td>
<td>Long Ho River at the beginning of embankment</td>
<td>X: 1133 827  Y: 552 087</td>
<td>Embankment of Long Ho river, Tidal sluices 6, upgraded residential area</td>
</tr>
</tbody>
</table>
Environmental and Social Impact Assessment
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<table>
<thead>
<tr>
<th>Code</th>
<th>Sampling location</th>
<th>Coordinates</th>
<th>Work items</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM7</td>
<td>Cai Sao Lon canal at the point of receiving wastewater</td>
<td>1132 783</td>
<td>WWTP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>556 614</td>
<td></td>
</tr>
<tr>
<td>NM8</td>
<td>Co Chien River at the intersection with Cai Sao Lon canal</td>
<td>1134 357</td>
<td>WWTP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>555 788</td>
<td></td>
</tr>
</tbody>
</table>

b) Analysis results

The monitoring results of surface water quality in the project area is shown in Table 15, surface water quality is basically within the permitted limits. However, there are several parameters concentration higher than the allowable limit specified in QCVN 08-MT:2015/BTNMT - National technical regulation on surface water quality in which column B1 is applied to water for irrigation purposes and column B2 is applied for other purposes such as TSS, DO, COD, BOD₅, NO₂⁻, Fe at some locations at the rivers and canals (including NM2 - The canal is near the sluice gate No. 2; NM3 - the canal is near the sluice gate No. 3 and the location to build a bridge across the canal on the Urban main road No.1; NM5 - The canal at the location to build a bridge across the canal on the Urban main road No.1; NM6 - Long Ho River at the beginning of embankment and NM7 - Cai Sao Lon canal at the point of receiving wastewater) is TSS (exceed from 2.04 to 2.74 times), COD (exceed 1.03 times), BOD₅ (exceed from 1.13 to 1.2 times), NO₂⁻ (exceed from 1.14 to 7.92 times) and Fe (exceed from 1.64 to 3.54 times). The surface water quality of Co Chien River at the intersection with Cai Sao Lon canal (MN8) and the surface water quality of Cut canal at tidal gate No.3 with parameters that meet the allowable standards.
**Table 15: Results of surface water quality in the project area**

<table>
<thead>
<tr>
<th>No</th>
<th>Parameters</th>
<th>Unit</th>
<th>NM1</th>
<th>NM2</th>
<th>NM3</th>
<th>NM4</th>
<th>NM5</th>
<th>NM6</th>
<th>NM7</th>
<th>NM8</th>
<th>QCVN 08-MT:2015/BTNMTB1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Temporary</td>
<td>°C</td>
<td>31.1</td>
<td>31.0</td>
<td>30.7</td>
<td>30.6</td>
<td>30.9</td>
<td>31.0</td>
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<td>2</td>
<td>pH</td>
<td>-</td>
<td>7.21</td>
<td>7.24</td>
<td>7.10</td>
<td>7.59</td>
<td>7.29</td>
<td>7.41</td>
<td>7.37</td>
<td>7.52</td>
<td>5.5 – 9</td>
</tr>
<tr>
<td>3</td>
<td>TSS</td>
<td>mg/l</td>
<td>29</td>
<td>102</td>
<td>103</td>
<td>16</td>
<td>20</td>
<td>116</td>
<td>137</td>
<td>9</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>DO</td>
<td>mg/l</td>
<td>3.39</td>
<td>3.97</td>
<td>3.60</td>
<td>4.18</td>
<td>3.62</td>
<td>3.37</td>
<td>3.37</td>
<td>3.34</td>
<td>≥ 4</td>
</tr>
<tr>
<td>5</td>
<td>COD</td>
<td>mg/l</td>
<td>18</td>
<td>12</td>
<td>31</td>
<td>12</td>
<td>18</td>
<td>18</td>
<td>31</td>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>BOD₅</td>
<td>mg/l</td>
<td>10</td>
<td>7</td>
<td>18</td>
<td>5</td>
<td>8</td>
<td>10</td>
<td>17</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>7</td>
<td>NH₄⁺</td>
<td>mg/l</td>
<td>0.021</td>
<td>0.035</td>
<td>0.056</td>
<td>0.021</td>
<td>0.014</td>
<td>0.021</td>
<td>0.056</td>
<td>0.021</td>
<td>0.9</td>
</tr>
<tr>
<td>8</td>
<td>NO₃⁻</td>
<td>mg/l</td>
<td>0.379</td>
<td>0.598</td>
<td>0.877</td>
<td>0.528</td>
<td>0.618</td>
<td>0.454</td>
<td>0.339</td>
<td>0.548</td>
<td>10</td>
</tr>
<tr>
<td>9</td>
<td>NO₂⁻</td>
<td>mg/l</td>
<td>0.396</td>
<td>0.057</td>
<td>0.163</td>
<td>ND (MDL = 0.003)</td>
<td>0.157</td>
<td>0.101</td>
<td>0.088</td>
<td>0.012</td>
<td>0.05</td>
</tr>
<tr>
<td>10</td>
<td>PO₄³⁻</td>
<td>mg/l</td>
<td>ND (MDL = 0.02)</td>
<td>ND (MDL = 0.02)</td>
<td>0.120</td>
<td>ND (MDL = 0.02)</td>
<td>ND (MDL = 0.02)</td>
<td>ND (MDL = 0.02)</td>
<td>ND (MDL = 0.02)</td>
<td>ND (MDL = 0.02)</td>
<td>0.3</td>
</tr>
<tr>
<td>11</td>
<td>Fe</td>
<td>mg/l</td>
<td>1.011</td>
<td>2.473</td>
<td>5.313</td>
<td>0.658</td>
<td>0.891</td>
<td>3.197</td>
<td>4.481</td>
<td>0.277</td>
<td>1.5</td>
</tr>
<tr>
<td>12</td>
<td>Sunfat (SO₄²⁻)</td>
<td>mg/l</td>
<td>39.50</td>
<td>46.67</td>
<td>46.67</td>
<td>42.49</td>
<td>39.54</td>
<td>46.02</td>
<td>54.65</td>
<td>37.16</td>
<td>-</td>
</tr>
<tr>
<td>13</td>
<td>Cu</td>
<td>mg/l</td>
<td>0.062</td>
<td>0.091</td>
<td>0.045</td>
<td>0.034</td>
<td>0.051</td>
<td>0.033</td>
<td>0.102</td>
<td>0.052</td>
<td>0.5</td>
</tr>
<tr>
<td>14</td>
<td>Zn</td>
<td>mg/l</td>
<td>ND (MDL = 0.018)</td>
<td>ND (MDL = 0.018)</td>
<td>ND (MDL = 0.018)</td>
<td>ND (MDL = 0.018)</td>
<td>ND (MDL = 0.018)</td>
<td>ND (MDL = 0.018)</td>
<td>0.056</td>
<td>0.024</td>
<td>1.5</td>
</tr>
<tr>
<td>15</td>
<td>As</td>
<td>mg/l</td>
<td>0.0021</td>
<td>0.0030</td>
<td>0.0018</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>0.0036</td>
<td>0.0016</td>
<td>0.05</td>
</tr>
<tr>
<td>No</td>
<td>Parameters</td>
<td>Unit</td>
<td>NM1</td>
<td>NM2</td>
<td>NM3</td>
<td>NM4</td>
<td>NM5</td>
<td>NM6</td>
<td>NM7</td>
<td>NM8</td>
<td>QCVN 08-MT:2015/BTNMTB1</td>
</tr>
<tr>
<td>----</td>
<td>--------------------</td>
<td>-----------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(MDL = 0.0017)</td>
<td>(MDL=0.0017)</td>
<td>(MDL=0.0017)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Pb</td>
<td>mg/l</td>
<td>0.0012</td>
<td>0.0022</td>
<td>0.0016</td>
<td>0.0010</td>
<td>0.0016</td>
<td>0.0022</td>
<td>0.0041</td>
<td>0.0020</td>
<td>0.05</td>
</tr>
<tr>
<td>17</td>
<td>Chloride</td>
<td>mg/l</td>
<td>25.70</td>
<td>12.64</td>
<td>30.92</td>
<td>19.65</td>
<td>39.03</td>
<td>31.74</td>
<td>33.80</td>
<td>48.37</td>
<td>350</td>
</tr>
<tr>
<td>18</td>
<td>Total oil and grease</td>
<td>mg/l</td>
<td>0.4</td>
<td>0.8</td>
<td>0.4</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>1.4</td>
<td>ND</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>E. Coli</td>
<td>MPN/100ml</td>
<td>6</td>
<td>19</td>
<td>15</td>
<td>4</td>
<td>9</td>
<td>14</td>
<td>29</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>20</td>
<td>Coliform</td>
<td>MPN/100ml</td>
<td>2,300</td>
<td>5,300</td>
<td>4,600</td>
<td>1,400</td>
<td>2,100</td>
<td>4,400</td>
<td>6,400</td>
<td>1,900</td>
<td>7,500</td>
</tr>
</tbody>
</table>

Remark: QCVN 08-MT:2015/BTNMT (Column B1)- National technical regulations on surface water quality. Of which B1 standards are applicable to water used for irrigation purposes and B2 standards are applicable to other usages; ND- not detected; MDL- Method Detection Limit.
2.2.3. **Groundwater quality**

a) Sampling location: There are 3 locations of groundwater quality sample on 20\textsuperscript{th} February 2020 in some households using water in drilling wells which have depth from 20m - 30m and the sampling map is presented respectively in Figure 8.

![Figure 8: The sampling map of ground water quality](image)

<table>
<thead>
<tr>
<th>Code</th>
<th>Sampling location</th>
<th>Coordinates</th>
<th>Work items</th>
</tr>
</thead>
<tbody>
<tr>
<td>NN1</td>
<td>Well of the local people living near the resettlement area of 12ha</td>
<td>X: 1132 665</td>
<td>Y: 548 935</td>
</tr>
<tr>
<td>NN2</td>
<td>The well of the local people near the WWTP area.</td>
<td>X: 1132 586</td>
<td>Y: 556 842</td>
</tr>
<tr>
<td>NN3</td>
<td>Well of the people near the canal construction area on the Urban main road 2 (near Dinh Tien Hoang Street)</td>
<td>X: 1129 720</td>
<td>Y: 548 941</td>
</tr>
</tbody>
</table>

b) The monitoring results of ground water quality in the project area is shown in Table 16, the monitoring results show that the underground water parameters in the project area is lower than the permissible level as per QCVN 09-MT:2015/BTNMT – National technical standard on underground water quality.
Table 16: Result of ground water quality in the project area

<table>
<thead>
<tr>
<th>No</th>
<th>Parameters</th>
<th>Unit</th>
<th>NN1</th>
<th>NN2</th>
<th>NN3</th>
<th>QCVN 09-MT: 2015/BTNMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>pH</td>
<td>-</td>
<td>6.40</td>
<td>6.52</td>
<td>6.45</td>
<td>5.5-8.5</td>
</tr>
<tr>
<td>2</td>
<td>Hardness</td>
<td>mg/l</td>
<td>112.6</td>
<td>110.8</td>
<td>102.0</td>
<td>500</td>
</tr>
<tr>
<td>3</td>
<td>TDS</td>
<td>mg/l</td>
<td>106.3</td>
<td>115.3</td>
<td>114.5</td>
<td>1500</td>
</tr>
<tr>
<td>4</td>
<td>DO</td>
<td>mg/l</td>
<td>3.59</td>
<td>3.26</td>
<td>3.42</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Ammonium</td>
<td>mg/l</td>
<td>0.021</td>
<td>0.014</td>
<td>0.015</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Nitrate</td>
<td>mg/l</td>
<td>0.464</td>
<td>0.285</td>
<td>0.633</td>
<td>15</td>
</tr>
<tr>
<td>7</td>
<td>Nitrite</td>
<td>mg/l</td>
<td>0.025</td>
<td>0.017</td>
<td>ND</td>
<td>(MDL = 0.0003)</td>
</tr>
<tr>
<td>8</td>
<td>Sulfate</td>
<td>mg/l</td>
<td>36.70</td>
<td>40.22</td>
<td>35.44</td>
<td>400</td>
</tr>
<tr>
<td>9</td>
<td>Chloride</td>
<td>mg/l</td>
<td>23.77</td>
<td>25.63</td>
<td>23.64</td>
<td>250</td>
</tr>
<tr>
<td>10</td>
<td>Arsenic</td>
<td>mg/l</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>0.05</td>
</tr>
<tr>
<td>11</td>
<td>Cadmium</td>
<td>mg/l</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>0.005</td>
</tr>
<tr>
<td>12</td>
<td>Manganese</td>
<td>mg/l</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>0.5</td>
</tr>
<tr>
<td>13</td>
<td>Iron</td>
<td>mg/l</td>
<td>0.190</td>
<td>0.214</td>
<td>ND</td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>Coliform</td>
<td>MPN/100ml</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>E.Coli</td>
<td>MPN/100ml</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
</tbody>
</table>


2.2.4. Wastewater characteristics

a) Sampling location: Wastewater samples were also collected at 5 locations in the residential areas on 20th February 2020. The sampling map is presented in Figure 9.
Figure 9: The sampling map of wastewater quality

<table>
<thead>
<tr>
<th>Code</th>
<th>Sampling location</th>
<th>Coordinates</th>
<th>Work items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>NT1</td>
<td>From the residential area to a common sewer on NH53, near the resettlement area</td>
<td>1132 512</td>
<td>549 193</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The resettlement area, WWTP</td>
</tr>
<tr>
<td>NT2</td>
<td>From the renovated residential area No. 2 to a common drainage system on Mau Than road</td>
<td>1132 429</td>
<td>550 789</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The renovated residential area, WWTP</td>
</tr>
<tr>
<td>NT3</td>
<td>From the renovated residential area No. 1 to the common sewer on Le Thai To street</td>
<td>1133 972</td>
<td>550 751</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The renovated residential area, WWTP</td>
</tr>
<tr>
<td>NT4</td>
<td>From the renovated residential area No. 4 to a common drainage system on Nguyen Chi Thanh street</td>
<td>1134 082</td>
<td>552 123</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The renovated residential area, WWTP</td>
</tr>
<tr>
<td>NT5</td>
<td>From renovated residential area No. 6, to a shared drainage system on Ong Phu street</td>
<td>1132 196</td>
<td>553 317</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The renovated residential area, WWTP</td>
</tr>
</tbody>
</table>

b) Analysis results: The collected wastewater samples were analyzed for 11 criteria according to the standards for wastewater quality (QCVN14/2008: BTNMT) on 20th February 2020. The results are presented in Table 17.

Table 17: Wastewater quality measurement results

<table>
<thead>
<tr>
<th>No</th>
<th>Parameters</th>
<th>Unit</th>
<th>Results</th>
<th>QCVN 14: 2008/BTNMT (Column B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>NT1</td>
<td>NT2</td>
</tr>
<tr>
<td>1</td>
<td>pH</td>
<td>-</td>
<td>7.43</td>
<td>7.20</td>
</tr>
<tr>
<td>2</td>
<td>TSS</td>
<td>mg/l</td>
<td>68</td>
<td>91</td>
</tr>
</tbody>
</table>
The results of domestic wastewater monitoring in the residential areas showed that almost all wastewater parameters in the common drainage culverts are within allowable limit, excepting for TSS, BOD$_5$, Ammonium and Coliform concentration is higher than the allowable level of QCVN 14:2008/ BTNMT, Column B including:

- At the sampling point NT1 (from the residential area to a common sewer on NH53, near the resettlement area): BOD$_5$ exceeds 2.2 times; Ammonium exceeds 3.4 times and Coliform exceeds 2.4 times.

- At the sampling point NT2 (from the renovated residential area No. 2 to a common drainage system on Mau Than road): Coliform exceeds 1.06 times.

- At the sampling point NT3 (from the renovated residential area No. 1 to the common sewer on Le Thai To street); NT4 (from the renovated residential area No. 4 to a common drainage system on Nguyen Chi Thanh street) and NT5 (From renovated residential area No. 6, to a shared drainage system on Ong Phu street): TSS exceeds from 1.09 to 1.17 times; BOD$_5$ exceeds from 1.66 to 2.52 times; Ammonium exceeds from 1.35 to 1.77 times and Coliform exceeds from 1.06 to 1.4 times.

In general, domestic wastewater from residential areas after treatment of septic tanks has not been collected and treated to meet standards before discharging into the canals. These residential areas will be constructed the sewers to collect wastewater and lead to treatment at the wastewater treatment plant with a capacity of 15,000 m$^3$/day under the project.

### 2.2.5. Soil quality

a) Sampling location: Soil quality samples were collected in the project areas, along proposed roads, proposed embankment and sewers on 20$^{th}$ February 2020. The locations of soil quality sample on map are shown in Figure 10.
### Figure 10: The sampling map of soil quality

<table>
<thead>
<tr>
<th>Code</th>
<th>Sampling location</th>
<th>Coordinates</th>
<th>Work items</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>12ha resettlement area</td>
<td>X: 1132 512</td>
<td>Y: 549 193</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12ha resettlement area</td>
</tr>
<tr>
<td>D2</td>
<td>Construction location of tidal sluice gate No. 1</td>
<td>X: 1108 161</td>
<td>Y: 587 232</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>tidal sluice gate</td>
</tr>
<tr>
<td>D3</td>
<td>The position of the end of the road P8 connecting P9</td>
<td>X: 1130 889</td>
<td>Y: 548 767</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>the road P8 connecting P9</td>
</tr>
<tr>
<td>D4</td>
<td>Location near the beginning of embankment of Long Ho river</td>
<td>X: 1133 827</td>
<td>Y: 552 087</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>embankment of Long Ho river</td>
</tr>
<tr>
<td>D5</td>
<td>Construction location of Urban main road 2 (near the bridge over the canal)</td>
<td>X: 1130 898</td>
<td>Y: 552 524</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Urban main road 2</td>
</tr>
<tr>
<td>D6</td>
<td>WWTP area</td>
<td>X: 1132 783</td>
<td>Y: 556 614</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>WWTP</td>
</tr>
</tbody>
</table>

b) Analysis results: The monitoring results of soil quality in the project area is shown in Table 18. The concentration of heavy metals (Cd, As, Zn, Pb, Cu, Cr) in the project area are many times lower than the permissible limits of QCVN 03-MT:2015/BTNMT - National technical regulation on the allowable limits of some needles heavy type in the soil. Heavy metal parameters are within the permitted limits of QCVN 03-MT:2015/BTNMT. The process of construction of the project will remove the topsoil, depending on the nature of the soil, which will determine the reuse or disposal plan. Various purposes such as leveling or may dispose as ordinary waste.
### Table 18: Results of soil quality in the project area

<table>
<thead>
<tr>
<th>No</th>
<th>Parameters</th>
<th>Unit</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>D5</th>
<th>D6</th>
<th>QCVN 03-MT:2015 (Agricultural land)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>As</td>
<td>mg/kg</td>
<td>ND (MDL=0.4)</td>
<td>ND (MDL=0.4)</td>
<td>ND (MDL=0.4)</td>
<td>ND (MDL=0.4)</td>
<td>ND (MDL=0.4)</td>
<td>ND (MDL=0.4)</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>Cd</td>
<td>mg/kg</td>
<td>ND (MDL=0.14)</td>
<td>ND (MDL=0.14)</td>
<td>ND (MDL=0.14)</td>
<td>ND (MDL=0.14)</td>
<td>ND (MDL=0.14)</td>
<td>ND (MDL=0.14)</td>
<td>1.5</td>
</tr>
<tr>
<td>3</td>
<td>Pb</td>
<td>mg/kg</td>
<td>ND (MDL=1.33)</td>
<td>ND (MDL=1.33)</td>
<td>ND (MDL=1.33)</td>
<td>ND (MDL=1.33)</td>
<td>ND (MDL=1.33)</td>
<td>ND (MDL=1.33)</td>
<td>70</td>
</tr>
<tr>
<td>4</td>
<td>Cr</td>
<td>mg/kg</td>
<td>0.214</td>
<td>0.185</td>
<td>0.263</td>
<td>0.164</td>
<td>0.262</td>
<td>0.281</td>
<td>200</td>
</tr>
<tr>
<td>5</td>
<td>Cu</td>
<td>mg/kg</td>
<td>6.352</td>
<td>6.694</td>
<td>6.112</td>
<td>5.784</td>
<td>6.947</td>
<td>7.102</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>Zn</td>
<td>mg/kg</td>
<td>4.875</td>
<td>4.475</td>
<td>4.947</td>
<td>3.692</td>
<td>4.534</td>
<td>5.326</td>
<td>200</td>
</tr>
</tbody>
</table>

**Remark:** QCVN 03-MT:2015/BTNMT - National technical regulation on the allowable limits of heavy metals in the soils; ND - not detected; MDL- Method Detection Limit.

### 2.2.6. Sediment quality

**a) Locations:** The sediment quality is conducted at 6 locations in canals to be rehabilitated under the Project on 20th February 2020. The sediment quality samples on map is shown in Figure 11.

<table>
<thead>
<tr>
<th>Code</th>
<th>Sampling location</th>
<th>Coordinates</th>
<th>Work items</th>
</tr>
</thead>
<tbody>
<tr>
<td>TT1</td>
<td>Sediments of the canal at the intersection with NH53 (near the road P8 connecting P9)</td>
<td>X: 1132 665</td>
<td>Y: 548 935</td>
</tr>
<tr>
<td>TT2</td>
<td>Sediment of the canal at the tidal sluices No.3 (the point of intersection with the urban main road 1)</td>
<td>X: 1130 889</td>
<td>Y: 548 767</td>
</tr>
<tr>
<td>TT3</td>
<td>Sediment of the canal near the intersection of Mau Than road and Nguyen Du road.</td>
<td>X: 1133 352</td>
<td>Y: 551 479</td>
</tr>
<tr>
<td>TT4</td>
<td>Sediments of Long Ho River, near the tidal sluices No.8</td>
<td>X: 1132 072</td>
<td>Y: 553 622</td>
</tr>
<tr>
<td>TT5</td>
<td>Sediments of the canal at the location of bridge construction on the urban main road 2 (near the bigining point)</td>
<td>X: 1130 898</td>
<td>Y: 552 524</td>
</tr>
<tr>
<td>TT6</td>
<td>Sediments of the canal at the location of bridge construction on the urban main road 2 (near Dinh Tien Hoang road)</td>
<td>X: 1129 720</td>
<td>Y: 548 941</td>
</tr>
</tbody>
</table>
b) Analysis results:

Table 19: Sediment quality monitoring results

<table>
<thead>
<tr>
<th>No</th>
<th>Parameter</th>
<th>Unit</th>
<th>TT1</th>
<th>TT2</th>
<th>TT3</th>
<th>TT4</th>
<th>TT5</th>
<th>TT6</th>
<th>QCVN 43:2017/BTNMT (sediment on fresh water)</th>
<th>QCVN 07:2009/BTNMT H (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Salinity</td>
<td>‰</td>
<td>3.22</td>
<td>2.84</td>
<td>3.62</td>
<td>3.53</td>
<td>2.74</td>
<td>3.53</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>As</td>
<td>mg/kg</td>
<td>0.651</td>
<td>0.626</td>
<td>0.714</td>
<td>0.693</td>
<td>0.583</td>
<td>0.693</td>
<td>17</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>Cd</td>
<td>mg/kg</td>
<td>0.412</td>
<td>0.384</td>
<td>0.485</td>
<td>0.417</td>
<td>0.348</td>
<td>0.417</td>
<td>3.5</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>Pb</td>
<td>mg/kg</td>
<td>3.692</td>
<td>3.325</td>
<td>2.794</td>
<td>3.021</td>
<td>3.329</td>
<td>3.021</td>
<td>91.3</td>
<td>300</td>
</tr>
<tr>
<td>5</td>
<td>Zn</td>
<td>mg/kg</td>
<td>5.487</td>
<td>6.152</td>
<td>6.325</td>
<td>6.841</td>
<td>5.794</td>
<td>6.841</td>
<td>315</td>
<td>5000</td>
</tr>
<tr>
<td>6</td>
<td>Cu</td>
<td>mg/kg</td>
<td>4.521</td>
<td>4.987</td>
<td>5.286</td>
<td>5.479</td>
<td>4.153</td>
<td>5.479</td>
<td>197</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Hg</td>
<td>mg/kg</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND (MDL=0.19)</td>
<td>0.7</td>
</tr>
<tr>
<td>8</td>
<td>Cr⁶⁺</td>
<td>mg/kg</td>
<td>0.386</td>
<td>0.327</td>
<td>0.298</td>
<td>0.368</td>
<td>0.328</td>
<td>0.368</td>
<td>-</td>
<td>100</td>
</tr>
</tbody>
</table>


The results show in Table 19 that concentrations of heavy metals in sediment in the project area are lower than the allowable limit set forth in the national technical regulations on sediment quality (QCVN 43:2017/BTNMT). These concentrations are also below the acceptable limits of hazardous waste as specified in QCVN 07:2009/BTNMT. Therefore, the sediments from the canal rehabilitating work are neither hazardous nor contaminated with heavy metals. So that, the dredged material from the project areas can be collected, transported and disposed at the approved disposal site as non-hazardous wastes.
2.3. SOCIO-ECONOMIC CONDITIONS

2.3.1. Economic development condition

Vinh Long City was established in 2009 under the Government's Resolution No. 16 on April 10, 2009. Over the past 10 years, Vinh Long city has strongly promoted its function of a provincial city, creating a new driving force for development. The city's economy continues to grow, the economic structure changes positively with rapid increase in the proportion of services - trade - industry. The total value of industrial production in 2018 increased by 1.4 times compared to the year 2008. With the results achieved over the years, Vinh Long City has affirmed its role as a driving force for the province’s socio-economic development. In particular, the city is the central convergence for the province’s economic restructuring and a bridge between Vinh Long province and other provinces in the Mekong Delta region.

❖ Trades and services

From 2010 to 2018, total retail sales of goods and services increased by 2.7 times, strong development in industries with high added value, significantly contributing to economic growth and budget collection of the province in general. In which, value in 2010 reached over 4,909,698 million dongs. The value in 2015 reached over 4,909,698 million dongs, increasing 101.7% in comparison with year 2010; in 2016 reached over 10,849,957 million dongs, increasing 9.54% compared with 2015; in 2017 reached over 11,873,488 million dongs, increasing 9.43% compared with 2016; in 2018 the value reached over 13,276,201 million dongs, increasing 11.81% compared with 2017.

With its riverside location, Vinh Long city aims to exploit the river landscape, making a difference and attractiveness specifically for the development of tourism economy. In 2018, the city triggered operation of a walking street. Although there are still many pending issues for improvement, this action has initially contributed to refreshing the landscape of the city environment, providing many entertainment options for the city people as well as visitors. According to information of the Vinh Long city people’s committee, there are 31 hotels all over the city with a total of 898 rooms; There are 2 commercial and service centers and 4 public recreation areas serving a total of 450,000 visitors.

❖ Industrial-handicraft sector

Production value of industrial section in the last four years from 2015-2018 has reached over 17,433 billion dongs. In which, in 2015, the total production value reached over 3,933 billion dongs; in 2016 the total production value reached 4,057 billion dongs, increasing 3.17% in comparing with 2015; in 2017 the total production value reached over 4,520 billion dongs, increasing 11.39% comparing with 2016; in 2018 the total production value reached over 4,922 billion dongs, increasing 8.90% comparing with 2017.

Over the past years, despite of facing many difficulties in industrial production, Vinh Long city has focused on directing the implementation of policies and national, provincial directions in an effective and timely manner to support for the enterprises. Industrial products in the city are relatively diversified with various types, in which some sectors have developed well and stably like food processing, mining industry, drink production, weaving, production of leather and related products… Getting these results is thanks to the investment in equipment, technology, increase in product quality, decrease in price and increase in competitiveness in the market in the country and all over the world, bringing high economic efficiency and contributing into economic growth in the area.

❖ Agricultural-forestry-aquacultural production

In 2018, production value of agricultural – forestry - aquacultural sectors in the city according to current price was over 707 billion dongs. In which, the value in 2015 reached over 708 billion
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dongs, decreasing 2.07% comparing with 2014; the value in in 2016 reached over 684 billion dongs, increasing 3.44% in comparison with 2015; the value in in 2017 reached over 664 billion dongs, decreasing 2.9% in comparison with 2016.

Vinh Long city has changed of agricultural structure toward urban development, thereby reducing cultivation and farming area; applying science and technology into agricultural production, mainly in selecting and breeding species, shifting the production mechanism, constructing farming models for bonsai and flowers, developing the model of special marine products. However, the shifts are small and unsynchronous.

In the mean time, the area of agricultural land of the city decreased more and more; during the period of 2015-2018, rice area has decreased 175.13ha. The aquacultural breeding has been decreased of 6.67ha.

2.3.2. Social development conditions
❖ Population

As of 31th December 2018, there were 143,135 people living in Vinh Long city. The population density was 2,934 people/km², of which the population mainly concentrated in urban areas (9 wards): 76.4%. There was no big gap in population structure by genders, with 48.24% of male population and 51.76% of female population. The natural population growth rate kept stable at 0.8-1% for 5 years from 2010-2015.

The project area consists of 7 urban wards with a total natural area of 20.59 km², accounting for 47.82% of the city’s natural land area, with a population of 109,520 people, accounting for 76.4% of the city's population, population density is 5,319 people/km².

Table 20: Area and population of Vinh Long city in 2018

<table>
<thead>
<tr>
<th>No.</th>
<th>Ward/commune</th>
<th>Area (km²)</th>
<th>Population (person)</th>
<th>Population density (pers/km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>Male</td>
</tr>
<tr>
<td>1</td>
<td>Ward 1</td>
<td>0.92</td>
<td>13,503</td>
<td>6,265</td>
</tr>
<tr>
<td>2</td>
<td>Ward 2</td>
<td>1.52</td>
<td>16,459</td>
<td>8,097</td>
</tr>
<tr>
<td>3</td>
<td>Ward 3</td>
<td>3.76</td>
<td>17,813</td>
<td>8,670</td>
</tr>
<tr>
<td>4</td>
<td>Ward 4</td>
<td>2.43</td>
<td>19,193</td>
<td>9,128</td>
</tr>
<tr>
<td>5</td>
<td>Ward 5</td>
<td>3.94</td>
<td>16,328</td>
<td>7,808</td>
</tr>
<tr>
<td>6</td>
<td>Ward 8</td>
<td>3.38</td>
<td>14,206</td>
<td>6,871</td>
</tr>
<tr>
<td>7</td>
<td>Ward 9</td>
<td>4.64</td>
<td>12,018</td>
<td>5,812</td>
</tr>
<tr>
<td>8</td>
<td>Tan Hoa commune</td>
<td>7.48</td>
<td>8,502</td>
<td>4,179</td>
</tr>
<tr>
<td>9</td>
<td>Tan Hoi commune</td>
<td>5.20</td>
<td>8,371</td>
<td>4,102</td>
</tr>
<tr>
<td>10</td>
<td>Tan Ngai commune</td>
<td>9.01</td>
<td>9,434</td>
<td>4,573</td>
</tr>
<tr>
<td>11</td>
<td>Truong An commune</td>
<td>5.54</td>
<td>7,529</td>
<td>3,655</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>47.82</td>
<td>143.356</td>
<td>69,160</td>
</tr>
</tbody>
</table>

(Source: Statistical yearbook of Vinh Long city, 2018)

Ethnic structure of the population: In the city, there are 3 main ethnic groups, of which the Kinh
account for over 90% of the population, then the Khmer and the Chinese and the rest are other ethnic groups like the Tay, Thai, Cham ...people. These ethnic groups together with their customs, traditional trades, festivals, historical and cultural relics, etc. have created an unique and diverse culture for Vinh Long city.

2.3.3. Results of affected households survey in Project area

a. Household information

❖ Household size

According to the survey with 400 households (1,856 people), the average size of affected households is 4.64 people/household, of which, there is no household with 1 member; 55.75% of households have 2-4 members; 37.5% have 5-7 members; 5.5% have 8-10 members and 1.25% have 11-13 people. The highest number of family members is 13 people/household and the lowest is 2 people/household. (In this survey, the number of family members is the number of people living together and having name in the same household registration book). There is no big difference in terms of gender, the average number of males is 2.16 per household (687 people) and the figure of female is 2.51 per household (1,169 people).

(Source: Socio-economic survey with AHs, 01/2020)

Figure 12: Demographic characteristics (Unit: %)

❖ Age

Age of respondents: The average age of the respondents is 54.94, the youngest is 24 years old while the oldest is 88 years old. The results of the survey on the age of respondents show that the respondents are mainly adults who hold an important role in the family.

❖ Ethnicity

Ethnicity: According to the survey results the vast majority of the affected households is Kinh people (98.6%), the remaining is 1.4% of ethnic minority.

❖ Educational level

Educational level of householders: The survey results indicated that the educational level of householders is relatively high, most of them graduated from College/University with 143 people (accounting for 35.75%), followed by high school graduates with129 householders (32.25%), secondary school with 84 householders (21%), primary school with 22 people (5.5%) and post graduate is 14 people (3.5%). The percentage of illiterate household heads is 2.0% (8 people).
b. Living conditions of households

Main occupation: According to the survey on the main occupation of employees, (the age of workers in the report is from 18 to 60 years old), employees mainly participate in 3 occupational groups: civil servants (37.7%), Trade/service (16.4%) and other jobs such as housewives, freelance workers (9.6%), in addition, there are some other occupations. Specific information about occupations of employees is presented in the following chart:

Table 21: Income of affected households

<table>
<thead>
<tr>
<th>Income source</th>
<th>Average income</th>
<th>Highest</th>
<th>Lowest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total average income</td>
<td>12,806,860</td>
<td>100,000,000</td>
<td>2,300,000</td>
</tr>
</tbody>
</table>

Assessment of income sources: According to the assessment of AHs’ income source stability,
87.7% of the households have stable income source which is mainly from stable salary paid jobs (civil servants, workers, service traders, etc.); and 12.3% of households said that their income is unstable as they live on agriculture, hired workers and small businesses.

**Expenditures:** The average expenditure of the affected households/month is 9,923,970 VND/household/month, the highest expenditure is 35,000,000 VND/month and the lowest is 2,000,000 VND/household/month. The expenditure structure of AHs is as follows:

<table>
<thead>
<tr>
<th>Expenditure structure</th>
<th>Average expenditure</th>
<th>Highest</th>
<th>Lowest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>9,923,970</td>
<td>35,000,000</td>
<td>2,000,000</td>
</tr>
</tbody>
</table>

(Source: Socio-economic survey with AHs, 01/2020)

**Saving money:** According to the survey results, the savings of affected households is quite low, the average saving amount of the households is 3,041,350 VND/household/month. The highest saving is 80 million VND/month while the lowest is nil because their income is only enough for expenditures.

**Loan:** According to the survey about the income and expenditure of AHs, the vast majority of respondents said that their average income in the last 2 months was lower than the expenditures. Therefore, 36.7% of surveyed households (150 households) confirmed that they had to ask for a loan. The main borrowing sources are from banks (118 households) and mass organizations (19 households), relatives (10 households), high-interest rate loans (2 households), and from other sources (1 household). The borrowing amount ranges VND 10 million to VND 950 million; loans from organizations (10 million to 60 million VND); from relatives (from VND 10 million to VND 200 million); high-interest rate loans (VND 30 million); others (VND 100 million). The households said that they asked for a loan to build/repair house (37%), for business (24.1%), or agricultural production (18.5%), for investment purposes (7.4%), family expenditures (5.6%), and others (7.4%).

(Source: Socio-economic survey with AHs, 01/2020)

**Figure 15: Purposes of loans**

*Housing* is one of the most important criteria of household living standards. Most of the Ahs in the Project area mainly live in permanent houses. Types of houses of affected households are detailed in the following chart.
Land: According to the survey results, there are 96.5% of households owning residential land, 32.9% having garden land, and 7.7% owning agricultural land.

Table 23: Ownership of lands (Unit: %)

<table>
<thead>
<tr>
<th></th>
<th>Residential land</th>
<th></th>
<th>Garden land</th>
<th></th>
<th>Agricultural land</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>96.5</td>
<td>3.5</td>
<td>32.9</td>
<td>67.1</td>
<td>7.7</td>
<td>92.3</td>
</tr>
</tbody>
</table>

Land use right certificate: up to 91.7% of the households responded that they have land use right certificate, of which 35.1% named by the husband and 26% named of wife and 26% named by both husband and wife, the remaining 13% named by another person. The results are clearly shown below:

Figure 16: Types of house

Figure 17: Named in land use right certificate

Furniture: Survey results revealed that almost all households own essential assets such as televisions, motorcycles, phones, refrigerators, etc.
**Means of production**: The main means of production consist of cars, harvesters, trucks/pickup trucks and other means. The following figure presents details about households’ means of production:

![Means of production diagram](image)

(Source: Socio-economic survey with AHs, 01/2020)

**Figure 19: Means of production**

**Hygiene**: In the Project area, 76.8% of households use hygienic toilets (septic tanks), 8.5% use two-compartment toilet, 5.6% use one-compartment toilet. In addition, 8.5% of households use simple toilet and the remaining 0.7% use public toilets. According to households, 93.4% assessed that their toilet is clean and hygienic; 5.9% said that their toilet is dirty and unhygienic; The remaining 0.7% have no idea/or have no answer for the question.

**Energy**: The power used for lighting in households is from the national grid, 100% of households use this power source. The energy used for cooking are mainly Gas (99.3%); Kerosene (1.4%).

**Assessment of living standards**: According to the survey results, the living standard of
households is not high. only 1.4% said that their family was rich, 19.9% were normal, 73.3% were average. The remaining 5% thought that the family is poor and near-poor.

c. Access to Health care and medical services

Diseases: About 48% (192/400 households) of surveyed AHs said that in the past 2 months their family have members got sick. They mainly suffered from common diseases such as: cold/fever (47.0%); Dengue (1.6%); Digestion (20.3%); Respiratory (20.3%); Injury (9.4%) and others (37.9%). In comparison to general context that health conditions and health care services of people becomes better and better, this is a fairly high and worrying health indicator of AHs.

Health insurance: According to the results of the survey on health insurance, 96.5% of the affected households buying health insurance, while the remaining 3.5% did not.

Access to medical services: Local people in the Project said that it is quite convenient for them to access to medical services. Vinh Long city has a quite complete hospital system from the medical service unit to the city’s general hospital. In addition, there are private hospitals, clinics and pharmacies that facilitate the access of affected households to medical services. The distance from the Project area to the ward medical service unit and pharmacies is from 2 to 5km, while the distance to the city general hospital is over 5km. Currently, in Vinh Long city, there are 17 health care facilities including 6 hospitals and 11 health medical units with 2,862 beds and 2,029 medical staffs. In 2018, the percentage of under-1 child with full vaccination was 98%.

d. Public services and environmental issues

Public services: According to the survey results, clean water supply and wastewater collection services were provided to households. However, wastewater collection and treatment services have not been popular. The survey results are presented in the following in Table 24:
**Table 24: Public services**

<table>
<thead>
<tr>
<th>Public services</th>
<th>Yes</th>
<th>No</th>
<th>Implemented by</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean water</td>
<td>96.8</td>
<td>3.2</td>
<td>91.2</td>
<td>79.1</td>
</tr>
<tr>
<td>Waste collection</td>
<td>94.9</td>
<td>5.1</td>
<td>83</td>
<td>64.8</td>
</tr>
<tr>
<td>Wastewater collection and treatment</td>
<td>40.8</td>
<td>59.2</td>
<td>89.7</td>
<td>65.7</td>
</tr>
</tbody>
</table>

(Source: Socio-economic survey with AHs, 01/2020)

**Flooding:** Based on the results of the survey on the flooding in the Project area, some wards still suffer from flooding (41.4%), especially in Ward 1, 4 (the flooding rate is over 50%). The respondents reported that there are some places where the flooding happens inside the house (58.8%), outside the house (41.2%). The flooding frequency is from 1-3 times with a depth from 10-60cm. The average flooding duration is 2.48 hours/day, at least 1 hour/day and at most 6 hours/day.

The flooding is mainly caused by heavy rains, poor quality drainage systems and that the house’s base is lower than of the road bed. Details are displayed in the following figure.

(Source: Socio-economic survey with AHs, 01/2020)

**Figure 21: Flooding reasons**

**Sanitation conditions:** According to the results of the survey on the current sanitation condition in residential areas, 46.6% respondents confirmed pollution; 51.1% answered that the environment was not polluted and the remaining 2.3% had no idea. Of which 71.6% of households said that pollution level was low, 13.6% affirmed that pollution was severe, and the remaining 14.8% had no idea.

There are several environmental issues recorded in the Project area: air pollution/excessive dust pollution; Flooding in the rainy season; Pollution due to stagnant wastewater; groundwater wells/rivers pollution by the discharging of domestic wastewater. However, some households think that there are no such environmental problems. The survey results are shown in the following:
Gender issues, social relations and community cohesion

Gender violence: According to the survey results, there are still gender-based violence cases in the Project areas, but at a low rate (2.9%), mainly physical violence (4.2%).

Labor division: Regarding the labor division by gender, the survey results showed that there is not big difference between men and women. All activities are involved by both men and women. However, some jobs such as cooking, cleaning house and children care are mainly charged by women. The results of survey on labor division in the Project area are not different from the figures provided by current studies and analysis on labor division in Vietnam: Women are mainly responsible for housework and child care while men mainly engage in production activities.

Table 25: Survey on labor division (Unit: %)

<table>
<thead>
<tr>
<th>No.</th>
<th>Jobs</th>
<th>Female</th>
<th>Male</th>
<th>Both</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cooking</td>
<td>66.7</td>
<td>1.5</td>
<td>31.9</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Cleaning/washing</td>
<td>56.7</td>
<td>6.7</td>
<td>36.6</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Repair of equipment in the family</td>
<td>18</td>
<td>53.4</td>
<td>28.6</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>Children care</td>
<td>35.9</td>
<td>6.1</td>
<td>58</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>Income generating jobs</td>
<td>17.8</td>
<td>13.3</td>
<td>68.9</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>Participation of community/social activities</td>
<td>16.9</td>
<td>19.9</td>
<td>63.2</td>
<td>100</td>
</tr>
</tbody>
</table>

Decision making: According to the survey results, decisions in the family (on buying assets for the family, applying for loans from banks, repairing houses or children’s education, etc.) are discussed by both husband and wife before being made.

Name for valuable assets in the family: Under the Land Law 2013, both husband and wife are named in the land use right certificate. The survey results showed that 73.3% of the respondents said that the land use right certificate was named by both husband and wife, 12.6% named by wife and 14.1% by husband.
Community activities: The percentage of both spouse involvement in community activities such as public meetings, environmental sanitation in residential areas, and contribution to security and order in the residential area is over 40%. However, the figures for men and women in each activity are different, specifically: (meetings: 30.7% men, 23.4% women; sanitation activities: 29.9% men, 21.6% women; security and orders in the residential area: 43.2% men and 16.7% women.

Table 26: Survey on labor division in community activities

<table>
<thead>
<tr>
<th>No.</th>
<th>Activities</th>
<th>Women</th>
<th>Male</th>
<th>Both</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Community meeting</td>
<td>23.4</td>
<td>30.7</td>
<td>46</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Environmental sanitation in residential areas</td>
<td>21.6</td>
<td>29.9</td>
<td>48.5</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Security and orders in the residential area</td>
<td>16.7</td>
<td>43.2</td>
<td>40.2</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Socio-economic survey with AHs, 01/2020)

Participation in social and economic organization: According to the survey results, in the Project area, there are socio-political organizations and a large number of members who are in all around residential quarters: (i) Farmers Association; (ii) Women’s Union; (iii) Youth Union; (iv) Elderly Association and (v) Veterans Association, etc. By survey results, it can be seen that the vast majority of households have members engaging in at least one of the aforementioned organizations. These mass organizations are good connectors of local community. With these organizations, many of the community development activities are promoted. Therefore, in general, the Project’s resettlement and livelihood restoration activities are recommended to be integrated in or combined with these organizations to achieve the best results. The survey results are presented in the following table:

Table 27: Participation of households in socio-economic organizations

<table>
<thead>
<tr>
<th>No</th>
<th>Organizations</th>
<th>Frequency</th>
<th>Rate</th>
<th>No.of members</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Farmer Association</td>
<td>99</td>
<td>24.75</td>
<td>1_2</td>
</tr>
<tr>
<td>2</td>
<td>Women Union</td>
<td>207</td>
<td>51.75</td>
<td>1_4</td>
</tr>
<tr>
<td>3</td>
<td>Youth Union</td>
<td>94</td>
<td>23.5</td>
<td>1_5</td>
</tr>
<tr>
<td>4</td>
<td>Veteran association</td>
<td>75</td>
<td>18.75</td>
<td>1_2</td>
</tr>
<tr>
<td>5</td>
<td>Elderly association</td>
<td>134</td>
<td>33.5</td>
<td>1_3</td>
</tr>
</tbody>
</table>

(Source: Socio-economic survey with AHs, 01/2020)

2.4. INFRASTRUCTURE CONDITIONS

2.4.1. Transport System

Regional transportation system

Vinh Long city is a transportation hub for the entire Mekong Delta region. Many national highways (NH) and provincial ways run across the city, including:

- The NH1A from My Thuan bridge runs through Vinh Long city toward Can Tho bridge. The national way when comes to Vinh Long becomes roads Pham Hung and Nguyen Hue, serving as the city’s main roads.
- The NH 53 connects the NH 1 at Pham Hung road from Vinh Long city to Tra Vinh province. When comes to the city, it becomes Pho Co Dieu street.
- The NH 80 connects NH 1 at My Thuan bridge to Sa Dec city.
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- The NH 57 connects NH 53 (Pham Thai Buong street) through Dinh Khao ferry toward Ben Tre province.
- Provincial road 31 (PR902) runs from Thieng Duc bridge to Vung Liem.
- The inter-provincial bus station located at the intersection of NH1 and NH53 with area of 1.7ha.

![Inter-regional transport network map](image)

**Figure 23: Inter-regional transport network map**

- **City transportation system**

The city’s central road network consists of major roads connecting the central areas to outside areas, with width of lanes from 12-24m such as Le Thai To, 3/2, Trung Nu Vuong, Pham Thai Buong, 30/4, Tran Phu, Nguyen Hue streets… Most of roads in the downtown area have small right of ways, narrow road beds, weak structures, and do not meet the travel needs of the city people.

Existing status of parking lot: there are 2 bus stations in the city: Vinh Long bus station of about 1.4 ha and Vinh Long city bus station of about 0.24 ha.

**Table 28: Summary of urban roads in Vinh Long city**

<table>
<thead>
<tr>
<th>Name of city</th>
<th>Total</th>
<th>Road Management Board VII manages</th>
<th>Department of Transport manages</th>
<th>CPCs manage</th>
<th>Other unit manages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinh Long</td>
<td>66.27</td>
<td>17/717</td>
<td>10.74</td>
<td>27.60</td>
<td>21.43</td>
</tr>
</tbody>
</table>

- **Waterway**

The city has an interlacing system of waterways, connecting most of residential areas and main markets, including Cai Doi, Cai Cam, Cai Ca, Cau Lau, Kinh Cut, Long Ho rivers and some other canals… At present, some rivers have been narrowed due to people’s encroachment and
uncontrolled construction in the urban development process over the past years.

2.4.2. Water Supply System

Vinh Long City has a drinking water treatment plant, Truong An water plant with total capacity of 35,000m$^3$/day. Its raw water takes in from Co Chien River. The city provides a good coverage of drinking water supply (96.4%) with daily use of 126 l/person for total 30,477 households.

2.4.3. Solid Waste Collection and Treatment

Collection of solid waste in the area is not thoroughly implemented. Only 73.1% of solid waste is collected. The remaining amount is treated by either burning or throwing into canals, causing environmental pollution. The collection of waste only in central wards by using simple vehicles and methods.

Previously, Vinh Long city used a landfill in Tan Ap Hamlet, Tan Xuan, Tan Ngai ward, with total treatment capacity of 5,500m$^3$. At the present, this landfill was closed and the city use an alternate landfill of 2ha in Hoa Phu commune, Long Ho district, which is 13 km from the center of the city. The landfill is able to extend 2 more hectares from current land available at the site however it is the decision the City to make.

In addition, the waste of Vinh Long City can be gathered to Phuong Thao High-tech Waste Treatment Plant which has an area of 8ha in Hoa Phu Commune of Long Ho District and the treatment capacity is 300 tons of waste per day.

Due to the use of outdated methods of waste treatment and the area is insufficient to meet demand in the future, Vinh Long province is planning to build a new landfill for solid waste disposal and treatment right at the Phu Hung landfill with total area of 6ha.

2.4.4. Power System

Power source: Vinh Long city is connected to the national grid of 220KV-Western region Ho Chi Minh city - Cai Lay - Tra Noc via Tra Noc substation 220/110/66KV- (100+160) MVA and at-site power source from Vinh Long diesel power plant. In addition, Vinh Long 220kV substation 220/110/22KV - (2x125) MVA is being constructed in the city. Recently, Cuu Long University in Vinh Long province inaugurated a solar power plant combining high-tech agriculture with a capacity of 980KW. It is estimated that the school uses only 35% of the electricity produced, the rest goes to the national grid, contributing to solving the electricity shortage on the national grid.

Lighting system: All main roads in the city have been equipped with lighting system. Roads in the residential area have been invested but asynchronously.

2.4.5. Drainage and sewage treatment

Current status of stormwater drainage system

Drainage system of Vinh Long city has been built for 40-50 years and become deteriorated. Total length of pipeline is 11,900m of which 11,000m of pipe and 900m of canal. Stormwater and wastewater are led in a common system of the city, some segments have been damaged that is incapable of rapid drainage in case of heavy rain or high tides. Besides, the low land terrain is the element contributing to flooding in the city. In ward 1. There are 18 water drainage sluice gates to canals and rivers, of which 15-16 check-valve gates which are operated 5-6 times/years and play the role of drainage and preventing water from overflowing on the road surface.

Current status of drainage canals, rivers and ditches

Drainage river system of Vinh Long is relatively diverse, in which the class I canal system hold key role of water supply and drainage for the city: Cai Da Lon, Cai Doi Lon, Ba Dieu, Cau Lo river, Cai Cam and Long Ho. However, most of the rivers and canals are winded and long time
not being dredged, thus, the drainage capacity is limited.

Pumping station: At the present a check valve system and pumping stations have been installed for flooding control in ward 1. This is the first flooding prevention system in the Mekong Delta Region. The drainage culverts are installed with a check valve; in rainy season, the water only one-way flows to the river but cannot be reverse to the city center through the culverts. In the case of high tide combined with heavy rain, 03 pumping stations with a capacity of 150 m/h (in Tau Khach station (Tau bridge), in the end of Tran Van On road, and Trai Cua on 2/9 road) are operated to bring water to the river so that long-term inundation in communes is prevented; and on coastal roads where the elevation is low, water is controlled by sand bags.

❖ Flooding

Recently, due to climate change and high sea level, Mekong Delta provinces are frequently flooded. Vinh Long city is severely flooding, especially in inner city, the water level may reach 50-70cm.

Every year, in the rainy season, especially from July to November, many areas of the city are from 0.3-0.5m under water. Some roads heavily flooded include: Trung Nu Vuong, Hoang Thai Hieu (ward 1); Le Thai To and Nguyen Hue (ward 2); Mau Than (ward 3); Tran Phu (ward 4); 14/9, Nguyen Chi Thanh (ward 5); Dinh Tien Hoang (ward 8); Pham Hung (Ward 9).

In particular, at the end of September, early October 2019, Vinh Long City is faced high tide with at alerting water level III from 0.25 to 0.45m that submerge roads, residential areas in the city. This has greatly affected the living conditions of people in Vinh Long city center.

Through the survey data collected by the People’s Committee of Vinh Long City, the flooded
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areas and the current flooding status are presented as follows.

- Ward 1: As a center of Vinh Long city and surrounded by Co Chien, Long Ho, Lo Ren canal, the ward’s location is favorable for drainage. On the other hand, it also stands a high risk of flooding in case of high tide when its drainage system is so poor that the water flows back and submerge the ward. Some roads heavily flooded such as: Trung Nu Vuong road, the area in front of PPC (Hoang Thai Hieu), Hung Vuong road. Some residential areas in alleys are flooded because its elevation is lower than the tidal level.

- Ward 2: borders ward 8 and 9 and separated ward 1 and 3 by Cai Ca canal and Cau Lo river, and one side borders Co Chien river. The ward’s flooding situation will be more severe in case of heavy rain. Some roads under deep flooding level: Le Thai To, Nguyen Hue, Hoang Hoa Tham.

- Ward 3: far from Co Chien river, surrounded by ward 1,2,4 and Long Ho district. Cau Lo river is the main drainage system of the Ward. Flooding often occurs in some areas such as Mau Than road that have small drainage culverts and surrounding canals are encroached or filled, leading to flooding due to poor drainage capacity. Some other roads such as Pho Co Dieu and Le Thi Hong Gam are flooded for 1-2 hours.

- Ward 4: follows along Long Ho river. As main roads have been upgraded in recent years, the flooding has been occurred; however, the water discharged into the alleys which has low elevation leads to flooding in residential areas.

- Ward 5: with 1 side is adjacent to Co Chien River, and 1 side follows along Long Ho River. In case of rain, 14 Thang 9 and Nguyen Chi Thanh roads will be flooded. Day hamlet is the area directly affected by tide and flood, with the depth of 20-35cm depending on the tides. As in this area, the river banks have not been embanked, the erosion is seriously taken place.

- Ward 8: It is adjacent to Ward 9, 2 and is separated from Long Ho district by Cau Lo and Cai Cam Rivers. Because most of the roads have no drainage system (except for Phuoc Tho market) and drainage canals and ditches are mostly filled, the roads get flooding even when the rain is moderate. The roads with the deepest flooding level are Dinh Tien Hoang, Phan Dinh Phung, and Dien Huu temple within 1-2 hours and at the depth of 31-40cm in August and October of lunar year.

- Ward 9: has 1 side bordering Co Chien river, Cai Cam river, and dense system of canals and ditches, it is quite convenient for drainage. Therefore, the flooding level in Ward 9 is low compared to other wards. In Ward 9, there are hot spots of flooding due to incompletion drainage that cause long-time stagnancy and that water is drained only by evaporation.

- In the city, the communes of Tan Hoi, Tan Hoa, Tan Ngai, Truong An are mainly flooded by high tide. However, thanks to good dyke and canal system, the flooding level is low.

Flooding level and period: Flooding areas: ward 1, 8 and part of ward 5. The flooding level and period which depend on rainfall, intensity and drainage system, ranges from 20 to 40 cm.

The combination of high tides rain is so severe that causes long-lasting flooding period which lasts several hours during the peak tide and may occur twice in October (due to the tidal cycle: 2 high tides and 2 low tides in a month). The flooding depth depends on the combination of high tide and rain, and mainly ranges from 20-30 cm. The flooded wards include: 2, 3, 4, 5 and 9. The areas flooded by high tides are mainly located along rivers and canals with a scope of 200-300 m (from the edge of the river). The flooding level is from 10-20 cm, mainly in October and November. Thus, for solving the flooding due to tides, a system of dykes and sluice gates should be constructed.

Analysis of flooding reasons: According to previous analysis on flooding situation and economic and population information of Vinh Long city, the flooding caused by rain tends to
increase because:

- **Low land**: Vinh Long province in general and Vinh Long city in particular border large rivers with high tidal amplitude, thus it is directly affected by the tide. On the other hand, most of the province’s terrain is low-lying coastal plain of 0.7-1m, thus it is prone to flooding by water overflown from canals, rivers, especially in Vinh Long city.

- **Poor drainage system**: Despite of new urban area, throughout various periods of time, with different vision and financial capacities, the infrastructure systems in general and drainage systems in particular have not matched together, thus the drainage capacity is not good and fails to meeting the requirements. In addition, drainage system (drainage culverts, canals, etc.) is run-down and have not been maintained regularly, leading to frequent local flooding (despite moderate rain). Besides, there are some works which have been under construction applying unsuitable methods, leading local flooding for surrounding area. The flooding survey in 2010 revealed that:

  + In Ward 1, before 2008, severe flooding occurred whenever heavy rains or high tides happened. After 2008, the drainage systems were upgraded, pumps installed, and sluice gates installed in drainage system, roadbed and the house were upgraded, the flooding in the area was decreased. However, due to outdated and run-down drainage system, the flooding still happens after every heavy rain.

  + In ward 8, almost all roads have no drainage culvert (excepting for Phuoc Tho market) and ditches, canals have been filled, flooding still occurs whenever it rains (despite moderate rain), particularly Dinh Tien Hoang and Phan Dinh Phung road.

  + In Ward 5, 14 Thang 9, Nguyen Chi Thanh roads are flooded in case of heavy rains.

  + In ward 2 – the inner city’s ward, there are still some roads that flooded due to high tide and the situation becomes more serious when it rains (rainfall of over 50-60 mm), including Le Thai To and Nguyen Hue road (near the intersection of Can Tho and the market in ward 2).

  + Communes surrounding the city are mainly flooded by high tide. In recent years, thanks to the dyke system with flooding control elevation has been invested, the flooding area is small. However, the flooding situation of the city becomes complicated as the flooding control solutions do not fit to the urban development pace and climate change events as high tide, high sea level.

Over the past period, whenever the roads are flooded, the roads and houses are successively upgraded. This method leads to shortcomings: costing the capital of the State and people, water from high area flows into lower area that exacerbates the existing complicated and persistent flooding.

- **Flooding due to urbanization**: Population growth contributed to the rapid urbanization of the suburban area of Vinh Long city which, previously, was for agricultural development purpose. With the population growth: the area of ponds, reservoirs, and canal is filled leading to reduction of water storage capacity; natural area is reduced while the concreted area increased, thus, the water cannot be absorbed in the soil or is retained that decrease the concentrated flow; Not only does the situation increase stormwater on the surface (cannot be penetrated in the soil) and reduce groundwater quality and cause subsidence in the city, but it creates urban heat island. The change in temperature on the surface will contribute to increase of air temperature which is the element causing increase in number and scope of tropical rains. Deteriorated drainage system and poor infrastructure create low land which is locally flooded in case of rain. In fact, the heavier the rain is, the deeper the flooding reaches; and
- People’s awareness: People have poor awareness in creating an open space for stormwater sluice gates (the sluice gates are small, but local people stand a habit of throwing wastes into the gate to prevent odors rising ahead their houses or business facilities), leading local flooding for the city.

In brief, the flooding in Vinh Long tends to be more complicated as the flooding control solutions do not fit the urban development pact and impacts of climate change – high tide, high sea level.

❖ Current status of wastewater drainage

Urban area: water and wastewater of the city are drained in a common pipeline then discharged directly into river. Domestic wastewater is preliminarily treated through septic tanks of local households or squat toilet that 70% treated wastewater quality is below standard. The production wastewater, wastewater of almost all handicraft facilities in the city have not been treated but led to the common drainage system and then discharged into river. Wastewater in the general hospital have been treated by a separate system.

Rural area: the drainage system is still limited. Only a few of communal centers have drainage system but with narrow scope. Recently, although there are new residential areas where the drainage system is invested, there are several problems that need handling. All drainage systems of the new areas lead stormwater and wastewater into the common system to discharge directly to the rivers and canals without any treatment.
2.5. ENVIRONMENTAL AND SOCIAL CONDITIONS AT SPECIFIC PROJECT LOCATIONS

The project will be implemented in ward 1,2,3,4,5,8 and 9 of Vinh Long City. The core urban area center mainly includes populated residential areas in between fields and gardens. There are Cau Lau and Long Ho rivers, which run into Co Chien river, providing water for one branch of Tien river as well as rivers and canal network inside the area. Section 2.3 above provides baseline environmental conditions in Vinh Long city and this section will further characterize the specific environmental and social conditions at the project site, helping to identify the site-specific impacts and mitigation measures for the project activities.

The main environmental and social features along the Project works are shown as follows:

1. Construction of urban drainage system

Location: the urban drainage system will be built in 6 residential areas in the core urban area of Vinh Long City, covering wards 2, 3, 4 and 5.

The city use common drainage system, stormwater and domestic water are led to a common pipeline and discharged directly into canals. Domestic water is primarily treated by septic tanks in local households or squat toilet. It is estimated that the treated wastewater quality of 70% households is below standard. The production wastewater, wastewater of almost all handicraft facilities in the city has not treated but led to the common drainage system and then discharged into river.

Social status: dense population, poor infrastructure and social services; most of the labors have low to medium income level.

Environmental status: The environment is contaminated due to untreated wastewater. It should pay much attention to local people’s transport and domestic activities which will be interrupted by construction of the Project’s works.
Figure 26: Current status of rehabilitated residential areas

2. Construction of wastewater collection and treatment system

a) Collection system

With absence of wastewater treatment for the remaining area, the city’s environment becomes worse and worse. In particular, as a big city with a dense population, the living environment as well as the urban landscape of Vinh Long will be adversely affected. With current rapid development of the city, the pressure on the environment will be increasingly posed; therefore; a wastewater collection and treatment system for the city is very crucial.

Existing drainage ways: stormwater and wastewater of households are led to the common drainage system, then being discharged into the natural environment or released into surrounding ditches.

Social status: crowded population.

Environmental status: In general, the air quality is still good. In the future, wastewater, if not being collected and treated, will affect daily activities of local people and environmental sanitation. It should pay much attention to local people’s transport and domestic activities which will be interrupted by construction of the Project’s works.
b) Wastewater treatment area

Location: Thanh Duc commune, Long Ho district.

Using status: the treatment area is built in agricultural land of local people with an area of 4.5ha. The treated wastewater will be discharged into Cai Sao Lon canal, then released into Co Chien river. The distance from the work to Co Chien river is nearly 3.1km.

Social current status: Sparse population, only few households resides near the work. The distance from the nearest residential area to the work is about 200m.

Environmental status: the environmental quality is still good and has no sign of pollution. However, in the process of construction, issues related to dust, noise and gases emitted from the transportation of construction materials should be paid much attention. Also, wastewater pipeline from the city center to the treatment plant should be noticed as it runs through canals.
3. Flooding control in the core urban area

a) Embankment of Long Ho river

Location: Ward 4 and 5 – Vinh Long city
- Start point is near Thieng Duc bridge, about 700m from Co Chien river.
- End point is near Cho Cua bridge, on the NH57.

Using status:
- Along Long Ho river embankment in ward 4: Most of local people live and do trade along the embankment; there is a large area of residential land of local residents along both sides of the embankment.
- Along Long Ho river embankment in ward 5: Although the population density in this ward is lower than ward 4, its density is still assessed to be high. In addition, there is a vacant land area in the end of the embankment.

Social status: high population density along Long Ho river embankment. Population density along Long Ho river embankment in ward 4 is higher than in ward 5.

Environmental status: The environmental quality is still good and has no sign of pollution. Along 02 sides of the embankments, there are sensitive receptors that should be paid attention. However, the receptors are about 100-200m away from the embankment.

In addition, in the course of construction, suitable construction methods and impact mitigation measures for business households in Cua market should be taken.
b) **Construction of tidal prevention system**

Location: Ward 1, 2, 3, 4, 5, 8 and 9 – Vinh Long city

Number of tidal preventing culverts: 9

Dimension: from 4.0 to 12.0m

Using status: Tidal preventing culverts are constructed on canals where the terrains are quite flat, mostly in the start points of canals.

Social status: People is sparsely resided in most of the areas of the tidal preventing culverts. The culverts are about 300m far from the nearest residential area.

Environmental status: The environmental quality is still good and has no sign of pollution. However, attention should be paid to waterway transport and water supply for surrounding agricultural land area during construction and operation phases.
Improvement of main drainage canal system in inner urban area

Location: Ward 1, 2, 3, 4, 5, 8 and 9 – Vinh Long city

Drainage canals of Vinh Long city mainly have a width from 3.0-6.0m with main function of stormwater and wastewater drainage. However, the canals have been sedimented and encroached by local people, leading to poor drainage capacity and posing risks of inundation in the case of high tide and flooding. Within the canal bed, the development of grass and hyacinth causes obstruction of the water flow.

Residential status: there is crowded population along the canals, they mainly live in grade-4 house with natural drainage system.

Environmental status: Although the environmental quality is still good and has no sign of pollution, the untreated wastewater and wastes, in the coming years, will adversely affect the environmental sanitation, posing epidemics and health-related issues as well as curbing the social development of Vinh Long city.
Figure 31: Main canal system in the inner urban area

4. New construction of road connecting Ward 8 to Ward 9

The road starts from the intersection of Vo Van Kiet road and the route to the Ward 9 People’s Committee and ends at the intersection with the Project’s main road No. 1.

- Start point (in ward 9): Currently, Vo Van Kiet road has a width of about 30m, including 16m of road surface for vehicles and sidewalks of 6.0m each. Surrounding the intersection area is crowded residential area.

- End point (in Ward 8): the road ends at the agricultural land area in Village 5 of Ward 8. The nearest household is 200m from the end point.

Social status: the road can be divided into 3 types: going through residential areas; passing go rice paddies and intersecting NH53 (Phan Van Dang street).

- At the start point where goes through residential area, there is highly population density, permanent houses; it is estimated about 20 households in this area.

- The road passing through paddies has relatively flat terrain and is convenient for construction. The road intersects other local roads.

- Followingly, for the road cuts NH53, the population is crowded. Within 200m from the intersection, the population is dense and there are many permanent houses. At NH53, the road has good quality with a width of 25-30m.

- The road going through paddies extends till the end point. Its terrain is relatively flat and convenient for construction. In addition, there are a few households scattered along the road. The nearest household is about 50-100m from the road. In addition, it cuts several local roads with a width of about 3-5m and macadam roads.

Environmental status: The quality of the air, soil, and water environment in the construction site is good and has no sign of pollution. Wastes are mainly generated from domestic activities, agricultural production and small-sized means of transport. However, special attention should be paid to noise resonance during construction at the beginning of road and at the intersection with the NH53.
5. New construction of main road No.1

The Project’s main road No.1 starts from the intersection with NH1A and ends at Pho Co Dieu road (NH53).

- Start point (in Tan Hanh commune, Long Ho district): Surrounding the intersection point is sparse residential area, there are some households; the distance from the intersection point to local households ranges from 10 to 20m
- End point (in Ward 3): cuts Pho Co Dieu road, the population is crowded, they mainly live in permanent house. Near the end point is Vinh Long Funeral house and some households who live on production and services.

Social status: the Project’s road is divided into 02 types: cutting residential area (intersect canals and roads) and passing through rice paddies.

- Almost all the road runs through local people’s rice paddies that is quite flat and is favorable for construction
- The road intersects residential areas as it cuts canals and National highways and provincial roads where the population density is quite high; particularly: It cuts Cái Cam canal river, Cau Lo bridge, Dinh Tien Hoang road, Phuoc Hau road and residential roads and other canals
- At the end point, the main road No.1 intersects Pho Co Dieu road (NH53) where the population is crowded. Within 100m from the intersection, the population is quite dense and there are many permanent houses. At the NH53, the road quality is relatively good, with a width of about 25-30m

Environmental status: As the road mainly passes through fields, the environmental quality is good. However, noise at intersection with canals and roads should be paid attention.
6. New construction of the main road No.2

The Project’s main road 2 is similar to the main road 1: start from the intersection with NH1A and end at the intersection with Pho Co Dieu road (NH53).

- Start point (in Tan Hanh commune, Long Ho district): Surrounding the intersection point is sparse residential area, there are some households; the distance from the intersection point to the households ranges from 10 to 20m.
- End point (in Ward 3): cuts Pho Co Dieu road, the population is crowded, they mainly live in permanent house. The end point is near Vinh long People’s Court and Bo Kinh road.

Social status: the road is divided into 02 types: cutting residential area (intersect canals and roads) and passing through rice paddies.

- Almost all the road runs through rice paddy of local people with quite flat terrain that is favorable for construction.
- The road intersects residential areas as it cuts canals and National highways and provincial roads where the population density is quite high; Particularly: It cuts Cau Long river, Dinh Tien Hoang road, Phuoc Hau road and residential roads and other canals.
- In the end point, the main road No.2 intersects Pho Co Dieu road (NH53) where the population is crowded. Within 100m from the intersection, the population is quite dense and there are many permanent houses. At the NH53, the road quality is relatively good, with a width of about 25-30m.

Environmental status: As the road mainly passes through fields, the environmental quality is good. However, noise at the intersection with canals and roads should be paid special attention.
7. Construction of infrastructure for residential area in Ward 8

The resettlement area in ward 8 is constructed in the vacant land and agricultural land managed by People’s Committee of Ward 8.

The total area of vacant and agricultural land is about 12.5 ha, interspersed in residential areas.

Using status: The vacant land or agricultural land border the existing residential area to the North and the East, border the local road (asphalt road) to the South and the West.

Environmental status: There are no soil, water and air contamination in the construction area. However, dust, noise during construction process should be paid much attention to avoid impacts on surrounding residential area.

Figure 35: Residential area in ward 8
### 2.6. SENSITIVE RECEPTOR DESCRIPTION AT THE PROJECT AREAS

**Table 29: List of sensitive receptors at the project areas**

<table>
<thead>
<tr>
<th>Sensitive receptors</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Construction of urban drainage system:</strong> no sensitive receptors</td>
<td></td>
</tr>
<tr>
<td><strong>2. Construction of wastewater collection and treatment system:</strong> there is 01 sensitive receptors</td>
<td></td>
</tr>
</tbody>
</table>
| Thanh Duc market | - Located on the route of transporting raw materials into the construction area of the wastewater treatment plant.  
- This is a densely-populated area.  
- There is no land affected by the project.  
- Thanh Duc market area is about 3,000 m², with about 50 households doing business in the market.  
- Business activities occur from 6am to 7pm daily. |
| Thanh Duc C Primary School | - Located on the transportation road to the construction area of the wastewater treatment plant  
- The area has highly population density  
- Do not require land acquisition  
- The area of campus is about 2,000 m², the total number of classes is 20.  
The school has about 40 teachers, with over 600 students  
- School time: Monday - Friday, start from 6:30 am - 7:30 pm and end from, 11:00 pm - 12:00 pm and 4:30 pm - 17:30 pm |
| **3. Flood control in core urban areas:** There are 06 sensitive structures |
| Cua market | - The market is located at the embankment of the Long Ho river, where people’s business activities are concentrated.  
- This is a densely populated area around Cua market  
- Construction of Long Ho river embankment will affect a small area of Cua market (about <10%), affecting people’s business activities.  
- Cua market area is about 2,100 m². Business and trading time takes place from 5h to 19h everyday. |
| Tran Phu Secondary School | - Located near Long Ho river embankment area, where is crowded residential area, about 40-50m from Long Ho embankment area  
- Do not require land acquisition.  
- The area of the campus is about 1,700 m², with over 500 students  
- School time: Monday - Friday, start from 6:30 am - 7:30 pm and end from, 11:00 pm - 12:00 pm and 4:30 pm - 17:30 pm |
| Van Thanh Temple of Vinh Long city | - Located near Long Ho river embankment area, where is crowded residential area, about 40-50m from Long Ho embankment area.  
- Do not require land acquisition.  
- Worship and ceremonies mostly take place on the first day or full moon day, on holidays and there is only 1 holy worshiping day in Van Thanh Temple area every year |
### Sensitive receptors and Descriptions

<table>
<thead>
<tr>
<th>Sensitive receptors</th>
<th>Descriptions</th>
</tr>
</thead>
</table>
| **Tran Quoc Toan Primary School**           | - Located near the area of embankment of Long Ho river, a densely populated place, about 70-80m from Long Ho embankment area  
  - Do not require land acquisition.  
  - The area of the campus is about 1,500 m², with over 400 students  
  - Students' study time takes place from Monday - Friday, starting time and ending time is between 6:30 am - 7:30 pm, 11:00 pm - 12:00 pm and 4:30 pm - 17:30 pm |
| **Phap Hai Pagoda**                         | - Located near Long Ho river embankment area, where densely populated, about 40-50m from Long Ho embankment area.  
  - Do not require land acquisition  
  - Worship and ceremonies mostly take place on the first day or full moon day, on holidays and there is only 1 holy worshiping day in Phap Hai Pagoda area every year. |
| **Giac Thien Pagoda**                       | - Located near Long Ho river embankment area, where densely populated, about 50-60m from Long Ho embankment area.  
  - Do not require land acquisition  
  - Worship and ceremonies mostly take place on the first day or full moon day, on holidays and there is only 1 holy worshiping day in Giap Thien Pagoda area every year. |
| **University of Economics Ho Chi Minh City – Vinh Long Branch** | - Located near tidal sewer area No. 4, about 30-50m from the construction area  
  - Do not require land acquisition  
  - The area of the campus is about 40,000 m², with over 1500 students  
  - Students' study time takes place from Monday - Friday, starting time and ending time is between 6:30 am - 7:30 pm, 11:00 pm - 12:00 pm, 13:00 pm – 14:00 pm and 4:30 pm - 17:30 pm. In addition, there are still research activities of teachers outside of teaching hours. |

4. New construction of road connecting Ward 8 to Ward 9: No sensitive structures

5. Construction of main road No. 1: No sensitive structures

6. Construction of main road No. 2: No sensitive structures

7. Construction of infrastructure for the Resettlement Area in Ward 8: There is 01 sensitive receptor

| **Pho Minh Pagoda**                         | - Located near the resettlement area of Ward 8, about 100m from the construction site.  
  - The project does not occupy land of this project  
  - There are not many people around  
  - Worship and ceremonies mostly take place on the first day or full moon day, on holidays and there is only 1 holy worshiping day in Pho Minh Pagoda area every year |

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CHAPTER 3. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

The assessment on environmental and social impacts caused by the activities under Vinh Long Urban Development and Climate Resilience Project in preparation, construction and operation stages aims to qualitatively and quantitatively identify potential impacts on environment, society and human health during the project implementation; then accordingly, to propose appropriate mitigation measures for the project’s negative impacts. The scope of the project's environmental and social impact assessment covers 3 components:

- Component 1: Flood risk management and environmental sanitation
- Component 2: Strategic corridors development;
- Component 3: Compensation and resettlement.

3.1. THE PROJECT'S POSITIVE IMPACTS

Component 1: Flood risk management and environmental sanitation

- Improving health and living conditions of the people in the project area, especially the households living in the encroachment areas, reducing pollution for Long Ho, Cau Lo rivers and canals in urban core area
- Improving environmental sanitation, reducing pollution (odor and flies) for households living along canals;
- Minimizing flooding for households in urban core areas and households living near canals;
- Ensuring safety along the banks of canals and rivers;
- Facilitating local people to increase their income during construction (by selling commodities) and have the opportunity to increase their income by protecting assets and commercial goods, ensuring their normal business activities during the flood season;
- Increasing the area for restaurants and tourism development;
- Creating open space along the river banks for recreational and sports activities;
- The project will relocate households encroaching canals to the resettlement site where living condition is better.
- Giving people opportunity to participate in the project as a worker, labor...
- In addition to the flood control impacts, the construction of roads along the embankments of Long Ho river will bring about economic, social, environmental and aesthetic values. It will create public spaces for people’s walking, exercising and recreation activities, etc. This will also facilitate river tourism development. In addition, the construction of the park will bring a new appearance to the city, an urban civilized country, and a green - clean - beautiful city.

Component 2: Strategic corridors development

- Increasing income through the production and trading of agricultural products, helping households to invest more in housing and health, thus helping to increase living standards for people
- Bringing higher profits to small household businesses thanks to improved transportation and as a result, local revenue will also increase;
- Giving opportunities for exploiting agricultural land in the project area, creating a driving force to improve production productivity and convert agricultural production to people;
- Increasing access to vocational training and employment opportunities for young workers
- The transport system connecting the inner city to the suburbs of Vinh Long City, and urban infrastructure will be upgraded to be more modern, effective for the production and consumption of goods thanks to better accessibility to the market; value of land in suburban areas will be increased.

**Component 3: Compensation and resettlement**

- Improving infrastructure and landscape for the city, creating motivation to form a civilized city, a green city - clean - beautiful;
- Creating a driving force for restructuring agricultural economy into services and commerce;
- Increasing the value of land use in the area;

*Environmental impacts:* Flooding, pollution, unpleasant odors will be significantly reduced in Vinh Long City thanks to the flood control and the drainage system of the project. The project’s investments will help achieve Vietnam’s goal of ensuring an environmental-friendly and sustainable development for the city. The project’s works will be built on the basis of research of climate change resilience and saline intrusion prevention in Vinh Long City which is expected to be seriously affected by climate change.

**3.2. TYPES AND SCOPES OF IMPACTS**

Based on the analysis of baseline data, field visits and discussions with officials and stakeholders, the project’s potential negative impacts on the physical, biological and economic environments have been identified. The type and scope of these potential negative impacts are summarized in the table below. The potential negative impacts of the project, after implementation of the mitigation measures presented in the following sections of the report, are mostly negligible.
### Table 30: Project's potential negative impacts

<table>
<thead>
<tr>
<th>Description</th>
<th>Physical</th>
<th>Biological</th>
<th>Social</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Air, noise, vibration</td>
<td>Soil, water</td>
<td>Solid waste, dredged sludge</td>
<td>Natural ecosystem</td>
</tr>
</tbody>
</table>

**Component 1: Flood risk management and environmental sanitation**

**Work items:**
- Investment in a rainwater drainage system in combination with rehabilitation of sidewalks and trees in low-lying areas in the urban core area with an area of 2,060 hectares and a population of about 112,000 people.
- Investment in a D400-D1200 round culvert system for roads in urban core: L = 26.3 km.
- Rehabilitation of sidewalks in combination with planting trees and investing in lighting systems: S = 240,000 m².
- Rehabilitation of the main drainage canal system in the urban area: dredging and embankment with a total length of 22.0km.
- Household connection: 26,000 households.
- Construction of DN300-DN800 collection sewers: L = 58.3 km.
- Construction of DN160 - DN225 wastewater collection pipeline: L = 105.7 km.
- Construction of 02 sewers across the bridge spanning Cau Lo and Long Ho rivers
- Constructing 30 wastewater overflow wells
- Construction of 8 pumping stations
- Constructing 01 WWTP with capacity of 15,000 m³/day using biotechnology.
- Construction of embankment of Long Ho river (L = 6.0km).
- Construction of tidal sluice gates: 9 sluices with dimensions of 4.0 - 12.0m.

<table>
<thead>
<tr>
<th>Preparation</th>
<th>L</th>
<th>M</th>
<th>L</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>L</th>
<th>M</th>
<th>L</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>L</td>
<td>L</td>
<td>N</td>
<td>N</td>
<td>L</td>
<td>M</td>
<td>L</td>
</tr>
<tr>
<td>Operation</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>L</td>
<td>L</td>
<td>M</td>
</tr>
</tbody>
</table>

**Note**
- Low and medium impacts can be mitigated through ESCOPs
- Impact on sensitive receptors.
- Impact on water environment.
- Interruption of traffic activities.
Environmental and Social Impact Assessment
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<table>
<thead>
<tr>
<th>Description</th>
<th>Physical</th>
<th>Biological</th>
<th>Social</th>
<th>Others</th>
<th>Impact outside the project area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Air, noise, vibration</td>
<td>Soil, water</td>
<td>Solid waste, dredged sludge</td>
<td>Natural ecosystem</td>
<td>Fish, aquatic system</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Impact on waterway transport activities on the river.
- Odor and emissions due to dredged materials.
- Impacts on agricultural production activities.

Component 2: Strategic corridors development

Work items
- Construction of a connection road between Ward 8 and Ward 9: L = 3.0km
- Construction of the main road No.1: L = 5.5km
- Construction of the main road No. 2: L = 5.8km

<table>
<thead>
<tr>
<th>Component 2: Strategic corridors development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work items</td>
</tr>
<tr>
<td>- Construction of a connection road between Ward 8 and Ward 9: L = 3.0km</td>
</tr>
<tr>
<td>- Construction of the main road No.1: L = 5.5km</td>
</tr>
<tr>
<td>- Construction of the main road No. 2: L = 5.8km</td>
</tr>
</tbody>
</table>

Preparation          | M | M | M | N | L | M | N | N | N | M | L | M
Construction         | M | M | M | N | L | N | N | N | M | L | M |
Operation            | M | L | L | N | L | N | N | N | N | M | M |

Note
- Low and medium impacts can be mitigated through ESCOPs
- Impact on sensitive receptors.
- Impact on water environment.
- Interruption of traffic activities.
- Risk of bridge abutment settlement during construction phase
- Impact on water navigation on the rivers\n- Impacts on agricultural production activities.

Component 3: Compensation and resettlement

Work items: Construction of infrastructure for the resettlement site in ward 8 with area of 12.5ha.

<table>
<thead>
<tr>
<th>Component 3: Compensation and resettlement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work items</td>
</tr>
<tr>
<td>- Construction of infrastructure for the resettlement site in ward 8 with area of 12.5ha.</td>
</tr>
</tbody>
</table>

Preparation          | L | L | L | N | N | M | N | N | N | L | N | N
Construction         | M | M | M | N | N | N | N | N | L | L | L |
Operation            | N | L | L | N | N | N | N | N | L | L | N |
### Environmental and Social Impact Assessment

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<table>
<thead>
<tr>
<th>Description</th>
<th>Physical</th>
<th>Biological</th>
<th>Social</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air, noise, vibration</td>
<td>Soil, water</td>
<td>Solid waste, dredged sludge</td>
<td>Natural ecosystem</td>
<td>Fish, aquatic system</td>
</tr>
</tbody>
</table>

**Note:**
- Low and medium impacts can be mitigated through ESCOPs.
- Concerns about road safety during material transportation.
- Safety and health risks of local community.
- Issues related to waste water and waste during operation.

**Note:**

1. The following criteria are used for impact assessment:
   - Negligible (N) very low or no adverse impacts; Low (L) - small works, minor impacts, localized, reversible, temporary; Medium (M) small works in urban/sensitive areas, medium-sized buildings with moderate impacts including reversible, minimized and manageable, local, temporary; High (H) - Medium and large scale urban/sensitive buildings, large scale buildings have significant impacts (and social/environmental) in which many cases are irreversible and requires compensation, Both M and H need to monitor and implement mitigation measures and adequate institutional capacity for safety.
   - Small and medium-sized buildings, most of their impacts are localized, temporary, and can be mitigated through the application of good engineering solutions and construction management practices, with supervision, inspection and close consultation with the local community.
3.3. IMPACTS AND RISKS IN THE PREPARATION STAGE

General impacts during the preparation phase include (1) land acquisition; (2) Safety risks related to leftover mines and unexploded ordnances (UXO). As the project is constructed by consecutive construction method or due to short preparation time, impacts from dismantling and site clearance, dredging, excavation or camp preparation will be mainly generated in the construction phase and will be presented in the next section.

3.3.1. Impact on land

Results of the preliminary inventory of losses show that, the project will affect land and assets of 1,800 households, of which 550 affected households will be relocated.

Table 31: Summary of project’s impacts

<table>
<thead>
<tr>
<th>No.</th>
<th>Work item</th>
<th>Number of affected HHs</th>
<th>Relocated HHs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction of urban drainage system</td>
<td>130</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>Construction of wastewater collection and treatment system</td>
<td>200</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>Flood control for the city’s key areas</td>
<td>600</td>
<td>280</td>
</tr>
<tr>
<td>4</td>
<td>Construction of connection road between ward 8 and ward 9</td>
<td>150</td>
<td>65</td>
</tr>
<tr>
<td>5</td>
<td>Construction of the main road No.1</td>
<td>300</td>
<td>70</td>
</tr>
<tr>
<td>6</td>
<td>Construction of the main road No.2</td>
<td>300</td>
<td>80</td>
</tr>
<tr>
<td>7</td>
<td>Construction of infrastructure for resettlement site in ward 8</td>
<td>120</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1,800</td>
<td>550</td>
</tr>
</tbody>
</table>

Details of data related to permanent and temporary land acquisition: areas, types of land, houses, structures, trees, etc. will be updated in the Resettlement Plan report (RP) in the next phases of the project.

❖ Impact on livelihood

According to the results of the preliminary socio-economic survey, the project will affect households whose main income is from agricultural production and some households who trade and live near the Long Ho embankment. The project will affect the livelihoods of 725 households who lose agricultural and business land.

The construction of Long Ho river embankment and the main roads No. 1 and No. 2, will cause greater impact on people’s income and livelihoods than other works because it will affect more productive land area and more trees.

710/725 households (making up 98%) are slightly affected on productive land (because most of them lose less than 20% of the total land area). Moreover, this impact is scattered in 11 wards/communes of Vinh Long City and Long Ho District, concentrated in the first phase of the project, after which this impact will be reduced as people can looking for new sources of livelihood and gradually have their lives subsistence. At the same time, the affected households will not only be compensated with cash for the affected land and trees, but also will get support with livelihood restoration (support for livelihood susistence, production stabilization and vocational training, job placement). Therefore, this impact is assessed as "MEDIUM" and can be mitigated through the project Resettlement Plan.

❖ Impact on relocated households

Households who have to relocate will have psychological effects and changes in community
relationships. Relocated households need time to adapt to the new environment with access to new services such as health care, markets, schools, etc. Other social relationships will gradually develop when they relocate to a new living area. The number of households that have to be resettled in the project is 550 households (accounting for 30.56% of the total affected households) due to the construction of work items (the most at the embankment of Long Ho river). Relocated households will receive compensation money, take care of their own accommodation near the current living area or will be resettled in the project Resettlement site (in Ward 8, Vinh Long City).

The resettlement site will be built with complete infrastructure such as electricity supply, water supply and drainage, health stations, markets and schools within a short distance of 0.5-2km. Daily activities of relocated households will be guaranteed. Therefore, the impact is assessed as "MEDIUM" and can be mitigated through supports for relocated households (transportation support, rental support, self-relocation support) under the Resettlement Plan of the project.

❖ Impacts on the business activities

The project will affect 75 business households at the embankment of Long Ho river (of which 50 households do business in Cua market and 25 households sell products along Long Ho river). However, the impacts are assessed to be “Moderate” because: (i) business activities are taken places in the area toward Long Ho river bak (ii) Interruption of business activities during construction period. However, the impacts can be mitigated; (i) successive construction methods are used to ensure the shortest period of interruption; (ii) information disclosure and public consultations are conducted to disclose the purposes, meaning and positive impacts brought about by the project in the future; (iii) households receive compensation and supports for loss of income and business (support for production and business subsistence; support for relocation of production and business establishments, severance allowances).

![Figure 36: Existing status of business activities in the project area](image)

Business disruption will locally take place during the construction period (within the household). However, when the project comes into operation, it will contribute to the development of household business and at the same time the impacts can be minimized through the Resettlement Plan specifically developed for the project.

❖ Change in land use purpose

The purpose of land use in the project area will be changed thanks to formation of three main roads No. 1, No. 2, the connection road between Ward 8 and Ward 9 and WWTP, in addition to changing the land use purpose during construction of Long Ho river embankment. The project’s occupation of residential land and agricultural land will change the local land use structure, affecting income sources and livelihoods of affected households. However, this impact is rated as "LOW” because: (i) the structure of land use in the project area tends to shift...
to increase the proportion in services and industry, and reduce the proportion in agricultural production; (ii) after the project is put into operation, the value of land use will be increased (from agricultural land to urban land); (iii) the accessibility will be easier, promoting local economic development.

The positive impacts brought by the project are much larger than the negative impacts, and these negative impacts can be mitigated through the project’s Resettlement Plan.

3.3.2. Safety risk related to unexploded ordnances

❖ Safety risk related to remaining unexploded ordnances

If the unexploded ordnances (UXO) are not cleared, this can be a risk in construction phase which can directly affect workers, local people and surrounding infrastructure. The project area has been highly developed by human activities, and thus there is not high probability that UXO will be encountered. The consequence of UXO would have a long-term impact on the psychology, health, property and lives of workers and people in the vicinity of the incident. At the same time, these impacts can affect a wide range, affecting the air, causing deterioration of soil quality. However, these impacts can be mitigated through clearance of bombs, mines and unexploded ordnances by functional units.

Project’s work items that need clearance of UXO include: (i) 03 main roads No. 1, No. 2, connection road between ward 8 and 9; (ii) Long Ho River embankment and (iii) Resettlement site in Ward 8. During the construction, the risk of explosion may directly affect those who directly involve in the clearance work because of the potential of the war’s left-over unexploded ordnances. The clearance process may detonate mines and unexploded ordnance due to improper clearance techniques, posing a danger to the clearance workers' lives. This impact is considered HIGH, but can be mitigated because the clearing unit is a military unit, with full functionality, technical equipment, qualifications and experience.

![Illustrative photographs for clearance of UXO]

3.4. IMPACTS AND RISKS DURING THE CONSTRUCTION PHASE

Types of activities to be performed during the construction of works items of Vinh Long UDCR project include:
- Leveling, erection of worker camps and construction office;
- Operation of machines and workers;
- Transportation and gathering of raw materials and fuels for construction;
- Rehabilitation of wastewater collection and treatment in residential area;
- Construction of wastewater collection pipeline to the wastewater treatment plant;
- Construction of wastewater treatment plant with a capacity of 15,000 m³/day;
- Dredging of 22km of drainage canals in urban areas;
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- Earthworks, construction of foundations for roads and resettlement site;
- Construction of tidal sluicegates;
- Drilling of bored piles to build piers and bridge abutments across canals; Piling/driving piles to reinforce embankments of Long Ho river;
- Backfilling, reinstatement of the site, revetment on canals and ditches;
- Construction of subgrade layer and asphalt paving for roads;
- Transportation of materials to landfills.

3.4.1. General impacts during the construction phase

3.4.1.1. Impacts on air

1. Dust and air pollutants

a) Dust from earthwork

The process of excavation, backfilling is considered to be the most substantial source of dust during the construction phase. If the construction is mainly conducted in dry season, dust pollution will be the highest. Dust concentration can be 10-15 times higher than the permitted level and dust concentration will gradually decrease after the completion of construction items.

According to the feasibility study report of the project, the total volume of earthwork and leveling of works is shown in the Table below:

**Table 32: Volume of earth work for the project’s work items**

<table>
<thead>
<tr>
<th>No</th>
<th>Work item</th>
<th>Excavation (m³)</th>
<th>Backfilling (m³)</th>
<th>Total (m³)</th>
<th>Convert into tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Construction of urban drainage system</td>
<td>5,273</td>
<td>4,598</td>
<td>9,871</td>
<td>14,313</td>
</tr>
<tr>
<td>2.</td>
<td>Construction of wastewater collection and treatment system</td>
<td>6,774</td>
<td>5,622</td>
<td>12,396</td>
<td>17,974</td>
</tr>
<tr>
<td>3.</td>
<td>Flood control for the city’s key areas</td>
<td>6,685</td>
<td>9,506</td>
<td>16,191</td>
<td>23,477</td>
</tr>
<tr>
<td>4.</td>
<td>Construction of connection road between 8 and ward 9</td>
<td>15,544</td>
<td>20,700</td>
<td>36,244</td>
<td>52,554</td>
</tr>
<tr>
<td>5.</td>
<td>Construction of the main road No.1</td>
<td>28,397</td>
<td>32,866</td>
<td>61,263</td>
<td>88,831</td>
</tr>
<tr>
<td>6.</td>
<td>Construction of the main road No.2</td>
<td>32,533</td>
<td>35,892</td>
<td>68,425</td>
<td>99,216</td>
</tr>
<tr>
<td>7.</td>
<td>Construction of infrastructure for resettlement site in ward 8</td>
<td>12,202</td>
<td>15,212</td>
<td>27,414</td>
<td>39,750</td>
</tr>
</tbody>
</table>

*Source: FS, 2020*

\[1m^3 = 1.45 \text{ ton of soil/stone}\]

The level of dust dispersion during leveling depends on the volume of excavation and backfilling. The amount of diffused dust is calculated based on the pollution coefficient and the volume of excavated and filled soil. According to the World Health Organization guidelines, the pollution coefficient E is calculated using the following formula:
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\[ E = k \times 0.0016 \times \left( \frac{u}{2.2} \right)^{1.4} \times \left( \frac{M}{2} \right)^{1.3} \]  

(CT1)

Where:
- \( E \) – Pollution coefficient (kg/ton).
- \( k \) - Particle structure, with mean values 0.35.
- \( u \) - Average wind speed in the project area (1.3 m/s).
- \( M \) - Average moisture of the material (20%).

From the conditions of average particle structure, average wind speed, humidity of earthwork materials... the pollution coefficient \( E \) is determined to be = 0.00535 (kg/ton).

The construction period of works items varies from 15 to 24 months (depending on the volume, geographical conditions, construction methods). The average dust concentration of 1 hour at each construction site is calculated in the following:

**Table 33: Concentration of dust generated by earthwork and leveling activities**

<table>
<thead>
<tr>
<th>No</th>
<th>Work item</th>
<th>Weight (ton)</th>
<th>Dust load (kg)</th>
<th>Surface area (m²)</th>
<th>Load (kg/day)</th>
<th>Average concentration (1h) (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Construction of urban drainage system</td>
<td>4,313</td>
<td>301</td>
<td>50,490</td>
<td>0.514</td>
<td>0.393</td>
</tr>
<tr>
<td>2.</td>
<td>Construction of wastewater collection and treatment system</td>
<td>7,974</td>
<td>329</td>
<td>50,490</td>
<td>0.609</td>
<td>0.524</td>
</tr>
<tr>
<td>3.</td>
<td>Flood control for the city’s key areas</td>
<td>23,477</td>
<td>1,105</td>
<td>31,240</td>
<td>1.535</td>
<td>0.675</td>
</tr>
<tr>
<td>4.</td>
<td>Construction of connection road between ward 8 and ward 9</td>
<td>52,554</td>
<td>2,816</td>
<td>144,320</td>
<td>4.694</td>
<td>0.447</td>
</tr>
<tr>
<td>5.</td>
<td>Construction of the main road No.1</td>
<td>88,831</td>
<td>4,692</td>
<td>152,268</td>
<td>8.689</td>
<td>0.785</td>
</tr>
<tr>
<td>6.</td>
<td>Construction of the main road No.2</td>
<td>99,216</td>
<td>4,526</td>
<td>73,920</td>
<td>10.058</td>
<td>1.871</td>
</tr>
<tr>
<td>7.</td>
<td>Construction of infrastructure for resettlement site in ward 8</td>
<td>39,750</td>
<td>137</td>
<td>10,429</td>
<td>0.305</td>
<td>0.756</td>
</tr>
</tbody>
</table>

The results of dust concentration calculation indicate that the total average dust concentration of 1 hour in the project area when performing construction items has exceeded the permissible standards of QCVN 05:2013/BTNMT (limit: 0.3 mg/m³); of which the maximum concentration of 6.24 times higher than permissible level is found at the work item of the urban main road No.2, and the concentration of about 2.5 times higher than permissible level is found at the work item of the urban main road No.1. The direct impact of dust on the concentrated residential areas along the intersection with canals are rated at MEDIUM because:

- The construction area has an open ground and many surrounding trees.
- The earthwork activities mostly take place in low-lying areas and field areas along the route due to the low-lying ground level and need to be improved.
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- Level of dust dispersion: locally at the earthwork area, not widely dispersed because the emission source is the point source and the area is open with many trees.

- Dust caused by earthwork, if mitigation measures are applied, will affect:
  + Daily activities, affecting the travel of people near the project area.
  + Potential risk to public health: eye and lung diseases due to higher levels of airborne dust.

In addition, dust from the leveling process also affects people living near the embankment area of Long Ho river, people near the resettlement site of Ward 8. In fact, the amount of dust generated is not much compared to the calculation because the construction time of each item is different (mainly focused on the first 1-2 months of the construction period) and does not occur at the same time. In addition, the construction sites are scattered in 11 wards/communes of Vinh Long City. Moreover, the dust dispersion concentration decreases very quickly compared to the distance to the source and the mitigation measures will be mentioned in the next chapters to minimize the impact of dust on the surrounding air as well as on local people near the project area.

b) Dust and emissions from construction machinery and equipment

To calculate the amount of emissions (CO, NO₂, SO₂) due to the operation of machinery and equipment during the construction process such as excavatorl, mixers, piling machines, etc. (using a tonne of oil for internal combustion engines), this ESIA report is based on Natz Transport, Shun Dar Lin, 2005. Emission factors are presented in the Table below.

**Table 34: Emission factors**

<table>
<thead>
<tr>
<th>Coefficient of oil (kg/ton of soil)</th>
<th>SO₂</th>
<th>NO₂</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>2.8</td>
<td>12.3</td>
<td>0.05</td>
</tr>
</tbody>
</table>

*Source: Natz Transport and Shun Dar Lin 2005*

Therefore, the amount of emissions generated during earthwork is estimated in the following table:

**Table 35: Estimated emissions generated by construction equipment**

<table>
<thead>
<tr>
<th>No</th>
<th>Work item</th>
<th>Weight (ton)</th>
<th>Amount of oil to be used (ton)</th>
<th>SO₂ concentration (mg/m³)</th>
<th>NOx concentration (mg/m³)</th>
<th>CO concentration (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Construction of urban drainage system</td>
<td>4,313</td>
<td>0.4313</td>
<td>0.0012</td>
<td>0.0053</td>
<td>0.00022</td>
</tr>
<tr>
<td>2.</td>
<td>Construction of wastewater collection and treatment system</td>
<td>7,974</td>
<td>0.7974</td>
<td>0.0022</td>
<td>0.0098</td>
<td>0.00040</td>
</tr>
<tr>
<td>3.</td>
<td>Flood control for the city’s key areas</td>
<td>23,477</td>
<td>2.3477</td>
<td>0.0066</td>
<td>0.0289</td>
<td>0.00117</td>
</tr>
<tr>
<td>4.</td>
<td>Construction of connection road between ward 8 and ward 9</td>
<td>52,554</td>
<td>5.2554</td>
<td>0.0147</td>
<td>0.0646</td>
<td>0.00263</td>
</tr>
<tr>
<td>5.</td>
<td>Construction of the main road No.1</td>
<td>88,831</td>
<td>8.8831</td>
<td>0.0249</td>
<td>0.1093</td>
<td>0.00444</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>No</th>
<th>Work item</th>
<th>Weight (ton)</th>
<th>Amount of oil to be used (ton)</th>
<th>SO₂ concentration (mg/m³)</th>
<th>NOₓ concentration (mg/m³)</th>
<th>CO concentration (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Construction of the main road No.2</td>
<td>99,216</td>
<td>9.9216</td>
<td>0.0278</td>
<td>0.1220</td>
<td>0.00496</td>
</tr>
<tr>
<td>7.</td>
<td>Construction of infrastructure for resettlement site in ward 8</td>
<td>39,750</td>
<td>3.9750</td>
<td>0.0111</td>
<td>0.0489</td>
<td>0.00199</td>
</tr>
</tbody>
</table>

In general, the concentration of emissions generated by construction equipment and machinery on the site is not high, both within the permissible limits of QCVN 05: 2013/BTNMT. The main affected objects are construction workers on the construction site and adjacent residential areas such as: residential areas near canals intersecting roads, residential areas near Long Ho river embankment, residential area near Ward 8 resettlement site... These impacts are locally at the construction site with radius of about 50-100m from the source. However, the direct impact will last mainly about 8-10 hours a day during construction activities so it is assessed to be LOW and can be mitigated through ESCOPs.

c) **Dust and emissions from transportation of materials and disposals**

The process of transportation of raw materials, fuels and construction materials from the sources to the construction site or the transportation of excess solid waste from the construction site to the disposal site can generate dust and emissions due to operation of vehicles (mainly emissions from engines include CO, SO₂, NOₓ). Dust and emissions will directly affect transportation workers and residents living along transportation routes. Impacts due to material transportation and disposal activities include:

- Dust and emissions generated will obstruct the view, affecting the health of workers, road users and residents living along the transportation and disposal routes

- The transport process may cause traffic congestion, traffic safety, affecting people's transportation activities.

- Affect business and trading activities of people along the transportation and disposal routes.

- Materials are not covered, spilled during transportation, causing loss of urban beauty, affecting environmental sanitation conditions along the transport route.

The level of impact of generated dust and emissions depends on many factors such as transportation distance, engine type, engine capacity, type and amount of fuel used, air operation, and road quality. In order to estimate the amount of dust and emissions generated, this report uses the "Environmental Pollution Factor" method of the US Environmental Protection Agency (USEPA) and the World Health Organization (WHO) which are applied for diesel vehicles of 10 tons capacity on urban roads as follows: (i) Dust 0.9 (g/km); (ii) SO₂ 4.29S (g/km, with S = 0.05% -% sulfur content in the fuel); (iii) CO 6.0 (g/km); (iv) NOₓ 1.18 (g/km).

From the generated dust load and emissions, the SUTTON model is used to determine the average concentration of pollutants at any time with the linear waste source as follows:

\[
C = \frac{0.8E \left\{ \exp \left( \frac{-(z + h)^2}{2\sigma_z^2} \right) + \exp \left( \frac{-(z - h)^2}{2\sigma_z^2} \right) \right\}}{\sigma_z \times u} \quad \text{(CT2)}
\]

Where:
The vertical diffusion coefficient of pollutant ($z$) with atmospheric stability in the study area is categorized as B which is determined by the following calculation formula:

$$\sigma_z = 0.53 \times 25^{0.73} \text{ (m)}$$

In which: $x$ is the distance from the calculation point to the waste source in the wind direction, the calculation method is to divide the coordinates of points in the horizontal axis ($x$) and the vertical axis ($z$). For the project area the average wind speed is 1.3 m/s. The level of stability of the atmosphere is type B.

Diffusion coefficient $\sigma_z$ depends on the atmosphere diffusion. The value of $\sigma_z$ by vertical wind is calculated by Slade with atmospheric stability of type B and the distance $x = 25m$ from the center of the calculated road to the sides.

**Dust and emissions generated from transportation of raw materials to the construction site**

According to the feasibility study report, total amount of raw materials (soil, sand, cement, iron, steel...) to be transported is shown in the Table below.

**Table 36: Volume of materials to be transported and amount of trips**

<table>
<thead>
<tr>
<th>No.</th>
<th>Work item</th>
<th>Weight (ton)</th>
<th>Total trips of transporting vehicles (trip)</th>
<th>Construction duration (day)</th>
<th>Number of trips per day (including entrance and leave)</th>
<th>Average transportation distance (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Construction of urban drainage system</td>
<td>4,313</td>
<td>431</td>
<td>300</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>2.</td>
<td>Construction of wastewater collection and treatment system</td>
<td>7,974</td>
<td>797</td>
<td>300</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>Flood control for the city’s key areas</td>
<td>23,477</td>
<td>2348</td>
<td>300</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>4.</td>
<td>Construction of connection road between ward 8 and ward 9</td>
<td>52,554</td>
<td>5255</td>
<td>540</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>5.</td>
<td>Construction of the main road No.1</td>
<td>88,831</td>
<td>8883</td>
<td>540</td>
<td>33</td>
<td>8</td>
</tr>
<tr>
<td>6.</td>
<td>Construction of the main road No.2</td>
<td>99,216</td>
<td>9922</td>
<td>540</td>
<td>37</td>
<td>10</td>
</tr>
<tr>
<td>7.</td>
<td>Construction of infrastructure for resettlement site in ward 8</td>
<td>39,750</td>
<td>3975</td>
<td>450</td>
<td>18</td>
<td>15</td>
</tr>
</tbody>
</table>
Table 37: Concentration of pollutants during transportation of materials

<table>
<thead>
<tr>
<th>No</th>
<th>Work item</th>
<th>Dust (mg/m³)</th>
<th>CO (mg/m³)</th>
<th>NO₂ (mg/m³)</th>
<th>SO₂ (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Construction of urban drainage system</td>
<td>0.134</td>
<td>0.139</td>
<td>0.135</td>
<td>0.136</td>
</tr>
<tr>
<td>2.</td>
<td>Construction of wastewater collection and</td>
<td>0.134</td>
<td>0.135</td>
<td>0.134</td>
<td>0.134</td>
</tr>
<tr>
<td></td>
<td>treatment system</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Flood control for the city’s key areas</td>
<td>0.139</td>
<td>0.169</td>
<td>0.14</td>
<td>0.135</td>
</tr>
<tr>
<td>4.</td>
<td>Construction of connection road between</td>
<td>0.139</td>
<td>0.171</td>
<td>0.141</td>
<td>0.135</td>
</tr>
<tr>
<td></td>
<td>ward 8 and ward 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Construction of the main road No.1</td>
<td>0.123</td>
<td>0.149</td>
<td>0.124</td>
<td>0.119</td>
</tr>
<tr>
<td>6.</td>
<td>Construction of the main road No.2</td>
<td>0.138</td>
<td>0.166</td>
<td>0.14</td>
<td>0.135</td>
</tr>
<tr>
<td>7.</td>
<td>Construction of infrastructure for resettlement site in ward 8</td>
<td>0.134</td>
<td>0.137</td>
<td>0.134</td>
<td>0.134</td>
</tr>
</tbody>
</table>

According to the calculation results in the mentioned table, the concentrations of dust and emissions generated from transportation of construction materials are all lower than the permissible limits of QCVN 05:2013/BTNMT for 1 hour. However, the dust and emissions caused by transportation can be combined with the dust and emissions of daily vehicles, along with hot weather, which can affect health and daily activities of people living along intersection areas of the roads with canals or with national highways, district roads and inter-communal roads (the distance from the road to the people's house ranges from 5 to 50m). These impacts occur during the construction process and will gradually decrease until the operation of the works. The effect is concentrated within 8-10 hours/day. Specifically:

- For the construction of roads, the volume of materials for transportation is large, with more than 20 transportation trips per day (during 24 months of construction), on an average transport distance of 15km. Dust and emissions directly affect households living along NH1A roads, district roads, and bypass roads of the city, but the population density is not large so the direct impact is assessed to be medium and mitigated.

- For the remaining works, the volume of materials for transportation is not much, with less than 20 transportation trips per day (during 24 months of construction), on a transport distance from 10-20km. At the same time, the transportation routes are convenient, so the direct impact of dust and emissions on these construction items is considered low and can be mitigated.

d) Dust pollution during mixing of construction materials

During the construction process, mixing sand, cement, concreting, etc. also causes dust pollution in the construction site and adjacent residential areas (especially on sunny and hot days). From the monitoring results obtained at some locations about 50-100m from the construction site, at the end of the prevailing wind, the concentration of dust in the ambient air is at 20-30 mg/m³, 60-100 times higher than the permissible limit in the QCVN 05: 2013/BTNMT. Meanwhile, the material gathering site is not located in residential areas (distance to the nearest residential area is about 100m, except 2 work items of Long Ho river embankment and Ward 8 Resettlement site) and the construction site is wide so this impact will mainly affect workers. For the work items of Long Ho river embankment and Ward 8 resettlement site, the distance to the private houses is from 30 to 50m, so the dust during mixing of materials can also affect people nearby the construction site. However, this direct impact is assessed at a low because it is only happened at the site and takes place about 10 hours intermittently during day-time construction process. This impact can be mitigated by appropriate measures.
2. Noise

During the construction phase of the project, noise generated mainly from the following sources:

- Transportation of construction materials, solid waste;
- Construction and dismantling works items;
- Operation of construction equipment at the construction site.

The noise will mainly affect construction workers, people living nearby the project area and along the transportation route. High noise level will cause health effects such as insomnia, fatigue, uncomfortable mood. It can also affect workers’s performance on the construction site, making them less mentally focused and easily leading to occupational accidents.

According to QCVN 26: 2010/BTNMT, the maximum permissible noise level is 70dBA in the production area and the lowest noise level is 45dBA in health centers, libraries, nursing homes, schools from 21h to 6am. For residential areas, the maximum permitted noise level must not exceed 70dBA.

In addition to the source of dust and emission gases from earthworks and vehicles, the operation of construction machinery and equipment such as bulldozers, compactors, cranes, hoists, drilling machines, concrete mixers, excavators, trucks ... also cause noise pollution and great vibration. Forecast on noise level generated by some main construction machines and equipment is shown in the table below.

Table 38: Noise generated from construction machinery and equipment

<table>
<thead>
<tr>
<th>No</th>
<th>Name of machine/equipment</th>
<th>Noise (dBA) at a distance of 1.5m from the source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bulldozer</td>
<td>93</td>
</tr>
<tr>
<td>2</td>
<td>Roller</td>
<td>72 – 74</td>
</tr>
<tr>
<td>3</td>
<td>Excavator</td>
<td>72 – 84</td>
</tr>
<tr>
<td>4</td>
<td>Bucket excavator</td>
<td>72 – 93</td>
</tr>
<tr>
<td>5</td>
<td>Grader</td>
<td>80 – 93</td>
</tr>
<tr>
<td>6</td>
<td>Concrete mixer</td>
<td>75 – 88</td>
</tr>
<tr>
<td>7</td>
<td>Concrete pump</td>
<td>80 – 83</td>
</tr>
<tr>
<td>8</td>
<td>Concrete compactor</td>
<td>85</td>
</tr>
<tr>
<td>9</td>
<td>Generator</td>
<td>72 – 83</td>
</tr>
</tbody>
</table>

(Source: US Environmental Protection Committee - Noise from construction equipment and construction machinery NJID, 300.1, 31/12/1971)
However, the noise level will decrease by distance and is determined by the formula

\[ L_p = L_p(X_0) + 20\log_{10}(X_0/X) \]

Where:
- \( L_p(X_0) \): noise level at a distance of 1.5m from the source (dBA);
- \( X_0 = 1.5 \); 
- \( L_p(X) \): noise level at the calculated position (dBA);
- \( X \): calculated position (m).

Maximum noise level by distance due to operation of construction equipment is shown in the following table:

### Table 39: Maximum noise level by distance

<table>
<thead>
<tr>
<th>No</th>
<th>Name of machine/equipment</th>
<th>Noise level distanced 1.5m from the source (dBA)</th>
<th>Noise level distanced 15m from the source (dBA)</th>
<th>Noise level distanced 30m from the source (dBA)</th>
<th>Noise level distanced 50m from the source (dBA)</th>
<th>Noise level distanced 100m from the source (dBA)</th>
<th>Noise level distanced 200m from the source (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bulldozer</td>
<td>93</td>
<td>Min: 73.0 Max: 67.0</td>
<td>Min: 62.5 Max: 56.5</td>
<td>Min: 41.5 Max: 35.5</td>
<td>Min: 29.5 Max: 25.5</td>
<td>Min: 25.5 Max: 21.5</td>
</tr>
<tr>
<td>2</td>
<td>Roller</td>
<td>72-74</td>
<td>52.0 Min: 54.0 Max: 46.0</td>
<td>60.0 Min: 54.0 Max: 48.0</td>
<td>70.0 Min: 60.0 Max: 43.5</td>
<td>80.0 Min: 63.5 Max: 43.0</td>
<td>90.0 Min: 63.5 Max: 50.5</td>
</tr>
<tr>
<td>3</td>
<td>Excavator</td>
<td>72-84</td>
<td>52.0 Min: 64.0 Max: 46.0</td>
<td>60.0 Min: 58.0 Max: 43.5</td>
<td>70.0 Min: 65.0 Max: 41.5</td>
<td>80.0 Min: 67.0 Max: 52.5</td>
<td>90.0 Min: 67.0 Max: 43.5</td>
</tr>
<tr>
<td>4</td>
<td>Bucket excavator</td>
<td>72-93</td>
<td>52.0 Min: 73.0 Max: 46.0</td>
<td>60.0 Min: 67.0 Max: 41.5</td>
<td>70.0 Min: 65.0 Max: 25.5</td>
<td>80.0 Min: 63.0 Max: 43.5</td>
<td>90.0 Min: 63.0 Max: 50.5</td>
</tr>
<tr>
<td>5</td>
<td>Grader</td>
<td>80-93</td>
<td>60.0 Min: 73.0 Max: 46.0</td>
<td>60.0 Min: 67.0 Max: 41.5</td>
<td>70.0 Min: 60.0 Max: 35.5</td>
<td>80.0 Min: 54.0 Max: 45.5</td>
<td>90.0 Min: 54.0 Max: 43.5</td>
</tr>
<tr>
<td>6</td>
<td>Concrete mixer</td>
<td>75-88</td>
<td>55.0 Min: 68.0 Max: 52.0</td>
<td>60.0 Min: 62.0 Max: 38.5</td>
<td>70.0 Min: 57.0 Max: 29.5</td>
<td>80.0 Min: 67.0 Max: 38.5</td>
<td>90.0 Min: 67.0 Max: 35.5</td>
</tr>
<tr>
<td>7</td>
<td>Concrete pump</td>
<td>80-83</td>
<td>60.0 Min: 63.0 Max: 54.0</td>
<td>60.0 Min: 57.0 Max: 45.5</td>
<td>70.0 Min: 52.0 Max: 24.5</td>
<td>80.0 Min: 49.0 Max: 43.5</td>
<td>90.0 Min: 49.0 Max: 40.5</td>
</tr>
<tr>
<td>8</td>
<td>Concrete compactor</td>
<td>85</td>
<td>65.0 Min: 59.0 Max: 45.0</td>
<td>65.0 Min: 54.0 Max: 40.0</td>
<td>70.0 Min: 50.0 Max: 31.5</td>
<td>80.0 Min: 44.0 Max: 37.5</td>
<td>90.0 Min: 44.0 Max: 40.5</td>
</tr>
<tr>
<td>9</td>
<td>Generator</td>
<td>72-83</td>
<td>52.0 Min: 62.0 Max: 46.0</td>
<td>56.0 Min: 60.0 Max: 41.5</td>
<td>60.0 Min: 56.0 Max: 24.5</td>
<td>70.0 Min: 49.0 Max: 29.5</td>
<td>80.0 Min: 49.0 Max: 25.5</td>
</tr>
<tr>
<td>QCVN 26:2010/BTNMT (6-21h)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>70 dBA</td>
</tr>
</tbody>
</table>

In addition, on the construction site there are many noise sources so the noise will be greater due to the resonance. Additional noise levels are presented below

### Table 40: Additional noise levels when there are other on-site activities

<table>
<thead>
<tr>
<th>Difference of noise levels (dB)</th>
<th>Additional noise (dB)</th>
<th>Difference of noise levels (dB)</th>
<th>Additional noise (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3.0</td>
<td>7</td>
<td>0.8</td>
</tr>
<tr>
<td>1</td>
<td>2.6</td>
<td>8</td>
<td>0.6</td>
</tr>
<tr>
<td>2</td>
<td>2.1</td>
<td>10</td>
<td>0.4</td>
</tr>
<tr>
<td>3</td>
<td>1.8</td>
<td>12</td>
<td>0.3</td>
</tr>
<tr>
<td>4</td>
<td>1.5</td>
<td>14</td>
<td>0.2</td>
</tr>
<tr>
<td>5</td>
<td>1.2</td>
<td>16</td>
<td>0.1</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Source: Le Trinh - Environmental impact assessment - Methods and applications - Science and Technology Publishing House)
According to the calculation results in Table 2, the noise level at a distance of 30m from the construction vehicles and equipment is within the permissible limits (<70dB). The noise is decreased by distance from the construction site. Among the above noise sources, the most noticeable is the noise of trucks transporting construction materials through residential areas.

- For the construction of roads: households are living along both sides of the transportation routes (about 20m distanced) or living far from the construction site (> 50m). Therefore, the noise will mainly affect workers participating in the construction and a small part of people living along canals at the intersection between the road to be constructed and the canal.

- For the construction of the resettlement site in Ward 8: noise will only affect workers at the construction site because the distance from the construction site to the nearest house is 50m.

- For construction of Long Ho river embankment: Because there are many houses around the construction site, the distance ranges from 5-30m, so the noise from vehicles, construction equipment on the construction site can directly affect daily activities of people.

- For the work item of rehabilitation of drainage system: most of people are living along the canals, so the construction process can affect daily activities of the people. However, not many construction machines will be used and construction volume in this work item is not much.

However, according to the calculation results, the noise level at the construction sites is LOW, generating in a short time and scattering over 11 wards under the project. Construction machinery and equipment will not work simultaneously but in shifts and phases depending on the progress and construction volume of items, of which each type of machine will be used differently, so the resonance impact is very low. Moreover, all vehicles and equipment will be checked periodically and noise will cease when construction is completed. Noise can be minimized by measures such as labor protection equipment and noise protection devices.

### 3. Vibration

Vibration can be generated mainly from equipment operating with large capacity and often on site such as bulldozers, excavators, air compressors, etc. from activities of leveling, pile driving during construction of bridge abutment and embankment. Vibration can directly affect the workers involved in operating the machines, the people living nearby and the infrastructure around the construction site. Vibration will affect people’s daily life, business activities and other structures and even cause the cracks or collapses of houses. When the intensity is small and the impact is short, this vibration has a good effect like increasing muscle strength, reducing fatigue. When the intensity is high and the effect is long, it can cause discomfort to the body. Vibration combined with noise makes the hearing organ too tired, affecting human health.

Typical vibration levels of some construction equipment are shown in the table below

<table>
<thead>
<tr>
<th>No</th>
<th>Type of construction machinery and equipment</th>
<th>Reference vibration (by vertical direction, dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Excavator</td>
<td>80</td>
</tr>
<tr>
<td>2</td>
<td>Bulldozer</td>
<td>79</td>
</tr>
<tr>
<td>3</td>
<td>Heavy transport vehicle</td>
<td>74</td>
</tr>
<tr>
<td>4</td>
<td>Roller</td>
<td>82</td>
</tr>
<tr>
<td>5</td>
<td>Air compressor</td>
<td>81</td>
</tr>
</tbody>
</table>

Source: U.S. Environmental Protection Committee Vibration from construction equipment and construction machinery, NJID, 300.1, 31 – 12 – 197
To forecast the amount of vibration decreasing by distance, following formula is used:

\[ L = L_0 - 10\log\left(\frac{r}{r_0}\right) - 8.7a (r - r_0) \text{ (dB)} \]

Where:
- \( L \) is vibration in dB at a distance "\( r \)" meters away from the source;
- \( L_0 \) is vibration in dB measured at a distance "\( r_0 \)" meters from the source. Vibration at a distance of \( r_0 = 10 \) m is generally acknowledged as source vibration.
- \( a \) is the intrinsic vibration reduction coefficient on clay ground of about 0.5.

Forecasting results are presented in following table

**Table 42: Vibration decrease by distance**

<table>
<thead>
<tr>
<th>No</th>
<th>Equipment</th>
<th>Source vibration ((r_0=10\text{m}))</th>
<th>Vibration at distance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>( L_{aeq} ) (dB) ( L_{veq} ) (mm/s)</td>
<td>( r=12\text{m} )</td>
</tr>
<tr>
<td>1</td>
<td>Excavator</td>
<td>80.0 1.72</td>
<td>70.5 0.58</td>
</tr>
<tr>
<td>2</td>
<td>Bulldozer</td>
<td>79.5 1.53</td>
<td>69.5 0.51</td>
</tr>
<tr>
<td>3</td>
<td>Heavy transport vehicle</td>
<td>74.0 0.86</td>
<td>64.5 0.29</td>
</tr>
<tr>
<td>4</td>
<td>Roller</td>
<td>82.0 2.17</td>
<td>72.5 0.73</td>
</tr>
<tr>
<td>5</td>
<td>Air compressor</td>
<td>81.0 1.93</td>
<td>71.5 0.65</td>
</tr>
</tbody>
</table>

QCVN27:2010/BTNMT, permissible limit 75dB from 6 ÷ 21h and baseline level from 21h ÷ 6h.
DIN 4150, 1970 (German), 2mm/s: No impact; 5mm/s: flaking; 10mm/s: potential impact on structural bearing component; 20 ÷ 40mm/s: affecting structural bearing component;

According to the calculation results in Table 42, the vibration caused by construction machinery and equipment at a distance of 12m is within the permissible limits of QCVN 27: 2010/BTNMT (<75dB) and will decrease by distance from the source. This vibration impact will mainly affect construction workers at the site. However, vibration impact should be considered in construction sites near the residential area, but at a low level:
- The intersection of traffic routes with canals.
- Residential area near the embankment of Long Ho river.
- Areas of sluice gates number 4, 5, 6, 7 and 9.

The direct impact due to vibration is assessed to be LOW because the equipment will only operate intermittently and the impact only happen at the construction site where workers can work if shifts and can be protected by labor protective equipment. Vibration impact can be minimized through the application of appropriate construction methods and construction plans.

### 3.4.1.2. Impacts on water quality

1. **Domestic wastewater generated from workers’ camp**

Each construction site will gather about 50 ÷ 100 workers for construction work. The number of workers will concentrate mostly in the first phase of the project and will decrease as the work progresses. With a standard norm of 100 liters of water per person per day (According to
Vietnam construction standards - TCXDVN 33-2006), equally 100% of water supply standard (45 liters/person/day), the total daily wastewater generated at each construction site will vary from 2.25 and 4.5 m³/day.

Domestic wastewater from construction workers is the main cause affecting the water quality in the surrounding area. Domestic wastewater contains many residues, easily degradable organic matter, nutrients and pathogenic bacteria, which can pollute surface and ground water sources if there is not prompt treatment. At the same time, if domestic wastewater is not collected, there is a potential risk of epidemics (gastrointestinal, respiratory, skin diseases) affecting workers and nearby people.

Based on the amount of pollutants presented in the Report on the current status of urban wastewater - Institute of Environmental Science and Technology - Hanoi University of Science and Technology in 2006, the amount of pollutants daily discharged by each person into the environment is given in the following table:

**Table 43: Volume of pollutants generated by each person per day**

<table>
<thead>
<tr>
<th>No</th>
<th>Pollutants</th>
<th>Volume (g/person/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BOD₅</td>
<td>45 - 54</td>
</tr>
<tr>
<td>2</td>
<td>Total suspended solids</td>
<td>70 - 145</td>
</tr>
<tr>
<td>3</td>
<td>Oil, grease</td>
<td>10 - 30</td>
</tr>
<tr>
<td>4</td>
<td>NO₃⁻ (by N)</td>
<td>6 - 12</td>
</tr>
<tr>
<td>5</td>
<td>PO₄³⁻ (by P)</td>
<td>0.8 - 4.0</td>
</tr>
<tr>
<td>6</td>
<td>Coliform</td>
<td>10⁶ - 10⁹ MPN/100ml</td>
</tr>
</tbody>
</table>

Source: Report on the current status of urban wastewater - Institute of Environmental Science and Technology - HUT, 2006

Concentration of pollutants in untreated domestic wastewater is calculated by following formula:

\[ M = \frac{m}{V} \]  

(CT3)

Where:
- M: Concentration of calculated pollutant
- m: Pollutant load (kg/day).
- V: Total generated wastewater (m³/day)

Calculation results are presented in following table

**Table 44: Concentration of pollutants in untreated domestic wastewater**

<table>
<thead>
<tr>
<th>No</th>
<th>Pollutant</th>
<th>Concentration of pollutants in untreated domestic wastewater (mg/l)</th>
<th>QCVN 14:2008/BTNMT (column B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BOD₅</td>
<td>582</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>TSS</td>
<td>1265</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Oil, grease</td>
<td>235</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>NO₃⁻ (by N)</td>
<td>106</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>PO₄³⁻ (by P)</td>
<td>28</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>Coliform</td>
<td>100x10⁶ - 60x10⁹ MPN/100ml</td>
<td>5000 MPN/100ml</td>
</tr>
</tbody>
</table>
The calculation results in the above table show that, concentrations of pollutants in the untreated domestic wastewater are much higher than permissible limits in the QCVN 14: 2008/BTNMT (column B). Wastewater of this type usually contains total suspended solids (TSS), organic substances (BODs, COD), nitrogen and phosphorus-containing substances as well as microorganisms that need to be controlled and treated before being discharged. This is a significant source of pollution which without proper treatment can directly affect the living environment of workers and people around the project area, causing epidemics and directly affecting the groundwater and surface water. Surface water areas prone to this risk are: Cai Cam canal, Cau Lo river, Long Ho, Cai Sao Lon canal...

However, the direct impact due to domestic wastewater is considered to be LOW because: (i) the volume of domestic wastewater generated at each camp is not large, and the Contractor also employs local labor or rent houses so the amount of wastewater generated is lower than the calculation; (ii) the impact is localized, only in each worker camp area; (iii) The amount of wastewater is generated intermittently during the day; (iv) Construction period is short (15-24 months depending on construction items). The impacts due to domestic wastewater can be minimized by applying appropriate management and technical measures.

2. Construction wastewater

Construction wastewater is generated mainly: (i) concrete mixing for construction of roads and bridges passing through existing roads and canals; construction of sluice gates; embankments of Long Ho river; construction of wastewater treatment plant; construction of technical infrastructure in resettlement area; and auxiliary works; (ii) washing materials and construction equipment.

Concrete mixing activities at construction site areas use 250l concrete mixers, total capacity of 30 m³/h. According to the document namely Concrete Technology and Special Concrete written by Pham Duy Huu, published by Construction Publishing House in 2009, for operation of a concrete mixer with a capacity of 30m³/h, 9.69m³ of water will be required to wash aggregate and 5.4 m³ of water will be required for concrete mixing work. Of which, 80% of the aggregate washing water will be recycled and reused. Thus, the wastewater during concrete mixing generated on a construction is 20% × 9.69 = 1.94 (m³/h). On average, concrete mixing activities take place 02 hours/day, so the amount of wastewater generated from concrete mixing activities is 1.94 x 2 = 3.88 (m³/day).

The amount of wastewater used to wash construction equipment is estimated at 0.5 m³/day. Thus, the amount of wastewater generated on a construction site is 4.38 m³/day, equivalent to 39.42 m³/day for all work items of the project. Construction wastewater usually contains high content of pH (usually pH>12), high content of total suspended solids and no hazardous substances. If this construction wastewater is not treated, it will cause sedimentation, affecting the receiving water bodies. The affected water bodies include: Cai Cam canal, Cau Lo river, Long Ho river, Cai Sao Lon canal and surrounding water bodies. In fact, this wastewater will be reused to moisten materials or watering the excavated areas on the site. At the same time, the amount of wastewater generated at each site is small, the construction period is short (15-24 months), the impact is considered partially at the construction site. Moreover, the frequency of wastewater generated from concrete mixing takes place intermittently. Therefore, the direct impacts caused by construction wastewater are assessed as low and can be mitigate.

3. Rainwater runoff

Rainwater is considered to be clean water if it is not in contact with polluted sources such as: polluted wastewater, gas, soil/mud, etc. The main sensitive receptors of this impact are the water bodies in catchment areas of the rainwater runoffs from the construction site. Pollutants in the rainwater runoff during the construction phase are mainly soil, rock, oil, grease and domestic
waste that are swept away by rainwater and become a source of pollution to the surface water, soil and groundwater. The amount of rain water runoff on the project area is determined by the following formula:

\[ W = \psi \times q \times F/1000 \text{ (m}^3/\text{ngày)} \]

Where:
- \( W \): amount of rainwater runoff, \( m^3 \);
- \( \psi \): Surface runoff coefficient, \( \psi = 0.2 – 0.95 \), selecting \( \psi = 0.2 \) (because the project area has many trees, canals and cultivated land);
- \( q \): Maximum daily precipitation in the calculated area, 120mm;
- \( F \): Calculated area (\( m^2 \)).

Calculation results of rainwater runoff in the project area are presented in the table below.

**Table 45: Rainwater runoff on the construction site**

<table>
<thead>
<tr>
<th>No</th>
<th>Description</th>
<th>Flow Q (( m^3 ))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Flood control in urban core areas (calculated for WWTP)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Construction of new roads connecting ward 8 and ward 9</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Construction of main road No. 1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Construction of main road No. 2</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Construction of infrastructure for the resettlement site in ward 8</td>
<td>7</td>
</tr>
<tr>
<td>1</td>
<td>Surface area (( m^2 ))</td>
<td>45,000</td>
</tr>
<tr>
<td>2</td>
<td>Calculated rain intensity (mm)</td>
<td>0.12</td>
</tr>
<tr>
<td>3</td>
<td>Surface runoff coefficient</td>
<td>0.2</td>
</tr>
<tr>
<td>4</td>
<td>Rainwater runoff volume (( m^3 ))</td>
<td>1,080</td>
</tr>
</tbody>
</table>

Notes: Works items: rehabilitation of waste collection routes, connection routes to tertiary wastewater are locally constructed. For rehabilitation of urban core area, tidal sluicegate, embankment of Long Ho river, the construction area is open and near the surface water drainage system of the city. Therefore, water runoff on the surface of the works is mostly not occured.

According to the WHO’s research, the concentration of pollutants in normal rainwater runoff is about 0.5 - 1.5 mg N/l; 0.004 -0.03 mg P/l; 10 - 20 mg COD/l and 10 - 20 mg TSS/l. The receiving sources of rainwater runoff are Cai Cam canal, Cau Lo river, Long Ho river, Cai Sao Lon rivers and other canals. Rainwater runoff from the construction site can sweep away loose materials and soil, minerals on the surface, leaking grease... increasing the content of suspended solids, substances, organic matter, increasing turbidity, oil and grease in water, adversely affecting aquatic ecosystems of water sources. Without drains, rainwater runoff can affect construction items such as damaging or destroying works in progress, etc. This impact is mainly on rainy season from September to December. However, this direct impact is assessed to be low because:

- The construction site is regularly cleaned by the workers, thus limiting material and loose soil and stones being swept away by rainwater runoff.
- At each construction site, there is a rainwater drainage system.
Construction activities take place mainly in the dry season and short-term. The impacts due to rainwater runoff can be minimized by appropriate technical and managerial measures, and no indirect adverse impact is anticipated.

3.4.1.3. Solid waste generation

1. Construction solid waste

Solid waste can be generated during construction from: earthwork, leveling; dredging sludge; transportation of excess raw materials and solid waste; construction activities; maintenance of construction vehicles, equipment... Solid wastes include: excavated and spilled soil, rock and sand. In addition, there can be iron debris and steel scrap; cement bags; wood debris, broken bricks...

Table 46: Volume of solid waste generated from construction phase

<table>
<thead>
<tr>
<th>No</th>
<th>Work item</th>
<th>Volume of material</th>
<th>Volume (ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Low loss level (0.005%)</td>
<td>High loss level (0.01%)</td>
</tr>
<tr>
<td>1.</td>
<td>Construction of urban drainage system</td>
<td>9,303</td>
<td>0.47</td>
</tr>
<tr>
<td>2.</td>
<td>Construction of wastewater collection and treatment system</td>
<td>10,639</td>
<td>0.53</td>
</tr>
<tr>
<td>3.</td>
<td>Flood control in the urban core area</td>
<td>29,815</td>
<td>1.49</td>
</tr>
<tr>
<td>4.</td>
<td>Construction of new roads connecting ward 8 and ward 9</td>
<td>36,441</td>
<td>1.82</td>
</tr>
<tr>
<td>5.</td>
<td>Construction of main road No. 1</td>
<td>55,932</td>
<td>2.80</td>
</tr>
<tr>
<td>6.</td>
<td>Construction of main road No. 2</td>
<td>61,172</td>
<td>3.06</td>
</tr>
<tr>
<td>7.</td>
<td>Construction of infrastructure for the resettlement site in ward 8</td>
<td>32,325</td>
<td>1.62</td>
</tr>
</tbody>
</table>

Note: The level of loss of raw materials in accordance with the norms of construction materials is attached to Official Letter No. 1784/BXD-VP of August 16, 2007 and Official Letter 1776/BXD-VP dated August 16, 2007 by MOC

However, these wastes, if not well controlled, can hinder construction work and increase the amount of dust in and around the construction site area, affecting workers and nearby people. Residential areas prone at this risk are: residential area at Long Ho river embankment, residential areas intersecting with works in Cau Lo river, NH1A road, Dinh Tien Hoang street, Pho Co Dieu street...

In addition, after the construction process, some types of solid waste such as rubble, scrap steel, cement bags, etc can also be generated. However, this is reusable solid waste and can be salvaged for reuse or sold to units in need so there is low risk of discharging these types of solid wastes into the environment.

This direct impact is assessed at a low because: (i) The volume of waste generated is not large and only at the construction site; (ii) Construction period is short; (iii) solid waste will be collected and transported daily to local disposal sites twice in a week. At the same time, this impact can be mitigated through the measures set out in ESCOPs.

2. Domestic solid waste

Solid wastes are generated from daily activities of construction workers in the camps. The main
components of domestic solid waste include decomposable organic substances and persistent inorganic substances such as nylon bags, bottles, old personal items. The average amount of domestic solid waste is about 0.3 - 0.5 kg/person/day (Vietnam National Environment Report 2011 - Solid waste), with the number of 50-100 workers/construction site. The amount of domestic solid waste is shown in Table 47.

**Table 47: Volume of domestic solid waste at the construction site**

<table>
<thead>
<tr>
<th>No</th>
<th>Work item</th>
<th>Workers</th>
<th>Volume of solid waste (kg/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction of urban drainage system</td>
<td>50</td>
<td>15 - 25</td>
</tr>
<tr>
<td>2</td>
<td>Construction of wastewater collection and treatment system</td>
<td>70</td>
<td>21 - 35</td>
</tr>
<tr>
<td>3</td>
<td>Flood control in the urban core area</td>
<td>100</td>
<td>30 - 50</td>
</tr>
<tr>
<td>4</td>
<td>Construction of new roads connecting ward 8 and ward 9</td>
<td>80</td>
<td>24 - 40</td>
</tr>
<tr>
<td>5</td>
<td>Construction of main road No. 1</td>
<td>50</td>
<td>15 – 25</td>
</tr>
<tr>
<td>6</td>
<td>Construction of main road No. 2</td>
<td>70</td>
<td>21 - 35</td>
</tr>
<tr>
<td>7</td>
<td>Construction of infrastructure for the resettlement site in ward 8</td>
<td>60</td>
<td>18 - 30</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>480</td>
<td><strong>144 - 240</strong></td>
</tr>
</tbody>
</table>

From Table 47, the total amount of domestic solid waste of the project is on average 192 kg/day, with a construction period of 15 - 24 months, the total amount of domestic solid waste is from 96.4 to 138.24 tons. If domestic solid waste is not collected and disposed appropriately

- It can obstruct the flow during the construction, facilitating flood and congestion (at the construction location of the bridge on the main roads No. 1 and No. 2; at the tidal sluice areas, at the canals like Cai Cam, Cau Lo, Long Ho, Cai Sao Lon...).
- It can obstruct traffic when transporting construction materials to the construction site and construction activities of workers (focusing mainly at the construction sites of the roads connecting wards 8 and 9; urban main roads 1 and No. 2, embankment of Long Ho river, resettlement site of ward 8).
- Domestic solid waste containing organic ingredients, containing pathogens, so if there is no proper plan for collection, transportation and treatment, it can create great risks to the water and air environment and can directly affect the health of people and construction workers.

However, the direct impact of domestic waste is considered as "low" and can be mitigated because: (i) The amount of waste generated on each site is low and is collected daily by workers; (ii) the impact is localized at construction sites; (iii) the contractor will employ local labor to limit the amount of domestic waste generated; (iv) worker camps will be located far away from residential areas.

3. **Hazardous solid wastes**

Sources of hazardous waste generated from the construction of the project’s items include: (i) Oil contaminated materials from the maintenance of construction machines; (ii) Asphalt removed from road construction, Asphalt containers; (iii) bags, tanks containing oil, asphalt, petrol and paint; (iv) excessive welding rods; (v) Batteries, light bulbs, cartridges from office at the construction site. The volume of hazardous waste depends on the number of equipment/machinery, labor and volume of materials:
If the maintenance of means, vehicles, construction machines is carried out at the construction site, it will generate oil, oil bottles and oil contaminated rags, etc. (estimated at 5kg/month/construction). If not collected and treated, it will affect the landscape, polluting the surface and underground water in the project area. Therefore, take measures should be taken to collect and treat hazardous waste (Circular No. 36/2015/TT-BTNT and Decree No. 38/2015/ND-CP on waste management) and to minimize negative impact on local environment. Besides, all equipment and construction must be repaired in the repairing center.

Asphalt is a sticky, black, and highly viscous liquid or semi-solid form. As a petrochemical product, the main component of asphalt is bitumen, so it can be dangerous or adversely affect the environment and people health unless being stored and used properly in accordance with technical specifications. In particular, at high temperatures, the stored asphalt can pose the risk of fire, explosion or burns during transportation and use. The discarded asphalt must be collected and stored in specialized bins which contain hazardous wastes, after which will be transported and treated in accordance to hazardous waste management regulations by a specialized units hired by the project Owner. Estimated amount of asphalt disposal is about 10kg/month/site with roads and embankments of Long Ho river.

The volume of bags, tanks containing oil, asphalt, fuel and paint are not large (about 10-30kg/month for each site). However, unless being collected, it will cause a loss of beauty landscape and a potential risk of soil and water pollution.

Wastes from welding rods which are used form steel frames are generated at the construction site. It is estimated that the percentage of excessive part of welding rods is equal to 5-7% of the weight of welding rods, about 5.0 kg for a bridge. However, the weld rods are discontinuously and rarely used, the waste will be collected to the regulated hazardous waste site in compliance with regulations.

Hazardous waste generated, with a small volume, from office activities with about 1-3kg/month for a construction site. Hazardous waste, if not collected, will cause impacts:

- Penetration of oil and grease into the water will directly affects aquatic species in canals within the project area (Cai Cam canal, Cau Lo river, Long Ho river, Cai Sao Lon canal, etc.), that curb the growth, or even cause death of aquatic plants and animals.
- The heavy metal elements will therefore penetrate into the food and badly affect people health.

However, the volume of hazardous waste generated on each site is small, localized and only occurs during the construction phase. Hazardous waste will be collected, managed and disposed in accordance with the regulations on hazardous waste collection and management. This direct impact is assessed to be LOW and can be mitigated through appropriate management and treatment measures.

### 3.4.1.4. Impacts on physical cultural resources

There is no physical and intangible cultural heritage within the area of influence of the project. The construction of roads, bridges, ditches, embankments, wastewater treatment plants and resettlement areas during the construction phase will require excavation of soil at various depths: (i) piling of the embankment foot at the depth from 8-12m (embankment of Long Ho river); (ii) drilling piles or precast piles for building piers/abutments at the depth of about 20m (Bridges on roads connecting wards 8 and 9; urban main roads No. 1 and No. 2); (iii) excavation of organic soil layer for roadbed construction at the depth of 0.5 m (03 works of road and embankments of Long Ho river, resettlement area of ward 8). During construction phases of the works, chance finds can be encountered. However, the possibility of chance finds is LOW.
value because most of the constructions are built on the existing base or on agricultural land. Nevertheless, a chance finds procedure is included in the ESCOPs to address the chance finds. Therefore, there is no indirect impact on the cultural heritage, and the direct impact is LOW.

3.4.1.5. Interruption of traffic activities

❖ Road

Construction of 3 roads and bridges and culverts on roads, embankment of Long Ho river will affect the traffics in the project area. At intersections, people’s travel will be affected. Bridge on the connection road between Ward 8 and Ward 9, urban main roads No. 1 and No. 2 are new works, so it will not affect the travel of people going through the area.

However, for each bridge or road, a temporary route will be provided for residents and successive construction measures will be taken to limit traffic congestion. Once completion of construction, the impact will be ended immediately. Additionally, local people strongly support construction of the road and bridge, the direct impact level is assessed to be LOW and can be mitigated through traffic management measures in the course of construction.

❖ Waterway

Construction of bridge, culverts on the road cutting the existing canals, tidal sluicegate, dredging of canals within urban core area, embankment of Long Ho river will affect the waterway transport in the project area.

For bridges and culverts: The construction activities will affect the waterway transport in the Project area within 15 months (construction period). The impact is rated as Moderate because: (i) the interruption causes other boats to go farther routes that consume time and fuel costs of local people; (ii) Although the waterway transport frequency is low, there are about 5-10 trips through the project area per day; (iii) the construction activities will affect daily activities of local people. However, the impacts are direct and can be mitigable by successive construction method and suitable arrangement that suitably for each type of work.

The dredging of canal and embankment of Long Ho river will affect waterway transport during 15-24 months. The activities will obstruct boats, narrow down the width of waterway. Despite high frequency of boats travelling in Long Ho river, the direct impact is assessed to be Low: (i) Long Ho has a wide river bed; (ii) Successive construction methods are applied, so the impact is localized; (iii) Obstruction of waterway transport is taken place within couple of hours. The impacts are mitigated through construction methods suitable to each item. The Project Owner and Contractor will work with local waterwater management unit to supply necessary information on alternative ways so that the impacts will be minimized.
3.4.1.6. Change in landscape and land use purpose

Construction of the urban main roads No. 1, No. 2, the roads linking wards 8 and 9, the resettlement site and the WWTP will lead to a change in the purpose of land use at the sites of these work items (i.e. the agricultural land is occupied to be construction sites in the construction phase). The construction of Long Ho river embankment will change the purpose of land use from residential land to construction site. These changes in land use purpose will affect the livelihoods of households owning agricultural land and affect the accommodation of people living in the embankment area of Long Ho river. Impacts related to livelihoods and resettlement will be mitigated in the RP. The impacts on land use purpose are direct, permanent and long-term. However, this impact is assessed to be "Medium" because: (i) it will happen only at the construction sites; (ii) the construction of work items will increase value of land in the surrounding areas.

When the construction works are under construction, the earthwork, dredging on canals and transportation of materials, gathering of bulky construction material, heaps of excavated and backfilled material, gathering of construction machinery and construction waste will cause negative impacts on the urban landscape. However, the impacts on urban landscape change is at low level because the construction time is expected within 6 months to 1 year, the environmental landscape will be recovered and even be better than before.

3.4.1.7. Impact on biodiversity

The operation of machines and equipment for dredging inner canals and construction of tidal sluice gates, bridges on the roads cutting canals, embankment of Long Ho river and other canals will affect aquatic ecosystem. Embankment of canals, construction of abutment, culverts may cause drops of soils and stones into the water bodies, leading to the increase in turbidity of canals and rivers, including: Long Ho river, Nga Cay, Tan Huu, Binh Lu, Cau Lo, Cai Cam canals affecting living environment of aquatic species and reducing the scope of foraging.

For dredging of inner city drainage canals: Current status of Vinh Long city drainage canals is from 3.0 to 6.0m in width with the function of storm water and wastewater drainage of city people. However, these canals have been filled and encroached, leading to reduced drainage capacity, causing inundation during high tide. Shrubs and water hyacinth grow much on the main stream causing obstruction of the flow. As such, the level of biodiversity in the dredged canals is low, so the impacts on biodiversity are assessed as Low. Moreover, the dredging of canals will improve the living environment of aquatic plants and animals, contribute to biodiversity development in the region in a positive way.

For construction of bridges and tidal sluices: The construction of tidal sluices and bridges on roads intersecting with canals is carried out on small canals. The construction site are mainly shrubs, aquatic plants and animals without endemic species, mainly small shrimp and fish of low economic value. Therefore, the impact of bridges and culverts construction on biodiversity
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is assessed at a low level.

*For embankment construction:* The construction of soft embankments is mainly taking place on the banks of dredged canals, the current situations are mainly shrubs, local plants such as lau sây - Phragmites australis, Arundo donax, mòn nuôi - Colocasia esculenta, bòn bèn - Typha orientalis G.A, mù u - Calophyllum inophyllum, bình.bat - Annona glabra with low economic value and biodiversity. The Long Ho river embankment is built along the banks of the Long Ho River, the current status is the residential and commercial areas. Therefore, the biodiversity along the embankments is low, the impact of embankment construction on biodiversity is assessed to be low.

In addition, if the hazardous wastes from machine cleaning and maintenance or from leakage are not strictly controlled, oil slicks will seriously damage the aquatic ecosystem.

The impacts on the ecosystem and aquatic species from construction works are regarded as Low because: (i) the water related works are built in dry season; (ii) the impacts are in short time; (iii) the works are implemented scatteredly in time and space manners and localized at the construction site. Additionally, these impacts will be faded and disappeared when the works are put into operation. It is expected that within 6 months to 1 year, the environmental quality will be recovered and even be better than before dredging and construction period.

### 3.4.1.8. Impacts on social aspects, on women and children

#### Social impacts

Social impacts are mainly generated from the labor influx for construction activities. There will be 7 construction sites and 50-100 worker/1 site. This impact affects people around the project area and local infrastructure. Social impacts include but not limited to:

- (i) Conflicts between construction workers and local communities due to differences in habits, customs, culture, lifestyle, employment and income. This impact is likely to be higher in densely populated construction areas such as the embankment of Long Ho River, the road linking Ward 8 and Ward 9.

- (ii) Conflicts between local residents and the Contractors when wastes generated from construction activities such as dust, solid wastes, hazardous wastes, wasted rock and soil cause adverse impacts on crops, rice and vegetables, or erosion and landslides that bury trees along the road linking Ward 8 and Ward 9; urban main road No. 1; urban main road No. 2; embankment of Long Ho river; construction of wastewater treatment plants; culverts 4, 5, 6, 7 and 9.

- Wastewater from worker camps discharged into the environment may also lead to conflicts with the local community. Besides, the conflicts can arise from workers’ use of local resources such as clean water, food and foodstuffs that cause price increase.

- (iv) Labor influx can cause social disorders and pose social problems such as gambling, drug, prostitution. Additionally, uncollected and untreated wastewater, which cause adverse impacts such as bad smell, loss of beautiful land scape and poor health of local people, from worker camps in or near residential areas (Long Ho river embankment, resettlement area, wastewater treatment plant) can bring workers into conflict with local people. Labor influx could also increase the risk of Gender Based Violence (GBV) and sexual exploitation and abuse (SEA).

- (v) Use of local labor for simple jobs will pose the potentially risk of children involvement, affecting children’s education, psychology, health and development, causing conflicts with local residents.

- (vi) Impacts on existing infrastructure and related services:
  - Transportation of construction materials and wastes (using 10-ton vehicles) be
risky of destroying roads (NH1A, Dinh Tien Hoang, Pho Co Dieu, PR 902, Tran Phu roads).

+ Operation of cranes, excavators can break existing power lines along national highways in sections passing urban or residential areas (embankment of Long Ho river, urban roads 1 and 2, connection road between ward 8 and ward 9).

+ The invested roads passing through paddies can interrupt irrigation activities.

(vii) Disturbance in traffics and increase in traffic safety risks: Construction vehicles and machines used in the project will increase the traffic density on the roads (NH1A, Pho Co Dieu, Dinh Tien Hoang roads), contributing to disturbance and increase the risk of traffic accidents and traffic jams.

However, the social impact is direct and assessed to be “low” as: (i) the workers concentrated scatteredly in 7 different areas. The impacts are localized within the construction areas; (ii) Local labor will prioritized to used for construction activities. At the same time measures to control the age of hired workers must be taken; (iii) The impacts are mainly occurred in the stages of construction phase and within a short period; (iv) drainage irrigation and ditches which are be newly built will be connected to the existing system before demolition; (v) the traffic density and frequency in the project area are low. Therefore, social impacts can be controlled by mitigation measures taken in the project construction phase.

❖ Impact due to improper universal access

Construction of roads (urban road No.1 and 2, connection road between Ward 8 and 9) will affect the road transport conditions at the project site. At intersections, local people’s travel will be affected. As the bridges and culverts cutting the existing roads and canals are newly built, travelling through these areas will not be affected. However, for each bridge and road, a temporary road and bridge will be arranged and successive construction method will be applied in effort to reduce traffic congestions. The impacts will be stopped after the completion of these works and that the construction of the works is strongly supported by local people, the impact is considered to be low and mitigated through transport management methods in the course of construction.

In addition, the construction of 09 tidal sluices will affect waterway transport of local people in the project area. However, the impact is temporary during the construction period. The impact level is considered to be “low” as (i) the construction activities are conducted in dry season when the frequency of waterway traffics is low; (ii) the impact is localized at the construction site; (iii) the construction activities are within 12 months; (iv) there are many alternative canals for travelling. For this issue, the Project Owner and Contractors will work with the local waterway management agency to provide necessary information about alternative waterways so as to minimize possible negative impacts.

❖ Impact on local small businesses and households

The construction of urban road No.1 and 2, connection road between Ward 8 and 9, embankment of Long Ho river, and construction of road for transportation of equipment and materials for WWTP will affect some business households (they mainly sell of domestic necessities and foods such as biscuit, candy, fruits, vegetables… and small coffee stores). Apart from risks related to safety, noise and dusts from construction activities and operation of machines and equipment, the households may temporarily suspend their business for about 15-20 months due to difficult access. However, the impact is considered to be low because: (i) successive construction method is applied, the interruption is localized (according to scope of households); (ii) the impacts happen in short period (about 2-3 months for each household); (iii) when the work is put into operation, their economic conditions will be promoted due to infrastructure improvement. Additionally, the impact is definitely mitigable through the
Project’s Resettlement Plan.

❖ **Impacts on women**

The concentration of 30-70 workers at a construction site with about 75% men and 25% women may cause social disturbance, affecting women directly work on the construction site or those living surrounding the project area and their families in the course of construction. For the previous similar works, unmarried women may be disadvantaged in getting married or they may become single mom. Meanwhile, married women can be affected with the happiness of their families. In addition, they may be infectious to communicable diseases, social diseases such as HIV/AIDS, syphilis, etc. (that may affect the next generation). This impact only takes place during construction of works items (15-24 months). However, the impacts on women are assessed as minor because: (i) According to the socio-economic survey results, no negative impacts related to women were recorded. At the construction sites; (ii) The number of women workers is not large as local workers are prioritized by the Contractor; (iii) Information about social diseases and prevention methods will be provided to workers through training programs and information disclosure; (iv) Regulations, penalties for the violated workers at the site must be developed; (v) The contractor must be closely work with local authorities to manage the number of workers at the construction site.

❖ **Use of child labor and forced labor**

To reduce construction costs, child labors can be used for some jobs that do not require high qualifications (according to Vietnam’s regulations, child is under 15 years old). Due to limited knowledge, children can suffer from labor abuse that affects their psychology, health and ability to learn. However, the impact is assessed to be MINOR as: (i) The experience with the Bank-financed and state budget projects show no cases of child labor or forced labor; (ii) According to the socio-economic survey results, no case of child labor or forced labor use was recorded; (iii) The Contractor committed not to hiring child labor for the project-related jobs; (iv) The project Owner will coordinate with local authorities and related units to strictly control the Contractor's labor use; (v) Commitment not to use child labor is one of the required conditions in the bidding documents.

❖ **Labor and working conditions**

*Type of workers.* The Project’s workforce will include direct workers (directly employed by PMU), contracted workers (recruited by third parties such as contractors or as consultants), and primary supply workers. The project is not likely to engage community workers, as civil works will be the responsibility of contractors.

*Direct workers.* The Project direct workers are workers directly employed by the PMU. The PMU is responsible for the management and supervision of overall implementation of the Project, including construction work by the contractors. The PMU will require support from the consultants in specific technical areas (i.e. in project management and coordination, financial management, procurement, construction, environmental/social safeguards, monitoring and evaluation, among others).

*Contracted workers.* The PMU will engage around 6 contractors, which may mobilize subcontractor, for carrying out the implementation of the different works under component 1, 2, and 3, and supervision contractors and independent monitoring consultant.

*Primary supplier workers.* The construction work under the Project will require primary supplies essential for the functions of the priority infrastructure, such as construction materials including aggregates, bitumen and precast concrete interlocking blocks. Where the contractor will source such materials directly from primary suppliers on an ongoing basis, the workers engaged by such primary suppliers are deemed “primary supply workers”, as defined in ESS2.
The number and type of primary suppliers will be determined at project implementation stage. The timing of labor use of primary supply workers will cover the construction stage of the project (see Section 12 for more details on primary supply workers).

**Community workers.** The project will not have community workers as defined under ESS2. The community members to be engaged by the contractors will be categorized and managed as “contracted workers”.

**Other stakeholders working in connection with the project.** Stakeholders working in connection with the Project other than the above project workers will include the Government civil servants. Some city and provincial government civil servants will be working in connection the Project, which will include DOC, DARD, DONRE, DPI. They will remain subject to the terms and conditions of their existing public sector employment, which are governed by the Vietnam Labor Code, the Law on Public Employees, and the Law on Civil Servants. There will be no legal transfer of their employment or engagement to the project. The Constitution and the Labor Code prohibit child labor and forced labor. The government civil servants involved in the Project are not expected to be exposed to OHS risks under the project as they will not engage in project-related civil works.

**Total number of workers.** The total number of workers is estimated at 405.

**Key labour risks.** The following are key occupational health and safety (OHS) risks anticipated and assessed during the implementation of the Project:

- Accidents due to falling: Incorrectly installed scaffolding, open walls, manholes on roadbeds, uninsured ladders and unprotected steel bars are the most common risks leading to labor accidents for construction workers.

- Risks of working on water surface: It may occur during the construction intersecting with canals, constructions of tidal sluicegates, river embankments and rehabilitation of drainage ditches.

- Falling objects: During construction process, heavy tools and equipment and supplies may fall from the high level and helmets are not effective. If the site area is not enclosed or something may fall from a crane out of the construction area, the pedestrians may also be hit by these objects.

- Accident due to ditches and trenches: During the process of excavation and construction of drainage system, collapse may occur. If the excavated material is too close to the trench, the material may fall back and cause serious injury.

- Physical injury due hard work: Back injuries caused by lifting heavy objects or improper posture.

- Risks of traffic accidents, labor accident, fire, explosion, short circuit and electric shock posed by the construction activities will also affect the safety of the community

- Heavy equipment: Injury may start from heavy equipment. The machineries may malfunction or fall down. Careless operation of the crane can cause many injuries. A forklift or excavator is also one of the common devices that cause accidents. In addition, the construction activities involving heavy machineries will be quite noisy. Loud, repetitive, and excessive noise causes long term hearing problems, such as deafness. Noise can also be a dangerous distraction and may distract the worker from the task at hand, which can cause accidents.

- Lack of awareness on occupational health and safety requirements: As it is common at work site in Vietnam, there is often a lack of use of personal protective equipment (PPE) and safe workplace practices.
- Labor disputes over terms and conditions of employment: Labor disputes in a new construction environment are common in Vietnam. Likely causes for labor disputes include demand for limited employment opportunities; labor wages rates and delays of payment; disagreement over working conditions; and health and safety concerns in work environment. In turn, there is also a risk that employers such as contractors/subcontractors may retaliate against workers for demanding legitimate working conditions, or raising concerns regarding unsafe or unhealthy work situations, or any grievances raised, and such situations could lead to labor unrest.

- Discrimination and exclusion of vulnerable/disadvantaged groups: Vulnerable/disadvantaged groups of people may be subject to increased risk of exclusion from employment opportunities under the Project. Such groups will include women and persons with disabilities. Lack of equal pay for equal work for men and women is also an issue in Vietnam. Sexual harassment and other forms of abusive behavior by workers will also have the potential to compromise the safety and wellbeing of the vulnerable groups of workers and the local communities, while adversely affecting project performance. This will also include potential sexual exploitation or harassment in recruitment or retention of skilled or unskilled female workers supported under the project.

The impact level of above risks is assessed from small to medium as: (i) the impacts are localized within the construction site and scattered in the local areas; (ii) short construction period from 15-24 months; (iii) workers are provided with protective equipment, reasonable construction time; (iv) mitigation measures for these risks have been provided in the ESCOP in ESIA and workers will be trained on labor safety, traffic safety, sanitation before starting any civil works.

❖ Impact assessment related to the labor force of the main suppliers

The main supplier of the Project will be a supplier of sand, stone and other construction materials (referred to as construction materials). Construction materials will be purchased from the suppliers in Vinh Long province or neighboring provinces. Moreover, the number of workers of the main supplier of the Project is expected to be limited as much of the work will be done mechanically. It is forecast that for the work item under the project, about 5-10 workers of the main suppliers will participate in the project. Similar to the contractor's workforce, the main supplier's workforce also has generated domestic wastewater and domestic solid waste. However, the major impacts and risks from the main supplier's workforce include but are not limited to the following:

- Risk of traffic accident may occur on the road or waterway. The main supplier's labor force mainly transports construction materials, so they will use the means of transport on road or waterway.
- There is a potential risk of a conflict between the main supplier's workforce and the contractor's workforce or the local community.
- Workers 'accidents may occur with the main suppliers' workforce.
- The main supplier's workforce may be seasonal workers, it is potential health and safety issues.

However, this indirect impacts and risks are forecasted "Low" level and can be mitigated due to: (i) The number of employees is not much; (ii) The employment time is not long; (iii) The main suppliers' workforce is regularly trained and instructed on traffic safety; (iv) They are usually local people; (v) Due diligence review on labor and working conditions of primary suppliers has been completed and monitoring requirements will also cover primary supply workers during the construction phase.
3.4.1.9. Risks during the construction phase

1. Risk from traffic accidents for both road and waterways
   - **Waterway accident due to boat collision**

   Accidents due to collision of ships transporting materials may occur in the following cases:
   - Fog, unfavorable weather, thunderstorms, and storms;
   - Vehicles traveling on waterways are not fully equipped with safety equipment and tools;
   - The means of boats and ships travelling on the waterway do not comply with the regulations on waterway traffic safety;
   - Inexperienced drivers.

   It is extremely important for cargo ships to comply with safety regulations, requiring full equipment of warning, information and signal systems and strict compliance with regulations on inland waterway safety. Drivers must have the necessary qualifications and practicing certificates.

   If risks or incidents occur, the impact is assessed to be large due to:
   - Impacts on the water environment in the canals in the project area, affecting the ecosystem due to the risk of the oil spill from vehicles.
   - Causing economic damage to vehicle owners.
   - Affecting the life and health of crew members.

   However, the level of risk is assessed to be low because the density of boats in the project area is not high (5-7 vehicles/day); moreover, the means of transportation on the canals are small vehicles. At the same time, there are large signal buoys and navigational channels in the project area, so the risk occurrence is low.

   - **Road traffic accident**

   High density of vehicles involved in transportation, unsecured vehicles or drivers who do not comply with traffic rules such as overloading, speeding, etc. can all lead to traffic accidents. During the construction phase of the project, the volume of vehicles involved in transporting raw materials has a lot of potential for traffic accidents. Therefore, it is essential to regularly check vehicles and shipping volumes to minimize accidents on roads. Besides, the investor/contractor should regularly propagate and enhance workers’ awareness of obeying traffic laws to minimize risks and accidents when driving vehicles.

   If risks or incidents occur, the drivers’ lives will be affected, causing economic losses and affecting the progress of the Project. The level of risk is assessed to be low and can be mitigated through the measures proposed in ESCOP.

2. Risks of fire, explosion and fuel leakage

   Fires and explosions can occur in situations such as: (i) fuel transportation and stores; (ii) temporary power supply systems or unsafe use of generators can cause electrical problems leading to fire; (iii) fire and explosion generated from welding and asphalt burning activities; (iv) gas leaks during cooking from worker camps; (v) the process of operating machines, welding and gasoline and diesel vehicles without complying with regulations on fire control. If a fire or explosion occurs, serious damages can be caused on:
   - Workers and local people’s life;
   - Impact on the natural environment (air, soil, biological resources, etc.);
- Impact on the psychology, causing confusion with people and local communities;
- Impacts on living condition economic and social aspects in the surrounding area;
- Damages on the project’s works and adjacent infrastructure.

Fire and exploitation can be occurred any time during construction period (from 15 to 24 months upon each works item). The impacts are assessed to be Moderate because the fire and explosion of fuel can: (i) affect workers and surrounding local people; (ii) affect water quality and construction schedule; (iii) Damage materials; (iv) Affect natural environmental and physical environment. The risks can be preventive and limited through mitigation measures. So that, a specific plan for emergency response to fire and explosion incidents at the construction site must be developed by the Contractor and the project Owner. At the same time, the contractor will carry out the fire prevention and fighting measures and strictly follow regulations on prevention of leakage, fire and explosion. Fire prevention will be regularly performed by the Contractor to minimize the incidents and negative impacts.

3. Risks of working on water

Risks of working on water surface may occur during the construction of bridges on roads intersecting with canals, constructions of tidal sluicegates, Long Ho river embankments and rehabilitation of drainage ditches. Workers will be prone to the risk. A worker is in danger of falling from a height of 2 to 10m (during construction or operation of machines and equipment) on hard surface or into water, causing injury or even death; or construction materials, machines and equipment can be felt from a height of 2 - 10m into the workers, causing injuries. This risks are originated from: (i) Carelessness of workers during construction; (ii) Failure of technical equipment, machines and scaffolding fall; (iii) unsafe equipment at the construction site; (iv) Lack of training on safety and knowledge about technology, workers are not able and knowledgeable to predict potential risks and ways to avoid accidents; (v) Workers do not wear any personal protective equipment, leading to increase in the probability of an unexpected accidents. This risk is assessed as Moderate unless appropriate mitigation measures are taken.

4. Short-circuit and electric shock

Electric shocks can occur as: (i) construction means can break existing power lines at the construction site; (ii) temporary power supply system for machines and equipment during construction cause short-circuit, electric shock, etc.; (iii) the process of unsafe use of generators. If the incidents affect the health or life of workers and people in the project area, causing damage to property, affecting the psychology of people in the area, The project Owner and the Contractor are required to develop a specific plan for emergency response of short-circuit and electric shock at the site. The contractor will regularly inspect electrical and wiring systems, provide trainings for workers on occupational safety and fire prevention to minimize the possibility of incidents and reduce negative impacts.

5. Safety and health risks

❖ Risks on community safety and health

The demolition process may generate risks accident risks for local people as well as for the workers. Labor accident, fire, explosion, short circuit and electric shock posed by the construction activities will also affect the safety of the community.

Inadequate lighting and fencing of construction sites inside of settlement areas can be dangerous for pedestrians and vehicles especially during the night time. Increasing of traffic due to trucks and vehicles movements to construction sites may cause inconvenience for local population as well. In addition, some construction/rehabilitation activities will cause temporary blockage of household access. Untimely and inefficient disposal of solid and domestic waste and improper sanitary conditions generated by the construction workers at construction sites and labor camps
may cause pollution of the surrounding environment. This creates conditions for development of flies and mosquitoes and possible outbreaks of diseases such as diarrhea, dengue fever, etc, affecting the health of the local community. Moreover, a movement of heavy tracks may destroy or deteriorate conditions of roads inside settlements.

In the construction phase, the number of workers will be increase (there will be 50 - 100 workers at each site), the medical examination and health care of the community in the medical service unit will be more difficult in the case of an epidemics such as dengue, malaria, diarrhea, conjunctivitis.

Concentration of workers can also lead to the increase in social evils such as prostitution, gambling, HIV/AIDS and other local sexually transmitted diseases.

The transporation of raw materials and wastes will contribute to increase traffic flow on existing roads, smoke, dust. Also, noise from construction activities will also pose health and safety risks to local people.

The impact level is assessed to be from small to medium as; (i) the impacts are localized in each construction area; (ii) construction period is not too long from 15-24 months; (iii) the number of workers is from 50 to 100 workers each site; moreover local labor will be prioritized by the Contractor; (iv) workers will be train on labor safety, traffic safety, sanitation. Therefore, this impacts can be minimized through ESCOPs.

❖ **Risk of security forces**

It is anticipated that during construction and operation the project contractor will retain or contract workers to provide security to safeguard its personnel and property. The experience with the Bank-financed project is that usually the contractor retains one or two persons at the construction, mainly at night to guard the construction materials and equipment, and no incident happened so far. Therefore, the risk posed by this security arrangement to those within and outside of the project site is assessed as Low. In order to avoid such risks, the contractor will be required to seek to ensure a proper procedure for recruiting and maintaining the security force at site.

❖ **Risks to worker safety and health**

Construction activities such as earthworks, leveling, loading and unloading of construction materials, operation of equipment (excavators, cranes, trucks, welding machines and concrete mixers), overhead construction, construction on water have potential risks of labor accidents, traffic accidents or the risks to workers' health unless there are appropriate control measures. In addition, the storage and use of fuels such as electricity, gas and petrol will pose risks such as electric shock, fire, explosion, gas leakage, etc. that will directly affect the health and safety of workers. Labor accident may occur during any stage of a project’s construction. Accidents in the construction phase include:

- Workers carrying out jobs on rivers (embankments, bridges across rivers, tidal sluicegates) are prone to drowning due to carelessness or tiredness or failing to comply with regulations on labor safety during construction at the site;

- Health condition: Especially workers working outdoors under extreme hot weather (in summer, the temperature can reach 38°C - 40°C)

- Operation of machines and equipment used for unloading of materials, equipment, for dredging, excavation and transportation of materials;

- Landslides in deeply excavated areas, bridge abutments, embankments;

- Injury due to insect bites, broken glass during the course of site clearance;
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- Extreme weather conditions such as heavy rain, storms, flash floods or too hot weather;
- Demolition of existing bridges: accidents may occur if people and vehicles travel on the bridge the is under demolition;
- Risk of infectious diseases, social diseases, sexually transmitted diseases

In general, the risk on the workers is characterized by: (i) the impacts are localized within the construction site and scattered in the local areas; (ii) short construction period; (iii) workers are provided with protective equipment, reasonable construction time and training on traffic safety and labor safety activities on the construction site will be arranged; (iv) fuel is stored in the area near the camps and is regularly inspected to minimize the risk of fire and explosion; (v) Training on fire prevention and fighting; (vi) Communication on prevention of infectious and sexually transmitted diseases will be implemented. These impacts can be mitigated through appropriate measures such as training on labor safety, traffic safety before and during construction and providing adequate protective equipment for workers.

In addition, safety and health non-compliance may create a risk for construction workers. The Contractors will have to follow Occupation Safety and Health rules, which include among others strictly implementation established norms and procedure health and safety which depends on type on conducting works, usage of PPE, training activities and monitoring. In addition, all workers need to be introduced to working procedure with hazardous materials (such as asbestos materials, etc.). Contractors have to provide workers with appropriate living conditions: safe water supply, washing conditions, rooms for rest and etc. Given the nature and scale of the investment and construction activities the risk and adverse impact are assessed as direct and Moderate.

❖ Coronavirus disease (COVID-19)

Delivering civil works projects requires the assembly of a workforce, together with suppliers and supporting functions and services, and may lead to congregations of a large number of people. The project may have a workforce from international, national, regional, and/or local labor markets and require workers to live in site accommodation, lodge within communities close to work sites, and/or return to their homes after works. There may be the regular coming and going of support services, such as catering, cleaning services, equipment, material and supply deliveries, and the interaction with specialist sub-contractors bought in to deliver elements of the works.

The potential for the spread of coronavirus infection by projects is high. In addition, projects may experience large numbers of the workforce becoming ill and will need to consider how they will receive treatment, and whether this will impact on local healthcare services, particularly when projects are in remote places where local healthcare facilities could be easily overwhelmed. The presence of international workers, especially if they come from countries with high infection rates, may also cause social tension between the foreign workers and local populations. Although the coronavirus outbreak in the country is under control, strict compliance with the government regulation in coronavirus prevention and control must be followed by the PMU and contractor.

6. Risks of local flooding

The earthwork, leveling activities obstruct the water drainage. At the same time, rain in the construction area may cause local flooding areas on the site. If the temporary drainage on the site is not arranged, local flooding will affect workers, surrounding people and the construction works. The prolonged local flooding will: (i) affect living conditions, production activities and travel of people and workers; (ii) lose beautiful landscape, cause poor environmental sanitation, and pose potential sources of communicable diseases; (iii) damage the works the are under
The construction areas of roads, resettlement area of ward 8, wastewater treatment plant are prone to local flooding. The risk mainly occurs during the rainy season (from September to December). The risk of local inundation is assessed to be MEDIUM because: (i) the drainage and wastewater system of Vinh Long City led in a common system which has not been completed; (ii) proposed canals to be rehabilitated have narrow bed; (iii) small urban drainage system, causing local flooding due to rapid water concentration. However, the risk can be minimized by mitigation measures.

7. Risks of raw material supply

The construction of the roads and WWTP would require substantial volume of materials (soil and sand) for ground levelling. Although the project material sources are detailed in section “1.3.5. Demand for Raw Materials, Fuels and Disposal Sites”. It is specified that materials including soil, sand and stone for construction must be obtained from licensed mines; cement, iron and steel from Vinh Long province or Can Tho city. However, some Contractors may not comply and choose the cheaper material supplies from the illegal sources. There are some risks and impacts including:

- Supply conditions and properties of materials are not met the standards for construction of work items, or will reduce the work construction quality.
- The supply is not guaranteed in quantity, affecting the implementation progress of work items under the Project.
- No guarantee of environmental conditions during the illegal exploitation of construction materials.
- There are potential risks such as labor accidents due to lack of labor protection equipment, traffic accident during the transportation process of raw materials if it is not appropriate with the proposed route for the project.

However, these indirect risks are assessed as "Low" and can be minimized due to: (i) All sources of raw materials for construction of work items must be licensed mines; (ii) Experimental conditions on construction geology are carried out before construction. This risk is short-term, only occurs during the construction period. Mitigation measures are mentioned in the next section.

3.4.2. Specific impacts

1. Impacts on water quality

The works of urban drainage system (renovating 22km of canals and ditches), embankment of Long Ho river; 09 tidal sluicegates; and 04 bridges (intersecting roads with existing canals) require excavation, backfilling, and dredging of large volume of soil. Excavation and embankment to reinforce embankments, tidal sluicegates, bridge abutments and piers as well as dredging ditches (Cau Lau canal, Cut canal, etc.) contribute to increasing suspended solid waste in the downstream. In addition, overflowing water can wash away pollutants in the area (construction materials, soil, sand, grease and waste, etc.) into nearby water bodies such as Cau Lo and Long Ho rivers, Cai Cam canal, Cau Lau, Cut or Cai Sao Lon canal, causing water pollution. This will contribute to increase in suspended substances in the water source, affecting the aquatic flora and fauna in the project. However, no endemic animals and plants need to be protected. Besides, excavation, embankment and dredging activities will take place during the dry season when water flows in rivers and ditches are at lowest. The impacts, therefore, will only occur 15 - 24 months in the course of construction of bridges, culverts and embankment and will be stopped when the works are put into operation. Therefore, the impact level is from low to moderate, temporary and can be minimized.
2. Impacts due to erosion, subsidence and damage on existing structures

During construction, a number of construction activities such as piling the embankment foot; bridges, culverts and tidal sluicegates; drilling piles for construction bridge piers/abutments; excavation of organic soils can easily cause subsidence or the risk of damages on surrounding structures. Areas with surrounding structures affected include Long Ho river embankment; tidal sluicegates No. 4, 5, 6, 7 and 9; Area of bridge construction which intersect existing roads and canals. The impact is assessed to be high in case of rains, otherwise the it is assessed to be MINOR because: (i) the construction activities usually take place in dry season; (ii) impacts are localized and short-term, the scope of impact is mainly within the construction area; (iii) pile driving and drilling activities are implemented in sparsely populated areas where the distance to surrounding structure is about 30-50m; (iv) the workers are built on stable ground. This risk can be mitigated by appropriate mitigation measures.

3. Bad smell from dredged materials

The dredging and rehabilitation of canals is carried out with a total length of 22km (improvement of the main drainage canal system in the inner city), the dredging depth ranges from 0.5 to 1.0m, an average of 0.8m. The total volume of dredged sludge is 42,000 m$^3$ (the main component is organic mud). The dredged materials will be loaded into specialized vehicles and transported to Hoa Phu and Phuong Thao disposal sites, about 13km from the project area. However, the dredging will break the current balance structure, evaporate of persistent organic compounds and some other volatile organic substances, causing an unpleasant odor. Odors
generated by anaerobic decomposition include NH\textsubscript{3}, H\textsubscript{2}S, CH\textsubscript{4}, amines, organic acids, volatile organic compounds (VOCs), etc. The smell will directly affects construction workers and people living near the project area (Ward 1, 2, 3, 4, 5, 8 and 9). In addition, the sludge contains pathogenic bacteria, viruses, along with helminths, other parasites that can affect the health of workers and local people.

![Current situation of dredging areas in canals](image)

**Figure 42: Current situation of dredging areas in canals**

- Malodors from dredged materials

According to the Cambridge Environmental Research Foundation’s study on smells based on cognitive intensity:

- Realizing odor: 1 Ou/m\textsuperscript{3}
- Light odor: 5 Ou/m\textsuperscript{3}
- Distinctive, strong odor: 10 Ou/m\textsuperscript{3}

Because of similarity in natural conditions between the dredging works and construction of similar projects in the Mekong Delta region, the odor dispersion from dredging sludge in ditches is at 5.42 - 8.42 Ou/m\textsuperscript{3}. Impact by smell from dredging activities is predicted by Screen View model and is shown in Figure 43.
Dredged sludge may have a fishy odor from organic sediments, clay sediments or the odor of NH$_3$ and CH$_4$ gases due to anaerobic digestion under water. The Screen View model is used to predict the odor dispersion of dredged materials. The results are shown in Figure 44 and Figure 45.

The results from Figure 43, Figure 44 and Figure 45 indicates:
- Bad smell from the construction site is assessed to be LOW.
- Emissions generated from dredged materials are not large that is lower than permissible
limits (200 µg/m$^3$) in QCVN 06:2009/BTNMT - National technical regulation on hazardous substances in ambient air.

Therefore, the impact of odors and emissions generated by dredged materials is assessed to be MINOR because: (i) the distance from houses to construction areas is > 50m; (ii) successive construction methods are applied, thus the impacts are localized only at the dredging site; (iii) dredged sludge is transported immediately to Hoa Phu and Phuong Thao disposal sites; (iv) the volume of dredged sludge is not large; (v) the dredging period is short that only within the construction period (about 20-24 months). At the same time, odors and emissions from dredged materials can be minimized through the implementation of a dredged material management plan that is developed in accordance with construction measures and conditions in the city.

4. Leachate from dredged material during dredging process

Total volume of sludge to be dredged is 42,000 m$^3$, the sludge is transported by special vehicles from the construction site to Hoa Phu and Phuong Thao disposal site. However, the sludge is separated from water before transportation. It is estimated to make up 20% of the total amount of dredged sludge, equivalent to 8,400 m$^3$ and 18 m$^3$/day. This separated water is channeled back to the dredged canals. According to the results of sediment monitoring in the project area, there are no sign of heavy metal contamination. The sludge leachate contains high TSS content that affects aquatic species of receiving sources.

The impact is assessed to be insignificant as: (i) the impacts are localized at the construction site; (ii) The leachate volume is not large and is channeled back to the canals with low speed and flow to minimize turbidity in the receiving source; (iii) Aquatic animals in ditches are mainly common species with little economic value; (iv) Dredging is not implemented in the period of agricultural production activities. This impact can be mitigated through the dredging material management plan developed in accordance with construction measures and conditions of the city.

5. Impacts on agricultural production activities

The project’s construction works will affect agricultural activities (rice and crops). The impacts include:

- Although construction activities are carried out in a sequential manner, the work still affect agricultural activities at various stages of seeding, planting and harvesting.
- Water overflow from the site, if not properly controlled, may pollute irrigation water and soil, affecting the crop yields.
- Construction waste and household waste that are not frequently collected can lead to sedimentation of agricultural land.
- Raw materials that are not collected and disposed indiscriminately will affect the access of
- Waste and wastewater from living activities which are not controlled will directly affect farming households.
- Excavation and embankment, construction of tidal sluicegates can increase the turbidity of the water, affecting irrigation activities.
- Construction of roads can divide agricultural production areas, local roads, affecting transportation and farming activities of local people.

Impact on agricultural production activities will be taken place by construction of roads connecting Ward 8 and Ward 9, urban main roads No. 1 and 2, and the wastewater treatment plant with capacity of 15,000 m³ per day.

However, the impact is assessed as insignificant because: (i) successive methods are applied, thus the impact is only localized within the construction area; (ii) The project Owner and Contractor must build temporary roads if the construction activities affect to accessing to agricultural land areas or trading activities for production; (iii) water supply and drainage for agricultural production areas must be planned by the project Owner and Contractor; (iv) Wastewater and waste must be collected daily by workers and local functional agencies; (v) Excavation and backfilling must be carried out in reasonable time and the time must be informed to local communities, and must not be implemented in the period of water supply for agricultural production activities; (vi) Impacts only occur during construction period and will end when the project is put into operation (15-24 months).

Roads connecting Ward 8 and Ward 9
Urban main roads No. 1
Urban main roads No. 2

*Figure 47: Current status of agricultural production*

6. **Impacts on groundwater quality**

Piling or drilling at a distance of 8 - 20 m at the points of construction of the intersection with existing roads and canals, embankments of the Long Ho River and tidal sluicegates may affect to the groundwater because

- When passing through shallow water layers (12 ÷ 20 m), a part of the pile body with bentonite containing additives will be sunk in the water layer complex. Bentonite with potential toxic additives will penetrate this complex and penetrate into the water vessels containing contaminants from piles.

- In the construction phase, contaminated surface water will overflow into the space between the void and borehole, then the groundwater will be contaminated.

The impact is assessed as MINOR because the majority of bentonite is collected to reduce the impact on surface water and groundwater. In addition, piling activities are only carried out in the dry season when water level and the water demand are low, in short term (about 1-2 weeks) and within the area.

7. ** Interruption of business activities**
The implementation of Long Ho river embankment will affect business households along 02 banks of Long Ho river, some households at the ending point of the main urban roads No.1 and No.2 (at the intersecting of Pho Co Dieu street), some households are near Thanh Duc market area (in the transport route accessing to WWTP construction area). In addition to safety risks, noise and dust from construction activities and construction equipment may interrupt the business of households (15 - 20 months of construction). However, this impact is assessed as Medium as: (i) successive methods are applied, thus the business activities are only locally affected (household scope); (ii) the impact is in short period of time (about 2-3 months for each household); (iii) when the project is put into operation, it contributes to the development of the households’ business. This impact can be mitigated through the Resettlement Action Plan prepared for the project.

![Long Ho river embankment](image1)
![Long Ho river embankment](image2)
![Long Ho river embankment](image3)

**Figure 48: Current status of business in the project area**

8. **Risks of soil erosion and landslides during construction of embankment and tidal sluicegates**

The total length of Long Ho river embankment system is 6.0km. In addition, the project area has 9 tidal sluicegates, 22km embankment length of the dredged canals under the subcomponent - improving main drainage systems in urban areas. Erosion and erosion can occur when the rainy season comes, and heavy floods with high tides will cause landslides along the river, affecting the construction site. Therefore, it is safest to work in the dry season due to very small rainfall. During the construction of embankments and tidal sluicegates, if the reinforcement is poorly carried and the construction period lasts to the rainy season, the soil become soft and subsided, posing dangerous for workers and affects the construction process. However, the impact is assessed minor as: (i) successive methods are applied; (ii) the construction activities are mainly carried out in the dry season; (iii) the scale of work items is not large; (iv) Can be mitigated through construction methods that are suitable to each work.

3.4.3. **Impacts on sensitive receptors**

The construction of the project’s works may impact on some sensitive receptors located near the construction areas, including the inconvenience of local people’s travel; Emissions and dust can become a nuisance for local people and cultural activities; Risks of traffic safety and accidents related to works. The survey results show that the project’s construction activities can
Environmental and Social Impact Assessment
Vinh Long Urban Development and Climate Resilience Project

affect not only workers and the surrounding community, but also some sensitive receptors on the road due to transportation of construction material. The impact level is assessed to be medium, temporary and mitigable. Receptors within the radius of 200 - 500 m around the project area are described as follows:

**Table 48: Impact on sensitive structures**

<table>
<thead>
<tr>
<th>Sensitive receptors</th>
<th>Descriptions</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Construction of urban drainage system:</td>
<td>no sensitive receptor</td>
<td></td>
</tr>
<tr>
<td>2. Construction of wastewater collection</td>
<td>01 sensitive receptor</td>
<td></td>
</tr>
<tr>
<td>and treatment system:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thanh Duc market</td>
<td>Located on the transportation road to the area of the wastewater treatment</td>
<td>- Dust and emissions</td>
</tr>
<tr>
<td></td>
<td>plant</td>
<td>- Noise and vibration</td>
</tr>
<tr>
<td></td>
<td>Densely populated area</td>
<td>- Solid waste</td>
</tr>
<tr>
<td></td>
<td>Do not require land acquisition</td>
<td>- Traffic jams, traffic accidents</td>
</tr>
<tr>
<td></td>
<td>The market has an area of 3,000m², with about 50 business households</td>
<td>- Obstruct the access and trading activities of local people to Thanh</td>
</tr>
<tr>
<td></td>
<td>Trading time is from 6h to 19h daily</td>
<td>Duc market</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Community conflict</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Impacts on trading and goods exchange of local people</td>
</tr>
<tr>
<td>Thanh Duc C Primary School</td>
<td>Located on the transportation road to the construction area of the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>wastewater treatment plant</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Densely populated area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Do not require land acquisition</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The area of campus is about 2,000 m², the total number of classes is 20.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The school has about 40 teachers, with over 600 students</td>
<td></td>
</tr>
<tr>
<td></td>
<td>School time: Monday - Friday, start from 6:30 am - 7:30 pm and end from,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:00 pm - 12:00 pm and 4:30 pm - 17:30 pm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Flood control in urban core areas:</td>
<td>06 sensitive receptors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cua market</td>
<td>Located on Long Ho embankment route where trading activities of local</td>
<td>- Dust and emissions</td>
</tr>
<tr>
<td></td>
<td>people are taken place</td>
<td>- Noise and vibration</td>
</tr>
<tr>
<td></td>
<td>Crowded residents surrounding Cua market</td>
<td>- Solid waste</td>
</tr>
<tr>
<td></td>
<td>Embankment of Long Ho river will affect part of Cua market area (&lt;10%),</td>
<td>- Traffic jams, traffic accidents</td>
</tr>
<tr>
<td></td>
<td>affect trading activities of local people</td>
<td>- Obstruct the access and trading activities of local people to Thanh</td>
</tr>
<tr>
<td></td>
<td>Cua market has an area of about 2,100 m². Trading time is from 17h to</td>
<td>Duc market</td>
</tr>
<tr>
<td></td>
<td>19h daily</td>
<td>- Community conflict</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Impacts on trading and goods exchange of local people</td>
</tr>
</tbody>
</table>
### Sensitive receptors

<table>
<thead>
<tr>
<th>Sensitive receptors</th>
<th>Descriptions</th>
<th>Impacts</th>
</tr>
</thead>
</table>
| Tran Phu Secondary School | - Located near Long Ho river embankment area, where is crowded residential area, about 40-50m from Long Ho embankment area  
- Do not require land acquisition  
- The area of the campus is about 1,700 m², with over 500 students  
- School time: Monday - Friday, start from 6:30 am - 7:30 pm and end from, 11:00 pm - 12:00 pm and 4:30 pm - 17:30 pm | - Dust and emissions  
- Noise and vibration  
- Traffic jams, traffic accidents  
- Obstruct parents’ approach to the teacher  
- Community conflict  
- Impact on extracurricular activities |
| Van Thanh Temple of Vinh Long | - Located near Long Ho river embankment area, where is crowded residential area, about 40-50m from Long Ho embankment area  
- Do not require land acquisition  
- Worship and ceremonies mostly take place on the first day or full moon day, on holidays and there is only 1 holy worshiping day in Van Thanh Temple area every year | - Dust and emissions  
- Noise, vibration  
- Spillage of solid waste affects the spiritual and social activities of the locals when they leave home  
- Obstruct people’s approach to the Van Thanh Temple  
- Risk of community conflict |
| Tran Quoc Toan Primary School | - Located near the area of embankment of Long Ho river, a densely populated place, about 70-80m from Long Ho embankment area  
- Do not require land acquisition  
- The area of the campus is about 1,500 m², with over 400 students  
- Students' study time takes place from Monday - Friday, starting time and ending time is between 6:30 am - 7:30 pm, 11:00 pm - 12:00 pm and 4:30 pm - 17:30 pm | - Dust and emissions  
- Noise and vibration  
- Traffic jams, traffic accidents  
- Obstruct parent’s approach to the teacher  
- Community conflict  
- Impact on extracurricular activities |
| Phap Hai Pagoda | - Located near Long Ho river embankment area, where densely populated, about 40-50m from Long Ho embankment area  
- Do not require land acquisition  
- Worship and ceremonies mostly take place on the first day or full moon day, on holidays and there is only 1 holy worshiping day in Phap Hai Pagoda area every year | - Dust and emissions  
- Noise, vibration  
- Spillage of solid waste affects the spiritual and social activities of the locals when they leave home  
- Obstruct people’s approach to the Phap Hai Pagoda  
- Risk of community conflict |
| Giac Thien Pagoda | - Located near Long Ho river embankment area, where densely populated, about 50-60m from Long Ho embankment area  
- Do not require land acquisition | - Dust and emissions  
- Noise, vibration  
- Spillage of solid waste affects the spiritual and social activities of the locals when they leave home |
### Sensitive receptors

<table>
<thead>
<tr>
<th>Sensitive receptors</th>
<th>Descriptions</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pine Pagoda</td>
<td>- Worship and ceremonies mostly take place on the first day or full moon day, on holidays and there is only 1 holy worshiping day in Pine Pagoda area every year</td>
<td>- Obstruct people’s approach to the Pine Pagoda area every year</td>
</tr>
</tbody>
</table>
| University of Economics Ho Chi Minh City – Vinh Long Branch | - Located near tidal sewer area No. 4, about 30-50m from the construction area  
- Do not require land acquisition  
- The area of the campus is about 40,000 m², with over 1500 students  
- Students’ study time takes place from Monday - Friday, starting time and ending time is between 6:30 am - 7:30 pm, 11:00 pm - 12:00 pm, 13:00 pm – 14:00 pm and 4:30 pm - 17:30 pm. In addition, there are still research activities of teachers outside of teaching hours | - Dust and emissions  
- Noise and vibration  
- Traffic jams, traffic accidents  
- Obstruct student’s approach to the teacher  
- Community conflict  
- Impact on extracurricular activities |
| Pho Minh Pagoda     | - Located near the resettlement area of Ward 8, about 100m from the construction site  
- The project does not occupy land of this project  
- There are not many people around  
- Worship and ceremonies mostly take place on the first day or full moon day, on holidays and there is only 1 holy worshiping day in Pho Minh Pagoda area every year | - Dust and emissions  
- Noise, vibration  
- Spillage of solid waste affects the spiritual and social activities of the locals when they leave home  
- Obstruct people’s approach to the Pho Minh Pagoda  
- Risk of community conflict |

In general, the impacts of project construction on sensitive works is assessed as MINOR as: (i) The distance from construction works to sensitive areas is more than 30m; (ii) short construction period (about 1-2 months); (iii) The main impacts include dust, noise and the impacts are localized and may descend with distance. These impacts can be minimized.

### 3.5. IMPACTS AND RISKS IN THE OPERATION PHASE

#### 3.5.1. General Impacts

1. **Dust and exhausted gases**

   When the roads, culverts, resettlement areas are put into use, the traffic flow rate will sharply increase. On the other hand, thanks to rehabilitation and improvement of canals, traffic flow in the canals is also increased. Thus, dust and gas emissions from the traffics on roads and...
waterway will affect the ambient air in the residential areas surrounding the project site. The impact will last throughout the operation phase. However, it is assessed to be “medium” and mitigated through: (i) the air quality in the area is quite good and has no sign of pollution; (ii) Trees along the road or in residential areas; (iii) Raise people's awareness on limiting use of fossil fuels (petrol, oil, etc.); (iv) the management and operation unit periodically waters and cleans roads; (v) Place traffic signs suitable to terrains and characteristics of each area.

2. Noise and vibration

When the roads connecting the 8th and 9th streets, urban trunk roads No. 1 and No. 2 come into operation, the source of the noise generated mainly from the transport means will affect the households living sparsely along the route. The process of transportation will certainly generate noise on the road, affecting the living environment of surrounding residential areas.

Table 49: Noise level of motor vehicles

<table>
<thead>
<tr>
<th>No.</th>
<th>Vehicle types</th>
<th>Noise (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Car</td>
<td>77</td>
</tr>
<tr>
<td>2</td>
<td>Minibus</td>
<td>84</td>
</tr>
<tr>
<td>3</td>
<td>4-stroke motorcycles</td>
<td>70</td>
</tr>
<tr>
<td>4</td>
<td>2-stroke motorcycles</td>
<td>73</td>
</tr>
</tbody>
</table>

The noise levels of vehicles on the newly constructed roads affecting the surrounding environment at distances of 50m, 100m and 200m are shown in Table 50 below:

Table 50: Maximum noise level by distance from vehicles

<table>
<thead>
<tr>
<th>No.</th>
<th>Vehicle types</th>
<th>The noise level from the source (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10m</td>
</tr>
<tr>
<td>1</td>
<td>Car</td>
<td>60.5</td>
</tr>
<tr>
<td>2</td>
<td>Minibus</td>
<td>67.5</td>
</tr>
<tr>
<td>3</td>
<td>4-stroke motorcycles</td>
<td>53.5</td>
</tr>
<tr>
<td>4</td>
<td>2-stroke motorcycles</td>
<td>56.5</td>
</tr>
<tr>
<td></td>
<td>QCVN 26:2010/BTNMT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(in the period from 6 am-9 pm)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>70 dBA</td>
</tr>
</tbody>
</table>

The calculation results show that at the position 20m or more from the point source, the noise level is within the allowed limits of QCVN 26: 2010 / BTNMT (in the period from 6 am-9 pm). Therefore, the impact of noise on the surrounding residents is assessed to be small.

3. Domestic wastewater and wastes

When the resettlement site in ward is put into operation, there will be more than 550 households with about 2000 thousand people live in, this is the main source of domestic wastewater and wastes. In addition, the domestic effluent and wastes are generated from workers operating the WWTP.

- Domestic wastewater:
It is estimated that domestic wastewater from resettlement sites is about 140 m$^3$/day to 200 m$^3$/day. As regulated, the effluent will be collected in the common drainage system of Vinh Long city; Then, it will be led to the concentrated WWTP with capacity of 15,000 m$^3$/day.

The domestic wastewater in the WWTP is estimated at 1.0 to 2.0 m$^3$/day. The effluent volume will be collected and treated in the WWTP before be discharged into the receiving sources.

- Domestic wastes:
  + The volume of wastes in the resettlement areas ranges from 600 to 1000 kg/day.
  + The volume of wastes in the WWTP is estimated at 6-10kg/day.
  + Solid wastes will be collected and treated daily by Vinh Long URENCO.

Therefore impacts of domestic wastewater and wastes in the operation phase of resettlement area is regarded as LOW because: the volume of domestic effluent and wastes is small, localized in Ward 8; (ii) wastes are daily collected by Vinh Long URENCO.

4. **Wasted sludge from periodic dredging of drainage system**

Dredged sludge from drainage system

In the course of operation of wastewater collection and treatment, sludge from wastewater collection system in Vinh Long will be dredged biannually to annually. This will help improve drainage capacity and prevent flooding in rainy season. The amount of sludge generated from the sewage drainage system includes dredging sewer sludge, dredging sludge from manholes; transporting sludge by the vehicles of about 6,312 m$^3$/year (round culvert system from D400-D1200, L= 26.3km)

Sludge from drainage system, if not being collected and treated, will affect the environment and people’s health due to: (i) the amount of sludge from the sewerage system will cause block the drainage if it is not collected periodically; (ii) non-dredged sludge is a good condition for the development of disease causing microorganisms, a source of spread of respiratory, and intestinal diseases; (iii) Stagnant of wastewater will generate odors that cause nuisance and degrade the city landscape.

However, the impact is assessed to be “Low” and controllable by collection periodically or prior to rainy season, regularly dredging the sewerage system to limit the stagnation of wastewater in residential areas.

Sludge from drainage systems in residential areas is considered as non-hazardous waste. The sludge will be collected and transported by specialized vehicles to Hoa Phu and Phuong Thao landfills and will be treated by a functional unit in accordance with existing regulations on waste management (Circular No. 36/2015/TT-BTNMT and Decree No. 38/2015/ND-CP)

**Odor from drainage system**

Odors from the stormwater and wastewater drainage system, pumping stations will affect adversely the air, mainly in the area of wastewater pumping stations and manholes. However, the volume of emitted odors is insignificant thanks to suitable technical design such as construction of submerged pumping stations and replacement of old manholes by odor-controlled manholes on urban roads. This will limit bad smells and exhausted gases generated by the decomposition of organic substances in wastewater.

The impact is rated at low level.
5. Change in ecological landscape and land use purpose

When the works come into use, the ecological landscape and environmental sanitation of Vinh Long city will be improved, because (i) the flow is expanded, reducing the risk of flooding in case of heavy rain or flooding in the area; (ii) domestic water of households will not directly released into the river but collected to the drainage pipeline; (iii) the canals will be dredged to minimize malodor and maximize environmental sanitation. The impact is positive and rated at HIGH level thanks to contribution to positive change of environmental conditions and stable living standard for local people.

Area of agricultural land along the connection road between Ward 8 and 9, urban main road 1 and 2 tends to change to urban residential area. This leads to reduction of agricultural land, influencing flood production yeild in the project area. However, the change of land use purpose will help increase the value of existing and neighboring land plots. The impact is HIGHLY appreciated that contributes to improve socio-economic aspects in the area and promote trading and service development.

However, there may be social impacts due to change of land use purpose and/or induced development (increase in solid waste, illegal use of ROW); This is considered to be a long-term issue. In the first beggining years, the impacts are assessed to be LOW, but it requiring combination with raising people’s awareness on socio-economic development and social development related issues which can mitigate potentially negative impacts on local people.

6. Risks, incidents in operation phase

Road safety is the main impacts in the course of operating connection road between Ward 8 and 9, urban main road 1 and 2 and the road behind the embankment of Long Ho river. In the first years, when rudimentary vehicles (bicycles, cargo carriers) are used mixing with motor vehicle (car, motorbike, truck) and the number of traffic accidents may increase. It can be noted that the impact will be mitigated through raising people’s awareness of regulations and practices on road use as well as monitoring and restriction of speed and behaviors of drivers. In the long-run, with high rate of traffic flow, dust, exhausted gases, noise and vibration should be paid attention but can be mitigated by long-term planning.

❖ Risk of falling into rivers, stream and drowning

The risk can be posed when going up or down the road below the embankment or at the drainage culvert along the embankment, travel through bridge, sluice gates. Then vehicles can be dropped into Cai Cam canal, Cau Lo river, Long Ho river and Cai Sao Lon river. Although in some sections, power coating steel handrail is installed with a height of 80-90cm. However, children and the elderly are in danger of falling into and drowning in rivers, canals due to slippery. This affects health or even causes life of traffic participants. Therefore, specific technical methods should be studied and added in the following stage and public consultation should be held. Thus, the design must take consideration into the aspect to prevent threats to local community in the operation phase.

❖ Erosion and subsidence

During operation, there may be incidents: (i) erosion of embanked banks, cracks of Long Ho river embankment; erosion in the abutment and tidal sluice gate; (iii) erosion and subsidence of transport roads, resettlement sites. This incidents will damage the embankment, bridge, road, infrastructure, cause dealth and affect assets of surrounding people and traffic participants. The risks are generated from (i) natural disaster, flooding and long-lasting heavy rain; (ii) construction activities that fail to meeting requirements on quality, technical and materials; (iii) overloaded transportation trucks on roads, bridges, embankments and tidal sluice gate; (iv) irregular operation and maintenance. Thus, the design must take consideration into the aspect
to prevent threats to local community in the operation phase.

3.5.2. Specific Impacts

1. Change in flow rate and drainage regime in canals

Rehabilitation of drainage system in the city’s core area with total area of 22km; the canal bed will be dredged to facilitate the flow and drainage for the city. At the same time, along 02 banks will be reinforced by soft embankment. Therefore, the flow direction of the drainage system will be changed (change in hydrology and hydraulics). Realignment and expansion of the route will create favorable for the flow, ensure good drainage in rainy season and the stability of the work. However, it has a potential of erosion, affecting production and domestic activities of people living along the canal. However, the impact is regarded as LOW because the terrain of 02 banks has not much change. This will limit erosion, invasion into people’s land area, step by step ensure living stability of local people.

2. Impacts on aquatic ecosystems

About 22km of inner canals will be dredged to remove polluted sediment and improve water quality, enhance water exchange capacity with local aquatic system). The water quality improved will contribute to better the living environment of fish, shrimps, crabs, and other aquatic species. The impact is considered to be positive to aquatic animals, especially in Tan Huu, Nga Cay, Binh Lu, Cai Cam canals.

On the other hand, the construction of 09 tidal sluice gates in these canals will interrupt the mitigation of some fish and other species. However, the impact is assessed to be “Low” because: (i) the operation of the tidal sluice gates is not discontinuous (the gates will be operated when high tides occur and cause flooding in inner city from 1-2hrs/day in flooding season); (ii) there is no rare plant and species as well as no biodiversity conservation area in the project site.

3. Impacts on waterway

Impacts on waterway during operation phase are positive because inner canals including Tan Huu, Nga Cay, Binh Lu, Cai Cam canals will be dredged and softly embanked on both sides and will be opened. It creates favorable conditions for waterway of local people. According to the survey results, the waterway mainly serves for transportation of construction materials, agricultural products and other domestic activities of local residents. The impact will be positive to and facilitate local people’s travel, trading activities and income generation.

It is worth noting that the increase in vehicle density of waterway traffics in the area will create potential impacts such as exhaust gases, dust, oil leakage in canals that will contaminate the water quality. However, the impact is assessed to be low and mitigated as local people mainly use small water transport means with local capacity and in discontinuous period.

In addition, construction of 09 tidal sluice gates on canals in Vinh Long city will cause interruption of existing waterway traffics going through these gates. However, the impact is regarded as “low” and controllable because (i) the gates only operate shortly when the high tides happen and cause flooding in the inner city; (ii) water transport means running through the canals are mainly households’ boats; (iii) there are alternative canals for local people’s travelling.

4. Impacts from operation of WWTP

❖ Impact on the water quality of receiving waters

The collection and treatment of wastewater in urban core area will help reduce a large amount of pollutants discharged into canals in the city (main canal: Cai Cam canal, Cau Lo river and Long Ho river). With a capacity of 15,000 m³/day and the treated effluent water meeting the Column B (e.g., effluent water meeting the inputs for domestic water supply) of the national
standard on industrial waste water (QCVN 14:2008/BTNMT) before being discharged in to Cai Sao Lon canal and Co Chien river, the specific amounts of pollutants reduced would be as follows: BOD5: 2.1 tons/day, TSS: 2.1 tons/day, NH₄⁺-N: 0.3 tons/day, PO₄³⁻-P: 0.04 tons/day. This will help improve the quality of water in inner regional canals in general and in the city in particular.

After treated, wastewater will be discharged into Cai Sao Lon canal, then released into Co Chien river. In the downstream area, there is no water supply activity.

Domestic wastewater of local people in the area is discharged into canals or penetrated in the ground or be retained at localized places in residential areas and decompose by itself, causing environmental pollution in these residential areas, or discharge itself into ponds, lakes and the river. The existing discharge into the Cai Sao Lon is of a small scale, distributing along the entire river section flowing through the city. It can be seen that when 15,000m³ of treated water/day is discharged into Cai Sao Lon canal, there will be a slight increase in the values of water indicators such as ammonia, PO₄³⁻. However, this increased value is only about 0.08mg/l even at lowest river levels, and the water quality is still within permitted limits QCVN 08-MT:2015/BTNMT (Column B1 – water using purpose for agricultural irrigation and waterway). Other indicators such as BOD₅ and SS would tend to decrease, improving river water quality

Heavy rains pose a risk that may affect the water quality. As the wastewater collection system is a combined one, heavy rains may cause wastewater to overflow out into the environment or may result in larger amounts of wastewater that exceed the treatment capacity of the WWTP. This would likely lead to input overload of WWTP and damages to the equipment. However, this issue has been studied in designing the collection system. Stormwater and wastewater will be collected into M1 ditch, where a constructed CSO will separate and take the stormwater to the balancing lake, and the remaining wastewater will be transmitted to the WWTP. The collection pipelines would be designed to ensure that the treatment capacity of the WWTP would not be exceeded, and the said impact can be eliminated.

❖ Offensive Odors

Odors from the wastewater treatment process are generated mainly from the treatment units where anaerobic decomposition takes place. Aerobic decomposition also generates offensive odors but at lower levels. The main gases generated from anaerobic decomposition consist of H₂S, mercaptans, CO₂, CH₄, etc. which are the main factors giving rise to mal odors.

**Table 51: Odorous compounds generated by anaerobic decomposition of wastewater**

<table>
<thead>
<tr>
<th>Compounds</th>
<th>Formula</th>
<th>Typical odor</th>
<th>Detection threshold (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amyl mercaptan</td>
<td>CH₃-(CH₂)₃-CH₂-SH</td>
<td>Unpleasant, stinking smell</td>
<td>0.0003</td>
</tr>
<tr>
<td>Ethyl mercaptan</td>
<td>CH₃CH₂-SH</td>
<td>Smell of decaying cabbage</td>
<td>0.00019</td>
</tr>
<tr>
<td>Hydrogen sulfide</td>
<td>H₂S</td>
<td>Smell of rotten eggs</td>
<td>0.00047</td>
</tr>
<tr>
<td>Methyl mercaptan</td>
<td>CH₃SH</td>
<td>Smell of decaying cabbage</td>
<td>0.0011</td>
</tr>
<tr>
<td>Propyl mercaptan</td>
<td>CH₃-CH₂-CH₂-SH</td>
<td>Unpleasant smell</td>
<td>0.000075</td>
</tr>
</tbody>
</table>
Environmental and Social Impact Assessment
Vinh Long Urban Development and Climate Resilience Project

<table>
<thead>
<tr>
<th>Sulfur dioxide</th>
<th>SO₂</th>
<th>Pungent smell</th>
<th>0.009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tert-butyl mercaptan</td>
<td>(CH₃)₃C-SH</td>
<td>Unpleasant skunk smell</td>
<td>0.00008</td>
</tr>
</tbody>
</table>


The WWTP would generate biological aerosols that can be dispersed into the atmosphere. Aerosols often contain many kinds of E. coli, enteric bacteria, and fungi which are pathogens or induce allergies through the respiratory system. Therefore, the generation and dispersion of biological aerosols can affect the air quality in the environment within the premises of the WWTP.

**Table 52: Content of bacteria dispersed from WWTP**

<table>
<thead>
<tr>
<th>Position</th>
<th>Distance</th>
<th>0 m</th>
<th>50 m</th>
<th>100 m</th>
<th>&gt; 500 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of wind direction</td>
<td>100-650</td>
<td>50-200</td>
<td>5-10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Beginning of wind direction</td>
<td>100-650</td>
<td>10-20</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>


The components of the WWTP are located fairly distantly from Thanh Duc C primary school (about 100m). There are some households at the distance of 100-150m from the plant. In normal operation conditions with a closed treatment technology and a separated buffer zone 30m away in accordance with QCVN 07:2010/BXD standards, offensive odors are not likely to exist.

The predominant winds in the WWTP area are the East and South-western wind. Down these directions, the population is quite sparse within a radius of 100m. With these wind directions, mal odors would have less impact on surrounding residential area. The dispersion of bacteria in aerosols within a distance of 50m could also give rise to the risk of contracting diseases to the community. However, the control of offensive odors and aerosols generated from the WWTP can be effectively performed with odor collection and treatment devices. Experiences from the CCESP in the Southern WWTP have shown that bad odors were not perceived in the air within the plant premises and beyond the fence.

In case of malfunctioning of the odor treatment system of the WWTP, bad odors and bacteria may be dispersed by the wind within a radius of 100m, adversely affecting residents’ and pupils’ health. Offensive odors are also much likely to badly affect the operators’ health.

The impact level is assessed to be low to medium.

❖ **Sludge from wastewater treatment plant**

Raw wastes, separated from the large-sized coarse and fine screeners, are automatically raked into a container and carried off to be treated as normal solid wastes at Hoa Phu or Phuong Thao landfill.

Sludge generated from the WWTP will be about 2.3 tons/day (for the WWTP’s capacity of 15,000m³/day). This volume of sludge would need to be treated with proper measures so as to avoid adverse impacts on the environment. As domestic wastewater normally does not contain hazardous substances, the treatment technology is biotechnology without the use of chemicals. The sludge can therefore be regarded as normal waste and can be used as fertilizer. However, during the operation of the WWTP, it will be necessary to carry out periodic sampling for
analysis to ensure this waste is without hazardous substances. In some similar WWTPs, the plant is currently doing research studies to produce fertilizer from these amounts of sludge, but the studies are still in the concept stage. Sanitary means of sludge disposal such as landfill will reduce adverse impacts associated with the sludge. Therefore, the sludge is still proposed for disposal at Hoa Phu or Phuong Thao landfill.

The volume of sludge generated from the WWTP will be transported once every month to at Hoa Phu or Phuong Thao landfill. Sludge transporting trucks must be carefully covered and thoroughly cleaned; otherwise dropping sludge may harm environmental sanitation along the route.

Another problem to be addressed is that the sludge treatment site is quite moist and provides an ideal place for flies and mosquitoes to swarm, reproduce and become a pathogenic source. Spraying to kill flies and mosquitoes is to be carried out in these areas. The health impact level is assessed to be moderate.

5. Flooding and inundation risks

Wastewater, after being treated, is discharged into the existing Cai Sao Lon canal. The wastewater leading ditch has a width of 4.0m.

Assessment on capacity of receiving treated water:

- Bottom elevation of box culvert for treated wastewater discharge: + 2.50m. Thus, in the most adverse case, treated wastewater can still be discharged into receiving waters.
- Flow rate of treated wastewater: Q=15,000m³/day = 625m³/h = 0.174 m³/s (equivalent to D800mm culverts)

Therefore, with the dimension of the existing ditch of Bmin~4m, Q=0.174m/s will raise the water level in the ditch by about 10cm, and the existing ditch can fully receive the treated water from the WWTP.

In addition, the operation of the stormwater pumping station of the Project will yield a flow rate of 40m³/s to force water pumping into the river. When the water level of Cai Sao Lon river is higher the elevation of the discharging culvert, drainage can be fulfilled with pumping. Therefore, flooding will not be likely to happen. The elevation the WWTP area will be raised to ensure flood prevention. The impact level is assessed to be low.

6. Risks of inundation from new roads

When roads come into operation, natural drainage direction in the area may be destructed, the upgraded roads can form a dyke that prevents water from drainage in case of heavy rain or in rainy season. This poses a risk of local flooding in some works, affecting (i) travelling and domestic activities of local people; (ii) long-lasting inundation may cause environmental pollution and potential diseases that influence local people’s health; (iii) affect agricultural production activities, cause damages to people’s assets.

In order to mitigate flooding impacts in the operation phase of roads, the drainage culverts across and along roads have been arranged:
- In the design, elevation of roads is considered to ensure the existing natural drainage system.
- Bridges over the intersection with water bodies are arranged.
- Construction of culverts across roads that fits to rainy intensity and run-off flow rate in the area.
- Regularly check the flooding risks so as to make additional design of drainage culverts crossing roads (if required).
- Consultation with local people in the flooding prone area to propose prompt measures.
However, specific technical methods should be studied and added in the following phases and consulted with local communities. The design must prevent threats to local people in operation phase.

7. Incidents of WWTP operation

❖ Waste discharge incidents due to possible emergencies and WWTP failure

Incidents likely to occur during the operation of the WWTP of the Project include:

- Fire and explosion of which the causes may be due to short-circuiting, fire and explosion of chemicals used in wastewater treatment;
- Power outage disrupting the operation of the WWTP;
- Malfunctioning of one of the works of the treatment system forcing stoppage of the operation, affecting the entire wastewater collection system of the city, in which case wastewater may overflow the wastewater pumping stations and overwhelm the pavements, causing localized flooding, thus damaging and causing environmental pollution;
- Other incidents which may force the WWTP to stop operating in such an emergency, untreated wastewater has to temporarily be discharged into the canal receiving wastewater beside the plant and into Cai Sao Lon canal. As a result, the receiving waters would be exposed to high risks of contamination from this source of wastewater.

Table 53: Forecast of Concentrations and load of pollutants in untreated wastewater

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Concentration (mg/l)</th>
<th>Load of 7,500m³ (kg/day)</th>
<th>Load of 15,000 m³ (kg/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOD₅</td>
<td>150</td>
<td>1,125</td>
<td>2,250</td>
</tr>
<tr>
<td>COD</td>
<td>270</td>
<td>2,025</td>
<td>4,050</td>
</tr>
<tr>
<td>TSS</td>
<td>160</td>
<td>1,200</td>
<td>2,400</td>
</tr>
<tr>
<td>NH₄ – N</td>
<td>30</td>
<td>225</td>
<td>450</td>
</tr>
<tr>
<td>Total N</td>
<td>23</td>
<td>172.5</td>
<td>345</td>
</tr>
<tr>
<td>Total P</td>
<td>7</td>
<td>52.5</td>
<td>105</td>
</tr>
</tbody>
</table>

Based on the analysis of environmental situation in Cai Sao Lon canal (Chapter 2), the surface water quality is relatively good and has not sign of pollution. At the same time, the self-cleaning capacity of the canal is good. Therefore, in the case of failure with untreated wastewater load of 7,500 m³/day (due to failure of a modulus) and 15,000 m³/day (failure of both moduluses) discharged totally into Cai Sao Lon canal, at the most adverse case, the canal is capable of receiving more wastewater, but the receiving time for parameters in the pollutants is not more than 02 days.

❖ Chemical leakage

During the WWTP operation, chlorine will be used in disinfection. Therefore, there might be risks of chlorine leakage if there are problems with the operator or management is poor. Chlorine leaked into the environment would endanger anyone getting into contact with it. At low concentrations, chlorine can bring about cause breathing difficulties, cough, nausea, skin burns or eye burns. A high concentration of 250ppm and an exposure of 30 minutes can really kill. Therefore, during the operation process, it is imperative to have measures of prevention against such risks. The impact level is assessed to be medium.

❖ Broken and blocked pipelines

Without being dredged periodically, sludge accumulating in the wastewater collection sewers
can block sewers, reducing wastewater transmission capacity. Any sewer segment, if blocked, will be likely to force accumulated wastewater overflow onto other areas, causing environmental pollution.

Heavy rains in the area would wash solid waste on the roads down into the drainage sewers, tertiary pipelines, and wastewater collecting sewers via manholes, reducing drainage capacity of the system.

Tertiary sewers may be threatened by risks of cracking, in which case incidents are more probable to take place, giving rise to badodor from the anaerobic decomposition of pollutants in wastewater. Its smell would then be dispersed, affecting the residents.

The incident of breaking joints, water and wastewater pipelines may pollute to the groundwater (for the wastewater pipeline) and causes the subsidence, affecting to infrastructures such as roads, people’s housing. Therefore, there must be plans on periodic checking and repairs.

The impact level is regarded as low.

❖ **Fire and explosion**

Fire and explosion incidents could occur due to short-circuiting, lightning strikes… in the areas of the WWTP and the stormwater and wastewater pumping stations, possibly causing damages to people and properties. Therefore, fire and explosion prevention measures will be specially taken.

❖ **Incidents at pumping stations**

During operation, problems related to pumping stations may arise such as malfunctioning or power cutoff disrupting the operation of the stations. In such instances, wastewater will accumulate and possibly overflow to outer environment, causing pollution. Or, with heavy rains, stormwater may be confined and cause flooding and inundation in the city. The impact level is assessed to be medium.

❖ **Risks and incidents caused by WWTP operation activities**

In addition to risks from the facilities and equipment operating the wastewater treatment station, there are also risks from human and funding for the operation and maintenance of the wastewater treatment plant. Risks include but are not limited to the following:

- The risk caused by operators of the wastewater treatment plant who do not follow the operating procedure guidelines developed for WWTP.
- The risk due to operators who do not have enough knowledge and skills to operate WWTP.
- The risk due to weak human resource management during WWTP operation.
- The risk because WWTP is not regularly maintained, replaced or repaired damaged machines and vehicles.
- The risk of improper collection of sludge and volume, which leads to a low WWTP treatment efficiency, and does not guarantee the current Vietnam's standard.

The above risks, if any, will reduce the effectiveness of WWTP’s wastewater treatment and affect the quality of receiving water and aquatic ecosystems. However, the risk is assessed to be small and can be mitigated: (i) The WWTP operation is carried out by knowledgeable and qualified technicians in wastewater treatment technology; (ii) The operation will be arranged alternately and there is always staff on duty to operate following the guidance process; (iii) WWTP is checked and maintained daily or immediately when incidents occur; (iv) There are always replacement machines and vehicles available in WWTP in case of damage; (v) At
3.6. CUMULATIVE IMPACTS

This section discusses the cumulative impacts of the project. In this regard, the cumulative impact under consideration is defined as two or more individual affects that, when considered together, are considerable or which compound or increase other environmental impacts. The cumulative impact from several projects result from the incremental impacts of the proposed project when added to other closely related, and reasonably foreseeable, future projects. The impacts that do not result in part from the project will not be discussed.

In this ESIA, it is considered whether the project construction and operation may contribute to cumulative impacts on the Valued Environmental and Social Components (VECs) on which other existing or future developments within or nearby the project area may also have detrimental effects.

In the development progress, Vinh Long city encounters rapid urbanization that, on the reverse side, cause traffic congestion, asynchronous infrastructure and poor management mechanism, overloaded public services, environmental pollution and complicated administrative procedures which curb the socio-economic development. Besides, the rapid development pace and the immigration of workers are posing loss of control and management of the authorities. Additionally, the urban management and development is left far behind the requirements. For solving this issue, Vinh Long city in particular and Vinh Long province in general have taken following actions: (a) preparation of socio-economic development plan of Vinh Long city in 2021-2025. (b) adjustment of the master plan of Vinh Long city by 2035, on vision to 2050. This will call for investment of investors, especially foreign groups in Vinh Long city; (c) Preparation of irrigation plan for flood control in Vinh Long city (according to the Decision No.2868/QD dated 05/12/2013 of Ministry of Agriculture and Rural Development on irrigation plan on flood control in Vinh Long city; (d) coordination with Asian Development Bank to carry out studies and propose the project on supporting Central and Local authorities in implementation of urban environmental improvement.

Investment in infrastructure projects which will be implemented on the basis of the city’s urban space development planning. The main roads in the city were completed, infrastructure has been improved and people’s living conditions are step-by-step enhanced. The infrastructure development projects have been implemented in Vinh Long city:

- Co Chien river embankment with a length of 9,000m; Vo Van Kiet road (ward 2 and ward 9); embankment of Ward 5; Vong bridge and NH1A bypass, NH1A have been under operation phase, contributing to socio-economic promotion, urban development and urbanization.

- Upgrade and scale-up of Mau Than road (Ward 3) funded by the State. Completion time: expectedly 2017-2018;

- Vo Van Kiet road, section from My Thuan new urban area to the administrative area of the province. State budget. Completion time: expectedly in 2020.

- Road to Phuoc Tho residential area and the expanded area of Mien Tay Construction University (Block B). State budget. Completion time: expectedly in 2018.


Particularly in 2018, Vinh Long PPC received a loan of WB for implementation of the Vietnam Scaling-up Upgrading Project – Vinh Long Project (SUUP-Vinh Long). According to the plan, investment works in phase I of SUUP Vinh Long will be carried out from Quarters III in 2020 to 2022 with 04 first construction packages and the phase 2 from 2022-2025. It is predicted that this time will coincide with the construction time of the UDCR project. However, the Project
brings about good effects. Accordingly, local people’s awareness on environmental protection has been raised and qualification of officials in Departments is clearly improved, especially in access to the fields related to climate change and green growth. Besides, the SUUP is prepared and developed based on valuable lessons from similar projects in the province, including: Vietnam Urban Upgrading Project (VUUP), Mekong Delta Region Urban Upgrading Project (MDR-UUP). This will help facilitate the project implementation, avoid mistakes and ensure the best performance. The SUUP’s works are very necessary and focus on disadvantages of the city and create a good platform for following works invested by the Vinh Long Urban Development and Climate Resilience Project.

The project description reveals that within the geographical scope of proposed project area, with small to medium scales that are being planned to be constructed in 2020-2025. All the planned projects are under management of Vinh Long Province. Under the cumulative impact definition, the proposed project may contribute to cumulative impact on VECs on which these projects are being constructed or planned to be constructed in next year.

According to the results of reviewing the relevant documents, consultation with the project affected communities and other stakeholders, combined with field studies, air quality and traffic safety have been identified as the key VECs which may be affected by the construction phase. Besides, the water quality, aquatic ecosystem and biodiversity are the key VECs which may be affected by the operation phase. It is assessed that the proposed project together with the projects that are being constructed or planned to be constructed in next year may not contribute to a cumulative impact on the water quality and its aquatic ecosystem and biodiversity in the project area. However, air pollution may be incremental in the project area and more traffic congestion and accident along local roadways may occur due to the current or planned construction of the other projects. Specific analysis of these cumulative impacts on these VECs is as follows:

❖ **Construction phase**

**Air quality:** Air pollution in the project area will be expected to be cumulative due to the number of projects within the proposed project area have been and will be built in the coming years. Regardless of their specific location in the project area, dust and emissions generated from excavation activities, machine operation and transportation vehicles from other projects will contribute to increased content of dust and toxic gases in the area unless the measures to control dust and gas emissions are taken. Air quality in Vinh Long city (during 2020 - 2025 period) will be affected by dust and emissions from construction activities of other projects/works in the local area, especially to Vinh Long SUUP as predicted in Table 54 and Table 55.

**Table 54: Dust emission from excavation, backfilling works under Suup Vinh Long during construction phase (from 2020 to 2025)**

<table>
<thead>
<tr>
<th>Work item</th>
<th>Construction stage (month)</th>
<th>Dust emission (kg/day)</th>
<th>Dust emission (mg/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 1 (2020-2022)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIA 01 (in Ward 2)</td>
<td>14</td>
<td>1.73</td>
<td>71</td>
</tr>
<tr>
<td>LIA 03 (in Ward 2)</td>
<td>14</td>
<td>1.55</td>
<td>66</td>
</tr>
<tr>
<td>P2-P9 road (in Ward 2 and 9)</td>
<td>24</td>
<td>10.45</td>
<td>363</td>
</tr>
<tr>
<td>Bo Kenh road (in Ward 3 and 4)</td>
<td>24</td>
<td>12.99</td>
<td>451</td>
</tr>
<tr>
<td><strong>Phase 2 (2022-2025)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIA 04 (in Ward 3)</td>
<td>14</td>
<td>2.65</td>
<td>87</td>
</tr>
</tbody>
</table>
### Work item | Construction stage (month) | Dust emission (kg/day) | Dust emission (mg/s) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vo Van Kiet road (in Ward 2 and 3)</td>
<td>24</td>
<td>8.02</td>
<td>278</td>
</tr>
<tr>
<td>Embankment Kinh Cụt (in Ward 3)</td>
<td>24</td>
<td>3.45</td>
<td>120</td>
</tr>
<tr>
<td>Embankment Cau Lau (in Ward 4)</td>
<td>24</td>
<td>1.51</td>
<td>53</td>
</tr>
</tbody>
</table>

(Source: Project implementation plan and ESIA for Vinh Long SUUP, March 2020)

Table 55: Load of Dust and gases emission generated from transportation during construction phase (from 2020 to 2025)

### Items | Quantity of transportation vehicle (trip/day) | Transportation distance (km) | Load of SO$_2$ generation (mg/m.s) | Load of NO$_2$ generation (mg/m.s) | Load of CO generation (mg/m.s) | Load of dust generation (mg/m.s) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LIA 01</td>
<td>7</td>
<td>12</td>
<td>0.000226</td>
<td>0.000995</td>
<td>0.000004</td>
<td>0.172</td>
</tr>
<tr>
<td>LIA 03</td>
<td>6</td>
<td>12.5</td>
<td>0.00194</td>
<td>0.000853</td>
<td>0.000003</td>
<td>0.147</td>
</tr>
<tr>
<td>P2-P9 road</td>
<td>26</td>
<td>12</td>
<td>0.638</td>
<td>0.000841</td>
<td>0.003695</td>
<td>0.000015</td>
</tr>
<tr>
<td>Bo Kenh road</td>
<td>32</td>
<td>14.5</td>
<td>0.785</td>
<td>0.001035</td>
<td>0.004548</td>
<td>0.000018</td>
</tr>
<tr>
<td>LIA 04</td>
<td>8</td>
<td>13.5</td>
<td>0.000259</td>
<td>0.001137</td>
<td>0.000005</td>
<td>0.196</td>
</tr>
<tr>
<td>Vo Van Kiet extended road</td>
<td>20</td>
<td>12.5</td>
<td>0.491</td>
<td>0.000647</td>
<td>0.002843</td>
<td>0.000012</td>
</tr>
<tr>
<td>Embankment of Kinh Cụt</td>
<td>15</td>
<td>13.5</td>
<td>0.368</td>
<td>0.000485</td>
<td>0.002132</td>
<td>0.000009</td>
</tr>
<tr>
<td>Embankment of Cau Lau</td>
<td>12</td>
<td>14</td>
<td>0.294</td>
<td>0.000388</td>
<td>0.001706</td>
<td>0.000007</td>
</tr>
</tbody>
</table>

(Source: ESIA for Vinh Long SUUP, 2018)

However, the survey shows that air quality in the project area is relatively good and parameters that should be noted is much lower than allowable limit. The impact is considered to be low and mitigable by mitigation measures in ESMP so that dust and emissions from the project’s construction will be controlled.

**Traffic safety:** Traffic congestion and the risks of traffic accidents, especially on NH53 (Pho Co Dieu), Dinh Tien Hoang, Tran Phu and NH1A may have a cumulative impact on traffic safety. There are roads which will mainly be used to transport materials to the construction sites and waste from sites to landfills. The increase in vehicles for the project will pose a greater risk of traffic congestion and accidents. In addition, within the project area, a number of other projects under the management of the PMU are under construction or planned for construction in the following years. The cumulative impact on traffic congestion and accidents is not only in NH53 (Pho Co Dieu,) Dinh Tien Hoang, Tran Phu, NH1A but also on other internal roads. The impact is considered moderate and can be managed by the PMU through traffic management plan proposed in the ESMP so as to address traffic congestion and traffic accidents on NH53 (Pho Co Dieu), Dinh Tien Hoang, Tran Phu, National Road 1A and internal roads.
Traffic safety risks will also increase in Vinh Long city (during 2020 - 2025 period) due to the increase in the number of vehicles participating in transportation (trucks transporting materials and wastes generated by construction activities of other projects/works in the local area, especially to Vinh Long SUUP as predicted above will increase about 71 trips/day from 2020 to 2022 and 55 trips/day from 2022 to 2025 in Vinh Long city. However, the road system is quite sustainable and synchronously that mentioned above, so this cumulative impact may be controlled by arranging the local traffic safety solutions.

**Construction and operation phase**

Water quality and aquatic ecosystems: The quality of water in canals, Co Chien, Long Ho and Cau Lo rivers in the project is considered accumulatively positively improved throughout operation phase. This is because the proposed Project would cause no significant adverse impacts on water quality and aquatic ecosystems throughout construction and operation phase. The wastewater from daily activities of Vinh Long city will be well managed through ESCOP applied in the construction phase. In the operation stage, wastewater will be collected and treated by the WWTP of the city with a capacity of 15,000 m$^3$/day. Certainly, wastewater will not be discharged in canals in the urban core area during operation, but into the sewage collection system constructed by the project.

Biodiversity: Leveling of roads, resettlement in Ward 8 and wastewater treatment plant will affect agricultural ecosystem in the Project area. However, the impact is localized and the agricultural ecosystem is paddy and shrubs with poor biodiversity. In the operation phase, green trees will be planted surrounding the WWPT, in residential area and along road sides. In addition, improvement of canals in the area will contribute to improving living environmental for aquatic species, reducing environmental pollution of canals in the area. Therefore, the impact is regarded as “low” and mitigable.

**3.7. INDUCED IMPACTS**

The induced impacts can be, due to induced actions of the project and activities that may occur if the action under assessment is implemented such as growth inducing impacts and other effects related to induced changes to the pattern of future land use or additional road network, population density or growth rate.

❖ **Embankment of Long Ho river**

After completion, the road along the Long Ho river embankment will be the attraction site for tourism and entertainment of local community. This is considered to be a social-related benefit brought about by the project. However, the operation of the embankment will create space for stores selling foods, beverage and other services. A certain of wastes and wastewater will be released, not only leading environmental pollution but also contaminating water in Long Ho river. Besides, landscape along the embankment will be affected unless sound mitigation measures to preventing the businesses along the embankment and management of wastes from entertainment activities are taken. To minimize adverse impacts, the PMU will coordinate with local authorities to set plan on sustainable socio-economic development around the Long Ho river embankment area. The impact is assessed to be Medium.

❖ **Urban main roads**

Construction of the connection road between ward 8 and 9, urban main road 1 and 2 will attract immigrated people living along the road. The land value, therefore, will be increased. This is a factor for socio-economic development.

However, the residential area of immigrated people and production facilities along the road will be formed. This will cause the community disturbance or unreal land values, leading to
community conflicts and affecting daily activities of local people.

In addition, there is part of residents living along the road. This will induce issues related to increased wastes and wastewater, affecting environmental and causing unsanitary environment and health problems if the wastes are not collected.

People living along the road can encounter the potential of traffic accidents due to formation of residential area along the roads; meanwhile the traffic signs have not been completed. Thus, people will be threatened by traffic accidents when going across the road.

In order to reduce negative impacts, the PMU will work with local authorities to manage the mechanical migration living along the road. At the same time, formation of residential areas will be managed by specific planning of Vinh Long’s functional agencies. The impact is assessed to be Medium.
CHAPTER 4. ANALYSIS OF ALTERNATIVES

The investment in urban upgrading and development in Vinh Long is completely compliant with the strategies and orientations of the Government, industries, and the Region as at the Resolution No. 142/2016/QH13; Resolution No. 07-NQ/TW; National urban Program in the period 2012-2020; the scheme “Vietnam Urban Resilient Development” in 2013-2020 and the National Action Plan on Green Growth. Besides, this project will contribute to fulfilling the socio-economic development criteria of Mekong Delta as well as Vinh Long city as described in the Socio-economic Development Master Plan in Mekong Delta by 2020 and towards 2030; the Development of Mekong Delta Region Plan by 2020 and on vision 2050; the Development of Vinh Long city Master Plan towards 2035 and socio-economic development orientation towards 2030.

The project’s investment items will make great contribution to achieving the objective of class 1 city by 2030 and helping Vinh Long confirm its important role in the key economic region of Mekong Delta, and become an administrative, economic, cultural, scientific, technical center.

Existing and future transport system includes:

- Road: HCM-Can Tho Expressway – under construction, NH1, 80, 53, 57 and PR902 connecting districts in the South of the province.
- Railway: to construct the HCM- Can Tho railway and railways of Mekong Delta provinces in the coming time.
- Waterway: Vinh Long Port and internal water way of Co Chien river and Tien river;
- Airport: about 50km from Can Tho international Airport.

Vinh Long city has a favorable condition for enhancing modern agricultural sectors and is a platform for improvement of industries and related services which will be key thrives for the city development:

- Low flooding frequency; abundant water source; fertile soil; mild climate and lots of sunshine.
- Abundant and high-quality resources: Vinh Long province has a high percentage of people at working age (about 70%), with large scale and high-qualified education system. Vinh Long residents are traditionally diligent and studious.
- Road and water way are so convenient that can easily connect to large economic centers of the region.
- Near large educational centers as Can Tho, Ho Chi Minh city.
- Have considerable tourism potential with diversified natural resources that are suitable for ecotourism promotion.
- Have available land fund for urban development: The land fund can be shifted from agricultural to urban development purpose. Its terrain is flat with relatively high elevation in comparison with other regions.

During the impact assessment of the project, the analysis of alternatives is an important stage in identifying the investment’s location, scope, design, and technology applicable for a particular project component in order to minimize the negative impacts, while at the same time maximize the positive impacts. The analysis of alternatives has been conducted in consultation with relevant stakeholders in the city for each project’s component.
4.1. “WITH” AND “WITHOUT” THE PROJECT ALTERNATIVES

If the project is not implemented, Vinh Long City continues to face the challenges of a small city being lack of adequate urban infrastructure and vulnerable to climate change and sea level rising. The situation is worsening due also to the rapid growth of population and labor force migrating from rural to urban areas. Challenges are among:

- Degradation of roads, embankments, water supply and sewage system
- Increase of different types of waste
- Increase localized floods during flooding seasons

As the existing land use purposes and the master plan on land use as well as the increase in land using level in the future, Scenarios of “With” and “without” the project are proposed as following:

**Table 56: Flooded area with scenarios of 10-year flooding**

<table>
<thead>
<tr>
<th>Types of land</th>
<th>1. a</th>
<th>1. b</th>
<th>2. a</th>
<th>2. b</th>
<th>3. a</th>
<th>3. b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total natural area</td>
<td>2660</td>
<td>2660</td>
<td>2660</td>
<td>2660</td>
<td>2660</td>
<td>2660</td>
</tr>
<tr>
<td>- Urban area including roads</td>
<td>1068</td>
<td>1068</td>
<td>1855</td>
<td>1855</td>
<td>1855</td>
<td>1855</td>
</tr>
<tr>
<td>- Urban areas and roads</td>
<td>632</td>
<td>40</td>
<td>460</td>
<td>64</td>
<td>487</td>
<td>18</td>
</tr>
<tr>
<td>- Agricultural land</td>
<td>880</td>
<td>82</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>- Commercial land</td>
<td>24</td>
<td>2</td>
<td>86</td>
<td>11</td>
<td>97</td>
<td>8</td>
</tr>
<tr>
<td>- Public buildings</td>
<td>151</td>
<td>9</td>
<td>358</td>
<td>108</td>
<td>367</td>
<td>66</td>
</tr>
<tr>
<td>- Other locations</td>
<td>30</td>
<td>3</td>
<td>52</td>
<td>16</td>
<td>54</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>1976</td>
<td>150</td>
<td>955</td>
<td>199</td>
<td>1006</td>
<td>102</td>
</tr>
<tr>
<td>Ratio %</td>
<td>59.2%</td>
<td>3.8%</td>
<td>24.8%</td>
<td>3.4%</td>
<td>26.3%</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

Notes:

- “a”: without the project
- “b”: with the project

Flooding map for 1. a

Flooding map for 1. b
According to assessment and calculation of the urban flooding risks analysis report for Vinh Long Urban Development and Climate Resilience project, the “with” project scenario will help to reduce 90% flooding risk level in comparison to the “without” scenario. EAD (Estimated Annual Damage) is the average damage level of the flooding based on some floods. Then, total damage for each flood will be multiplied to the occurrence frequency to figure out yearly flooding-incurring damage. Afterall, the sum of above results of all repeated cycles will be used to calculate annual damage of flood.

Accordingly, economic benefits are presented in the following table. Flood damage is assumed to be proportional to the population growth rate, with an annual population growth rate of about 1.03% and 1.23% per year in period 2020-2035 and in the 2016-2050, respectively.

Table 57: Economic benefits of the project for the “with” project scenario

<table>
<thead>
<tr>
<th>Year</th>
<th>Flooding damages in case of “without” the project</th>
<th>Flooding damages in case of “with” the project</th>
<th>Economic benefits for the “with” project scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>2026</td>
<td>(48,519,494)</td>
<td>(4,865,365)</td>
<td>43,654,129</td>
</tr>
<tr>
<td>2027</td>
<td>(49,019,245)</td>
<td>(4,915,479)</td>
<td>44,103,767</td>
</tr>
<tr>
<td>2028</td>
<td>(49,524,144)</td>
<td>(4,966,108)</td>
<td>44,558,036</td>
</tr>
</tbody>
</table>
The above analysis of a theoretical “without the project” case clearly demonstrates the benefits of the project.

Environmental and social issues in the cases of “with” and “without” project is displayed in the following table:

<table>
<thead>
<tr>
<th>Year</th>
<th>Flooding damages in case of “without” the project</th>
<th>Flooding damages in case of “with” the project</th>
<th>Economic benefits for the “with” project scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>2029</td>
<td>(50,034,242)</td>
<td>(5,017,259)</td>
<td>45,016,983</td>
</tr>
<tr>
<td>2030</td>
<td>(50,549,595)</td>
<td>(5,068,937)</td>
<td>45,480,658</td>
</tr>
<tr>
<td>2031</td>
<td>(51,070,256)</td>
<td>(5,121,147)</td>
<td>45,949,109</td>
</tr>
<tr>
<td>2032</td>
<td>(51,596,279)</td>
<td>(5,173,894)</td>
<td>46,422,385</td>
</tr>
<tr>
<td>2033</td>
<td>(52,127,721)</td>
<td>(5,227,186)</td>
<td>46,900,535</td>
</tr>
<tr>
<td>2034</td>
<td>(52,664,637)</td>
<td>(5,281,026)</td>
<td>47,383,611</td>
</tr>
<tr>
<td>2035</td>
<td>(53,207,082)</td>
<td>(5,335,420)</td>
<td>47,871,662</td>
</tr>
<tr>
<td>2036</td>
<td>(55,593,091)</td>
<td>(5,574,681)</td>
<td>50,018,410</td>
</tr>
<tr>
<td>2037</td>
<td>(56,276,886)</td>
<td>(5,643,249)</td>
<td>50,633,637</td>
</tr>
<tr>
<td>2038</td>
<td>(56,969,092)</td>
<td>(5,712,661)</td>
<td>51,256,431</td>
</tr>
<tr>
<td>2039</td>
<td>(57,669,812)</td>
<td>(5,782,927)</td>
<td>51,886,885</td>
</tr>
<tr>
<td>2040</td>
<td>(58,379,150)</td>
<td>(5,854,057)</td>
<td>52,525,093</td>
</tr>
<tr>
<td>2041</td>
<td>(59,097,214)</td>
<td>(5,926,062)</td>
<td>53,171,152</td>
</tr>
<tr>
<td>2042</td>
<td>(59,824,110)</td>
<td>(5,998,953)</td>
<td>53,825,157</td>
</tr>
<tr>
<td>2043</td>
<td>(60,559,946)</td>
<td>(6,072,740)</td>
<td>54,487,207</td>
</tr>
<tr>
<td>2044</td>
<td>(61,304,834)</td>
<td>(6,147,434)</td>
<td>55,157,399</td>
</tr>
<tr>
<td>2045</td>
<td>(62,058,883)</td>
<td>(6,223,048)</td>
<td>55,835,835</td>
</tr>
<tr>
<td>2046</td>
<td>(62,822,207)</td>
<td>(6,299,591)</td>
<td>56,522,616</td>
</tr>
<tr>
<td>2047</td>
<td>(63,594,920)</td>
<td>(6,377,076)</td>
<td>57,217,844</td>
</tr>
<tr>
<td>2048</td>
<td>(64,377,138)</td>
<td>(6,455,514)</td>
<td>57,921,624</td>
</tr>
<tr>
<td>2049</td>
<td>(65,168,977)</td>
<td>(6,534,917)</td>
<td>58,634,060</td>
</tr>
<tr>
<td>2050</td>
<td>(65,970,555)</td>
<td>(6,615,297)</td>
<td>59,355,259</td>
</tr>
</tbody>
</table>

The above analysis of a theoretical “without the project” case clearly demonstrates the benefits of the project.

Environmental and social issues in the cases of “with” and “without” project is displayed in the following table:

Table 58: Analysis of Alternatives - WITHOUT and WITH the project

<table>
<thead>
<tr>
<th>Key environmental and social issue</th>
<th>WITHOUT</th>
<th>WITH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental issues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flooding and high tide</td>
<td>Key urban area remains under flooding caused by high tide and precipitation.</td>
<td>With the project’s works, high tide is controlled and drainage capacity in the flooded urban area is improved thanks to hydraulic model.</td>
</tr>
</tbody>
</table>
### Key environmental and social issue

<table>
<thead>
<tr>
<th>WITHOUT</th>
<th>WITH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooding frequently occurs in the core of the project area; Hydraulic model will be used to emulate the flooding in the future with an estimated area of 1.976 ha, making up 59.2% of the project area.</td>
<td>Consequently, the flooding area reduces about 150ha, making up 3.8% of the project area.</td>
</tr>
<tr>
<td>Malodor from wastes and water stagnant in canals</td>
<td>Malodor from wastes and stagnant water will be treated Air pollution in the construction phase due to transportation of construction materials and ground leveling</td>
</tr>
<tr>
<td>Quality of surface water in canal was contaminated because of domestic wastewater from households in the area.</td>
<td>Improvement of surface water quality in canals by relocating households living along the canal; upgrade of wastewater collection system, dredging of canals.</td>
</tr>
<tr>
<td>Increased erosion due to heavy rain, climate change and high sea level</td>
<td>Mitigation of land erosion through flood control measures such as river embankment.</td>
</tr>
</tbody>
</table>

### Social issues

| Land acquisition and resettlement | Not affected by land acquisition and resettlement | Expectedly, there are about 1,800 affected households, of which 550 have to displace. |
| Interruption of daily activities of people in Vinh Long city | Not affect living conditions of people in Vinh Long city and their community relationship | Impacts on local people’s living conditions and their daily activities, community relationship due to construction activities and relocation of affected households. |
| Access to road transport and internal waterway | Frequent traffic congestion due to flooding and storms | Road and internal waterway will be more convenient for flood and tide control in the urban core area, improvement of canals by dredging and embankment. |
| Increase in land value | Low price | Once completion of the embankment, landscape of river will be improved; the embankment body will be used for advertisement of brands. The land on the banks will be utilized for parking lot, entertainment and restaurant. Therefore, the land surrounding the embankment will be used effectively and will bring high value. When roads are constructed, trade exchange will be promoted, land on both sides will be used for development of residential area, urban areas and commercial activities. Therefore, land price will be increased, creating thrive for socio-economic development. |
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<table>
<thead>
<tr>
<th>Key environmental and social issue</th>
<th>WITHOUT</th>
<th>WITH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental and community health</td>
<td>Worse environmental sanitation, increased diseases due to flooding and poor water sources: increase in respiratory disease, dengue fever, typhoid, dermatological diseases ...,</td>
<td>The environmental sanitation and community health are improved by rehabilitated water drainage capacity, controlled high tide; therefore, diseases will be reduced. Environmental sanitation and health conditions of the people will be better, especially those living along the canal.</td>
</tr>
<tr>
<td>Urban landscape</td>
<td>Poor urban landscape</td>
<td>The project will relocate households who encroach the canal banks, creating open space on both sides along with beautiful landscape: have public space, re-build traditional structures, plant green trees</td>
</tr>
<tr>
<td>Benefits</td>
<td>No</td>
<td>The project will directly benefits households in the core area of Vinh Long city (wards 1, 2, 3, 3, 5, 8 and 9). Additionally, thanks to the project, some households living in banks of Cau Lo, Long Ho rivers and in the project area will have a stable and safety shelter.</td>
</tr>
</tbody>
</table>

4.2. ALTERNATIVES FOR THE PROJECT'S WORKS

4.2.1. Wastewater collection in residential areas

There are 3 options for wastewater collection in residential areas proposed:

- Option 1: Common drainage culvert system
- Option 2: Separate drainage culvert system
- Option 3: Semi-separate drainage culvert system.

Selection of wastewater collection options will influence the technological chain and quality of treated water. Assessment of 03 above options is described below:

<table>
<thead>
<tr>
<th>No.</th>
<th>Specifications</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Technical criteria</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Effectiveness of stormwater drainage</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>Effectiveness of wastewater collection</td>
<td>Medium</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>Capacity of wastewater treatment plant</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>4</td>
<td>Concentration of pollutants in the wastewater led to the treatment plant</td>
<td>Low</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>5</td>
<td>Flow rate and quality of wastewater led to the treatment plant</td>
<td>Large</td>
<td>Small</td>
<td>Medium</td>
</tr>
</tbody>
</table>
Based on (i) Advantages and disadvantages of each options; (ii) Current situation of drainage system; (iii) Funding source for the project implementation (iv) Characteristics that the collection areas are mainly new urban areas without any drainage systems, the option of separate drainage culvert system is recommended. Also, the option is compliance with the Decision No. 1930/QD-TTg dated 20/11/2009 approving orientations for development of water drainage in Vietnamese urban centers and industrial parks up to 2025 and a vision towards 2050; and the Master Plan of Vinh Long city towards 2035, on vision to 2050.

Type of drainage system: Combine the option 2: separate drainage culvert system for new urban area which have sufficient area for construction and Option 3: semi-separate drainage system for old and narrow residential areas.

4.2.2. Construction of wastewater treatment plant

Location: The plant is located in a vacant land area in Thanh Duc commune. This location is convenient for building the plant as:

- Near the receiving source, about 3.1 km from Co Chien river;
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- Convenient for site clearance, construction in agricultural area;
- Completely compliance with the city’s planning.
- Treated wastewater quality satisfies Category A as stipulated at the QCVN 14/2008/BTNMT

Comparison and selection of treatment technology: To select suitable treatment technology, 03 technologies are proposed as follows:

a) Oxidation Ditch (OD).

b) Activated sludge process- anaerobic and aerobic advanced technology (AO).

c) Sequencing batch reactor (SBR).

Apart from the three technologies, others are widely applied in Vietnam, including: Double-Shell Tank + trickling biofilter technology and Conventional Activated Sludge System (CAS). However, only three technologies are considered because:

Double-Shell Tank + trickling biofilter has simple technology that is not suitable for high concentration of pollutants in wastewater from separate culvert system. Actually, the technology was applied in Da Lat with separate culvert system and had limited treatment effectiveness, especially treatment of Ammonium parameters. Another disadvantage recorded is the system have open tanks with natural ventilation that is hard to control bad smell.

Conventional Activated Sludge System (CAS) technology mostly has no nitrification process. Therefore, in order to satisfy the treatment requirements, an additional treatment chain should be used for radical ammonium treatment.

With three proposed technologies, the treated wastewater quality meets the standard. Thus, the most suitable technology that fulfills the criteria on land fund, stability, construction and O&M cost will be selected.

Table 60: Comparison and selection of treatment technologies

<table>
<thead>
<tr>
<th>No.</th>
<th>Criteria</th>
<th>Technology 1 Oxidation Ditch</th>
<th>Technology 2 Activated sludge process- anaerobic and aerobic advanced technology (AO)</th>
<th>Technology 3 Sequencing batch reactor (SBR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Compliance with discharging regulations</td>
<td>- Complied</td>
<td>- Complied</td>
<td>- Complied</td>
</tr>
<tr>
<td>2</td>
<td>Maintenance frequency</td>
<td>- Low frequency of equipment maintenance.</td>
<td>- Low frequency of equipment maintenance.</td>
<td>- Few equipment (pump), low frequency of equipment maintenance.</td>
</tr>
<tr>
<td>3</td>
<td>Replacement of parts and components</td>
<td>- Simple and the components can be easily purchased in the country</td>
<td>- Simple and the components can be easily purchased in the country</td>
<td>- complicated, some equipment must be imported.</td>
</tr>
<tr>
<td>4</td>
<td>Adaptability in case of increase</td>
<td>- Able to withstand load shock</td>
<td>- Prone to load shock, leading to poor</td>
<td>- Able to withstand load shock at 20 to</td>
</tr>
<tr>
<td>No.</td>
<td>Criteria</td>
<td>Technology 1 Oxidation Ditch</td>
<td>Technology 2 Activated sludge process-anaerobic and aerobic advanced technology (AO)</td>
<td>Technology 3 Sequencing batch reactor (SBR)</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------</td>
<td>-----------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>treatment effectiveness, the technology is only effective when the flow rate of effluent ranges from 50% to 120%.</td>
<td>40% of the designed flow rate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- At 140% of the design flow rate, the effectiveness is ensured thanks to large sediment area that ensure good sludge sediment process</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Construction period (from commencement date to operation date)</td>
<td>- Construction, installation and commissioning period is short</td>
<td>- Construction, installation and commissioning period is short.</td>
<td>- Construction, installation and commissioning period is short.</td>
</tr>
<tr>
<td>6</td>
<td>Construction area</td>
<td>- Large</td>
<td>- Medium.</td>
<td>- Small because there is no need to build 02 sediment tanks.</td>
</tr>
<tr>
<td>7</td>
<td>Operation mechanism</td>
<td>- Simple</td>
<td>- Simple</td>
<td>- Complicated. The devices are fully automated and preprogrammed, but it requires highly qualified personnel control the system.</td>
</tr>
<tr>
<td>8</td>
<td>Training period for staff to operate the wastewater treatment system until being proficient</td>
<td>- 30-40 days of commissioning, process control, activated sludge culture to have sludge concentration as requirements</td>
<td>- 30-40 days of commissioning, process control, microbiological culture to have sludge concentration as requirements</td>
<td>- 30-40 days of commissioning, process control, microbiological culture to have sludge concentration as requirements</td>
</tr>
</tbody>
</table>

**Economic criteria**

<table>
<thead>
<tr>
<th>9</th>
<th>Construction and equipment installation costs (by unit investment cost)</th>
<th>VND 10-12 million/m³</th>
<th>VND 17 million/m³</th>
<th>VND 16 million/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Operation and maintenance cost (by VND/m³ wastewater)</td>
<td>- Medium, about 4,400 VND/m³ wastewater.</td>
<td>- Medium, about 5,500 VND/m³ wastewater</td>
<td>- Medium, about 5,500 VND/m³ wastewater</td>
</tr>
</tbody>
</table>

Environmental criteria
Based on analyses in the table above:

Advantages of the oxidation ditch technology include: simple operation and maintenance, can get rid of total amount of nitrogen as the designed requirements. However, this technology requires a large area of land due to large size of oxidation ditch. In comparison with two remaining technologies, the oxidation ditch technology requires the largest land fund. In the case this technology is used, the existing land fund (4.5ha) of Vinh Long is only adequate for phase 1. There is no reserve land for Phase 2. Additionally, it is hard to control bad odor because it is impossible to build blocks of tanks and it uses mechanical ventilation with a stirrer. Therefore, this technology cannot be applied to Vinh Long City.

Activated sludge process- anaerobic and aerobic advanced technology (AO) requires medium land fund with simple operation mechanism. With existing land fund in Vinh Long, this technology is suitable for both phases. However, it is less flexible in treatment of multiple flows and different loads and has poor ability to withstand load shocks. On the other hand, this technology produces a large amount of wasted sludge while the land fund available for sludge disposal is very limited. Therefore, this technology is rejected.

SBR technology requires the smallest land fund among the three options above, fit to local land fund for both phases. This technology’s advantages are well treatment of all criteria, flexible in handling various different flows and loads, and easy to expand and increase treatment capacity in the future. Because the tanks are built in blocks, there is no need to build sediment tank so the construction cost is significantly lower than two remaining technologies. However, the

<table>
<thead>
<tr>
<th>No.</th>
<th>Criteria</th>
<th>Technology 1 Oxidation Ditch</th>
<th>Technology 2 Activated sludge process- anaerobic and aerobic advanced technology (AO)</th>
<th>Technology 3 Sequencing batch reactor (SBR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Quality of surrounding environment</td>
<td>- Cause bad smell due to open tank</td>
<td>- Large sludge volume - Less bad smell thanks to sealed and combined tanks.</td>
<td>- Lowest sludge volume - Less bad smell thanks to sealed and combined tanks.</td>
</tr>
<tr>
<td>12</td>
<td>Demand for raw materials and energy</td>
<td>- Use NaOCl or Ca(OCl)₂... for disinfection - Low energy consumption.</td>
<td>- Use NaOCl or Ca(OCl)₂... for disinfection. - Medium energy consumption.</td>
<td>- Use NaOCl or Ca(OCl)₂... for disinfection. - Medium energy consumption.</td>
</tr>
</tbody>
</table>

**Social criteria**

| 13  | Adaptability to regional conditions | - Depend on weather conditions if using sludge drying yard for sludge treatment | - Depend on weather conditions if using sludge drying yard for sludge treatment. | - Good adaption to various weather conditions in different regions (climate, weather). |
| 14  | Human resources for WWTP management and operation | - Not high qualification | - Medium qualification | - High qualification |
| 15  | Popularity of technology | - Popularly applied in Vietnam | - Popularly applied in Vietnam | - Popularly applied in Vietnam |

Conclusion: 

Based on analyses in the table above: 

Advantages of the oxidation ditch technology include: simple operation and maintenance, can get rid of total amount of nitrogen as the designed requirements. However, this technology requires a large area of land due to large size of oxidation ditch. In comparison with two remaining technologies, the oxidation ditch technology requires the largest land fund. In the case this technology is used, the existing land fund (4.5ha) of Vinh Long is only adequate for phase 1. There is no reserve land for Phase 2. Additionally, it is hard to control bad odor because it is impossible to build blocks of tanks and it uses mechanical ventilation with a stirrer. Therefore, this technology cannot be applied to Vinh Long City.

Activated sludge process- anaerobic and aerobic advanced technology (AO) requires medium land fund with simple operation mechanism. With existing land fund in Vinh Long, this technology is suitable for both phases. However, it is less flexible in treatment of multiple flows and different loads and has poor ability to withstand load shocks. On the other hand, this technology produces a large amount of wasted sludge while the land fund available for sludge disposal is very limited. Therefore, this technology is rejected.

SBR technology requires the smallest land fund among the three options above, fit to local land fund for both phases. This technology’s advantages are well treatment of all criteria, flexible in handling various different flows and loads, and easy to expand and increase treatment capacity in the future. Because the tanks are built in blocks, there is no need to build sediment tank so the construction cost is significantly lower than two remaining technologies. However, the
equipment cost is high due to complicated technology. As the operation and maintenance are quite complicated, only high qualified personnel can meet requirements. In return, SBR technology produces a small volume of sludge and requires a small area for sludge treatment.

Therefore, the SBR technology is proposed to use for the wastewater treatment plant with a capacity of 15,000 m$^3$/day in Vinh Long city.

### 4.2.3. Technical and technological options for embankment of Long Ho river

Analysis of embankment structure: proposed technical structures are typical embankment used for Mekong Delta and other provinces in Vietnam.

**Table 61: Comparison with technical and technological methods for embankment of Long Ho river**

<table>
<thead>
<tr>
<th>Items</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>Gravity concrete embankment wall + precast concrete reinforced embankment slope</td>
<td>Pre-stressed concrete embankment + reinforced by gabion</td>
<td>Pre-stressed concrete piles + slope with precast concrete</td>
</tr>
<tr>
<td>Advantages</td>
<td>Applied for river bank protection works in the project area and Mekong Delta. Along with existing embankment banks of Long Ho river. Piling in water is quite popular in Vietnam. Have lowest cost among proposed options.</td>
<td>Suitable to the location with limited construction area. The construction methods are simple that can be applied in deep positions.</td>
<td>Suitable to the location with limited construction area. The construction methods are simple that can be applied in deep positions</td>
</tr>
<tr>
<td>Disadvantages</td>
<td>Deep piling due to removal of soft soil. Construction of the embankment foundation can last long time depending on tidal period. It should arrange a temporary road for construction and material transportation.</td>
<td>Dimension and length of pile is large and deep. Investment cost is high and the construction period can be shortened. Temporary road should be arranged for transportation of piles, construction equipment and overweight volume. Not fit the old embankment.</td>
<td>Dimension and length of pile is large and deep. Investment cost is high and the construction period can be shortened. Temporary road should be arranged for transportation of piles, construction equipment and overweight volume. Not fit the old embankment.</td>
</tr>
<tr>
<td>Assessment Social criteria</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Environmental criteria</td>
<td>Ensure the urban landscape as it fits old embankment system and increased elevation in the future, ensuring beautiful, reliable and modern system</td>
<td>Do not ensure beautiful landscape as it does not fit old embankment system</td>
<td>Do not ensure beautiful landscape as it does not fit old embankment system</td>
</tr>
<tr>
<td>Economic criteria</td>
<td>Low cost</td>
<td>Higher than option 1</td>
<td>Higher than option 1</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Selected</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
As compared social, economic and environmental criteria, option 1 is selected because it protects the urban land scape and requires the lowest social costs.

4.2.4. Construction methods for tidal sluicegates

Table 62: Comparison of structural options and valve gate

<table>
<thead>
<tr>
<th>Items</th>
<th>Option 1: Jointing option</th>
<th>Option 2: conventional option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image</td>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>Advantages</td>
<td>Use cofferdam for construction that do not require canal dredging. Easy to combine with other structures to create beautiful landscape. Reinforce foundation of the bearing.</td>
<td>This is conventional option applied widely for works in river basins, locks with small aperture.</td>
</tr>
<tr>
<td>Disadvantages</td>
<td>This is a new option that require new technology; however, it was used for the flood control project in HCMC. The construction period is shorter than option 2.</td>
<td>This option requires rotary embankment between upstream and downstream and canal’s flow rate. As the shape is remained, the beautiful landscape is limited.</td>
</tr>
<tr>
<td>Social criteria</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Environmental criteria</td>
<td>Have fewer impacts in the construction phase as the construction period is shorter than option 2.</td>
<td>As long-time construction period, the option causes more impacts than option 1. Limited beautiful land scape</td>
</tr>
<tr>
<td>Economic criteria</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Selected</td>
<td>No</td>
</tr>
</tbody>
</table>

The option 1 is selected because it has fewer environmental impacts in the construction phase and create a special focus for Vinh Long city as well as ensure the beautiful urban landscape.

Table 63: Comparison of valve gate

<table>
<thead>
<tr>
<th>Items</th>
<th>Option 1</th>
<th>Option 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>Vertical valve gate</td>
<td>Valve with lower axis</td>
</tr>
<tr>
<td>Image</td>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
<tr>
<td>Advantages</td>
<td>Simple operation and maintenance Relatively simple installation</td>
<td>Erection of tower for operating valve gate is not required; operation system can be installed on the gate. The gate is invisible in case of not using For maintenance, entire gate will be pulled out</td>
</tr>
<tr>
<td>Items</td>
<td>Option 1</td>
<td>Option 1</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Disadvantages</td>
<td>A tower for operating the valve is required</td>
<td>It is complicated to install the gate</td>
</tr>
<tr>
<td></td>
<td>The gate will be pulled up in case of not using that affects surrounding structure.</td>
<td>The gate has medium structure and scale</td>
</tr>
<tr>
<td></td>
<td>The gate has large structural size</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Load bearing of the structure is medium</td>
<td></td>
</tr>
<tr>
<td>Social criteria</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Environmental criteria</td>
<td>Have more environmental impacts in the construction and operation phases as it requires building valve operating towers</td>
<td>Environmental impacts in the construction and operation phases as no valve operating tower is needed</td>
</tr>
<tr>
<td></td>
<td>Do not ensure beautiful urban landscape</td>
<td>Ensure beautiful urban landscape</td>
</tr>
<tr>
<td>Economic criteria</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Not selected</td>
<td>Selected</td>
</tr>
</tbody>
</table>

Option 2 will be selected because the valve with lower axis will cause fewer environmental impacts in the construction phase and create a special focus for Vinh Long city as well as ensure urban landscape.
CHAPTER 5. ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN

With the potential impacts and risks identified and assessed in Chapter 3, an Environmental and Social Management Plan (ESMP) has been prepared with the aim of impact prevention and mitigation for Vinh Long urban development and climate resilience project. Procedures for implementation, monitoring, supervision and reporting are also included in this ESMP together with Capacity building program and cost estimation. This ESMP consists of main contents as follows:

- The measures to minimize the potential environmental impacts to be incorporated into the Feasibility Study and Detailed Design, and the mitigation measures to address the adverse impacts during pre-construction, construction, and operation phases together with implementation responsibilities;
- Environmental Monitoring Program;
- The project Compliance Framework, including environmental and social supervision arrangements, fines applicable to non-compliance;
- Capacity building programs;
- Cost estimation; and
- Grievance Redress mechanism.

5.1. Mitigation Measures

5.1.1. Measures Incorporated into Feasibility Study and Detailed Design

5.1.1.1. Roads and Bridges

The following measures were considered during the preparation of the feasibility study and will be integrated in the detailed technical designs to mitigate the potential socio-environmental impacts and traffic safety risks and enhance environmental outcome during operation phase:

- Minimize site clearance requirements.
- Protect slopes with grass vegetation cover and concrete frames and/or embankments
- Install crossing and longitudinal drains to ensure the stability of the project's new roads and to avoid localized flooding risks along the new roads

5.1.1.2. Embankments

The design of the embankment operational roads along the Long Ho River and Canals allowed minimization of site clearance that affect local resident’s permanent houses while ensuring straight embankment. Consider the followings:

- There are stair cases and handrails at intervals along the embankments to maintain safe access to water fronts for local communities;
- Trees and grass would be planted along riverbanks of Long Ho River and Canals to maintain the green landscape and stabilize the canal-bank.

5.1.1.3. WWTP

To control and minimize the potential impacts of the operational phase of the wastewater treatment plant and promote environmental friendliness of the project, the following measures have been incorporated into the proposed investment project and will be implemented in the detailed design stage:

- Larsen sheet piles will be applied to reinforce and protect the slopes of pipe trenches to
prevent landslide and erosion when excavation depth is 3m or deeper

- The treatment units within the WWTP will be sited in compliance with the Vietnamese National Standard QCVN 01:2008/BXD. This standard requires the WWTP that has biological have a buffer zone of at least 30 m wide. For project, the minimum distance from some treatment units to the nearest residential buildings:

<table>
<thead>
<tr>
<th>Item</th>
<th>Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumping station</td>
<td>25 m</td>
</tr>
</tbody>
</table>

- Select the best available treatment technology to minimize generation of bad odor and better control of the sludge from the WWTP.
- To meet QCVN 01:2008/BXD requirements, the WWTP will have a buffer zone of at least 30 m (at this time) wide from the nearest residential area in which 3 - 5 m wide green corridor will be created.
- A 3 - 5 m wide green corridor and grass land will be established within the WWTP to create green landscape at the WWTP and separate the concrete buildings with the roads and residential areas near the front of the WWTP.
- Toilet, washing, and showers areas will be included in the administration building for the operators to use after working shifts. The administrative building shall be designed in such a way that maximise lighting using natural lights, water and electrical equipment will be energy-saving types.
- An Emergency Response plan has been proposed to address the causes where there is some failure in the wastewater treatment system.

5.1.2. Measures to be Implemented in Pre-construction Phase

5.1.2.1. Measures to Prevent Safety Risks related to UXO

Unexploded bombs and mines will be searched for removal right after completing the compensation for site clearance and before construction of connection road between ward 8 and 9, urban main road 1 and 2, tidal sluice, pumping stations, Long Ho river embankment and WWTP, resettlement sites in ward 8. The project owner will sign contract with competent army agencies for detection and clearance of bombs and mines (the depth at least 5.0m under the ground) at construction sites, if any.

The UXO clearance plan must be informed to local people before commencement of the clearance. No construction activities will be allowed before completion of the UXO and site handover to the PMU.

5.1.2.2. Measures to address the Impacts of Land Acquisition and Resettlement

During project preparation, resettlement consultants, technical consultants and PMUs worked together, reviewing the technical requirements and construction methods to reduce resettlement in principle (i) mitigate the impact of land acquisition on households in the project area; and (ii) prioritizing construction options that require the smallest area of land acquisition. A Resettlement Policy Framework (RPF) has been prepared as a stand-alone social document. The RPF establishes resettlement principles, organizational arrangements, funding mechanisms, and design criteria to be applied to projects to be prepared during project implementation. During project implementation, Resettlement Plans (RPs) will be prepared in line with the requirements of the RPF and government regulations. The RPs will include specific mitigation measures to address the impact of land acquisition and resettlement.

Compensation and supports given to the affected households will be based on the following key
principles:

All affected persons who have assets within or reside within the area of project land take before the cut-off date are entitled to compensation for their losses. Those who have lost their income and/or subsistence will be eligible for livelihood rehabilitation assistance based on the criteria of eligibility defined by the project in consultation with the project affected person. If, by the end of the project, livelihoods have been shown not to be restored to pre-project levels, additional measures will be provided.

**Agricultural land cost:** Compensation and support for agricultural land will follow the price list issued by the Vinh Long PPC.

**Housing construction cost:** Values of houses and other structures are determined according to the market price of construction materials at the time of determining the compensation cost in order to build a replacement house with quality and size at least as the old one, or to repair the affected part. The housing construction unit price shall comply with the decision of the Vinh Long provincial People's Committee.

**Cost of trees and farm produce:** The proposed price for compensation calculation is based on the legal regulations by Vinh Long PPC.

The table below presents mitigation measures to address potential negative environmental and social impacts during pre-construction.

**Table 64: Mitigation measures during pre-construction phase**

<table>
<thead>
<tr>
<th>Environmental and social impacts</th>
<th>Mitigation measures</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts of Land Acquisition and Resettlement</td>
<td>Implementation of approved RP in accordance with its provision</td>
<td>PMU, City People's Committee</td>
</tr>
<tr>
<td>UXO can affect health and safety of workers, staff, and local people</td>
<td>The Project owners must contract with a competent military agency to clear all UXO to the depth of five meters from the ground surface of the construction sites. The detailed plan for removal of UXO should be disclosed and informed to local people, workers in the affected area in a timely manner before UXO clearance starts.</td>
<td>PMU/contracted competent military unit</td>
</tr>
</tbody>
</table>

5.1.3. Measures to be Implemented During Construction Phase

As discussed in Chapter 3, the potential impacts and main risks that may occur during the construction include: (i) dust, emission, noise, vibration; (ii) wastewater; (iii) solid wastes and hazardous waste; (iv) Surface water quality reduction; (v) Impacts on Biological; (vi) Impacts on urban landscape; (vii) risk of erosion and landslide; (viii) risk of flooding and sedimentation; (ix) traffic disturbance and traffic safety risks; (x) impact on the existing infrastructure and related services; (xi) Disturbance to businesses and daily activities of local people; (xii) Impacts on cultural and historical resources and Chance find procedures; (xiii) Community Safety and Health; (xiv) risk to safety and health of workers and (xv) Communication to local community.

In addition, some specific impacts by each work, such as construction of bridge, tidal sluice, embankment or sensitive locations along the route, dredging and embankment the canals have also been identified.

Below are the mitigation measures to be implemented during the construction phase of the project and presented by category:
General mitigation measures presented as ESCOP (Environmental and Social Codes of Practice). ESCOP will be applied to all bid packages by the contractors and supervised by the construction supervision consultant (or Engineer).

Mitigation measure applicable to specific types of activities to be carried out; and Site-specific mitigation measures to address site-specific potential impacts and risks

Bidding documents and construction contracts of each bid package will include the entire ESCOP and specific mitigation measures by type of construction activity and location consistent with the work content in the bid package.

The contractors will be required to prepare Site-Specific Environmental and Social Management Plan (SESMP) and submit to the Construction Supervision Consultant and the project Management Unit (PMU) for review and approval at least two weeks prior to construction commencement. The SESMP will be prepared to meet the mitigation requirements described in below.

5.1.4. Environmental and Social Codes of Practice (ESCOP)

The mitigation measures for common negative impacts during the construction phase are presented in Tables in the form of Environmental and Social Codes of Practices (ESCOP). ESCOP will be included in all bidding documents and construction contracts of all bid packages to request the contractors to implement. ESCOP compliance will be supervised by the Construction Supervision Consultant (CSC) in coordination with PMU.

ESCOP, together with relevant type-specific and site-specific mitigation measures will be included in the construction contract signed between the PMU and the Contractor. In addition, each contractor will be required to prepare Site-specific Environmental Management Plan (SEMP) to cover all measures that the contractor will carry out to address potential impacts and risks associated with the works that they are contracted to implement.

1. Dust, emission, noise, vibration;
2. Wastewater management;
3. Solid wastes and Hazardous waste management;
4. Surface water quality reduction;
5. Impacts on Biological;
6. Impacts on urban landscape;
7. Risk of erosion and landslide;
8. Flooding and sedimentation;
9. Traffic disturbance and traffic safety risks;
10. Impact on the existing infrastructure and related services;
11. Social impact;
12. Impacts on cultural and historical resources and Chance find procedures;
13. Community Safety and Health;
15. Management of material stores and pits
16. Communication with local authorities.
### Table 65: Environmental and Social Codes of Practices (ESCOPs)

<table>
<thead>
<tr>
<th>Environmental –social issues</th>
<th>Mitigation measures</th>
</tr>
</thead>
</table>
| 1. Dust and exhaust emissions | - The Contractor is responsible for compliance with relevant Vietnamese legislation with respect to ambient air quality.  
- The Contractor shall ensure that the generation of dust is minimized and is not perceived as a nuisance by local residents and shall implement a dust control plan to maintain a safe working environment and minimize disturbances for surrounding residential areas/dwellings.  
- The Contractor shall implement dust suppression measures (e.g. use water spraying vehicles to water roads, covering of material stockpiles, etc.) as required.  
- Material loads shall be suitably covered and secured during transportation to prevent the scattering of soil, sand, materials, or dust.  
- Exposed soil and material stockpiles shall 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 should be used where dust levels are excessive  
- All vehicles must comply with Vietnamese regulations 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 TCVN 6438-2005: Road vehicles - Maximum permitted emission limits of exhaust gas  
- 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;  
- WB’s EHS standard |
| Vietnamese regulation | - TCVN 6438-2005: Road vehicles - Maximum permitted emission limits of exhaust gas  
- 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; |
| Responsibility | - Contractor |
| Supervised by | - PMU, CSC, IEMC |
### Environmental – social issues

<table>
<thead>
<tr>
<th>Mitigation measures</th>
<th>Vietnamese regulation</th>
<th>Responsibility</th>
<th>Supervised by</th>
</tr>
</thead>
<tbody>
<tr>
<td>quality, technical safety and environmental protection” following Decision No. 35/2005/QD-BGTVT; - There should strictly be no burning of solid wastes or construction materials (e.g. wood, rubber, oil-based rag, emptied cement bags, paper, plastic, bitumen, etc.) on site.</td>
<td>QCVN 26:2010/BTNMT: National technical regulation on noise - QCVN 27:2010/BTNMT: National technical regulation on vibration; - WB’s EHS standard</td>
<td>Contractor</td>
<td>PMU, CSC, IEMC</td>
</tr>
<tr>
<td>- Noise and vibration impacts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- The contractor is responsible for compliance with the relevant Vietnamese legislation 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. - Measures to reduce noise to acceptable levels should be implemented, including: + Selecting equipment with lower sound power levels + Installing silencers for fans + Installing suitable mufflers on engine exhausts and compressor components + Installing acoustic enclosures for equipment casing radiating noise + Installing acoustic barriers without gaps and with a continuous minimum surface density of 10 kg/m² in order to minimize the transmission of sound through the barrier</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Environmental – social issues

<table>
<thead>
<tr>
<th>Mitigation measures</th>
<th>Vietnamese regulation</th>
<th>Responsibility</th>
<th>Supervised by</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Barriers should be located as close to the source or to the receptor location to be effective</td>
<td>+ QCVN 14:2008/BTNMT: National technical regulation on domestic wastewater;</td>
<td>- Contractor</td>
<td>- PMU, CSC, IEMC</td>
</tr>
<tr>
<td>+ Installing vibration isolation for mechanical equipment</td>
<td>+ QCVN 40: 2011/BTNMT: National technical regulation on industrial wastewater;</td>
<td></td>
<td></td>
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<td>+ Limiting the hours of operation for specific pieces of equipment or operations, especially mobile sources operating through community areas</td>
<td>+ WB’s EHS standard</td>
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<td>+ Re-locating noise sources to less sensitive areas to take advantage of distance and shielding</td>
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<td>+ Siting permanent facilities away from community areas if possible</td>
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<td>+ Taking advantage of the natural topography as a noise buffer during facility design</td>
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<td>+ Reducing project traffic routing through community areas wherever possible</td>
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<td>- Developing a mechanism to record and respond to complaints</td>
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#### 2. Wastewater management

- The Contractor must be responsible for compliance with the relevant Vietnamese regulations on wastewater discharges into surroundings.
- Portable or constructed toilets must be provided on site for construction workers.
- Consider hiring local workers to reduce wastewater generation on site.
- Provide septic tanks for collecting and treating wastewater from toilets.
### Environmental – Social Issues

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| - Wastewater from kitchens, showers, sinks shall be discharged into a local sewerage system.  
- Wastewater from washing vehicles and construction equipment shall be collected into a settling pond before discharged into local drainage system.  
- At completion of construction works, wastewater collection tanks and septic tanks shall be safely disposed of or effectively sealed off. | - Decision No. 59/2007/ND-CP on solid waste management;  
- Decree No. 38/2015/ND-CP dated 24/04/2015 on waste and scrap management | - Contractor | - PMU, CSC, IEMC |

### Solid Waste Management

- Before construction, a solid waste control procedure (storage, provision of bins, site clean-up schedule, bin clean-out schedule, etc.) must be prepared by Contractors and it must be carefully followed during construction activities.  
- Before construction, all necessary waste disposal permits or licenses must be obtained.  
- Measures shall be taken to reduce the potential for litter and negligent behavior with regard to the disposal of all refuse. At all places of work, the Contractor shall provide litter bins, containers and refuse collection facilities.  
- Solid waste may be temporarily stored on site in a designated area approved by the Construction Supervision Consultant and relevant local authorities prior to collection and disposal through a licensed waste collector, for example, URENCO.  
- Waste storage containers shall be covered, tip-proof, weatherproof and scavenger proof.  
- No burning, on-site burying or dumping of solid waste shall occur.
| Environmental –social issues | Mitigation measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Vietnamese regulation                                                                 | Responsibility | Supervised by |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
|                              | - Recyclable materials such as wooden plates for trench works, steel, scaffolding material, site holding, packaging material, etc. shall 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 shall be disposed of only at sites identified and approved by the Construction Supervision Consultant and included in the solid waste plan. Under no circumstances shall the contractor dispose of any material in environmentally sensitive areas, such as in areas of natural habitat or in watercourses.                                                                                                                                                                                                                                                                                                                                 |                |                |
| 4. Hazardous waste management| - Fuels and chemicals must be safely stored in areas with impermeable ground with roofs and surrounding banks, equipped with safety warning signs located at least 20m from the camps and at the end of prevailing winds;                                                                                                                                                                                                                                                                                                                                                     | - Decree No. 38/2015/ND-CP dated 24/04/2015 on waste and scrap management                  | - Contractor   | - PMU, CSC, IEMC |
|                              | - Collect, store, and transported for treatment all hazardous wastes (road asphalt, waste oil and grease, organic solvents, chemicals, oil paints, etc.) in accordance with Circular No. 36/2015/TT-BTNMT on management of hazardous waste.                                                                                                                                                                                                                                                                                                                                                       | - Circular No. 36/2015/TT-BTNMT on hazardous waste management                              |                |                |
|                              | - Collect and temporarily store used oil and grease separately in specialized containers and place in safe and fire-free areas with impermeable floors roofs, at a safe distance from fire sources. Sign contracts with for oil and grease to be delivered to suppliers/ manufacturers                                                                                                                                                                                                                                                                                                                                                                               |                |                |
|                              | - Do not use unapproved toxic materials, including paint containing lead, asbestos, etc. ;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |                |
### Environmental – social issues

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<td>- The removal of asbestos-containing materials or other toxic substances shall be performed and disposed of by specially trained and certified workers.</td>
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<td>- Used oil and grease shall be removed from site and sold to an approved used oil recycling company.</td>
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<td>- Do not perform any maintenance (change of oil and filter) of cars and equipment outside the designated area.</td>
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<td>- Used oil, lubricants, cleaning materials, etc. from the maintenance of vehicles and machinery shall be collected in holding tanks and removed from site by an approved specialized oil recycling company for disposal.</td>
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<td>- Used oil or oil-contaminated materials that could potentially contain PCBs shall be securely stored to avoid any leakage or affecting workers.</td>
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<td>- Unused or rejected tar or bituminous products shall be returned to the supplier’s production plant.</td>
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<td>- Relevant agencies shall be promptly informed of any accidental spill or incident</td>
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<td>- Store chemicals appropriately and with appropriate labelling</td>
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<td>- Appropriate communication and training programs should be put in place to prepare workers to recognize and respond to workplace chemical hazards</td>
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<td>- Report all incidences of oil spills immediately and prevent any risks of oil spills</td>
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### Environmental – social issues

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<td>-</td>
<td>Prepare and initiate a remedial action following any spill or incident. In this case, the contractor shall provide a report explaining the reasons for the spill or incident, remedial action taken, consequences/damage from the spill, and proposed corrective actions.</td>
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<td>-</td>
<td>In the event that accidental leakage or spillage of diesel/chemicals/chemical wastes takes place, the following response procedures shall be followed immediately by the Contractor(s):</td>
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<td>+ The person who has identified the leakage/spillage shall immediately check if anyone is injured and shall then inform the Contractor(s), Supervision Engineer and PMU;</td>
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<td>+ The Contractor(s) shall ensure any injured persons are treated and assess what has spilled/leaked;</td>
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<td>+ Should the accidents/incidents generate serious environmental pollution (e.g. spillage / leakage of toxic or chemicals, large scale spillage / leakage, or spillage / leakage into the nearby water bodies, the Contractor shall immediately inform PMU;</td>
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<td>+ In such cases, the Contractor(s) shall take immediate action to stop the spillage / leakage and divert the spilled / leaked liquid to nearby non-sensitive areas;</td>
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<td>+ The Contractor(s) shall arrange maintenance staff with appropriate protective clothing to clean up the chemicals/chemical waste. This</td>
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|                              | may be achieved through soaking with sawdust (if the quantity of spillage/leakage is small), or sand bags (if the quantity is large); and/or using a shovel to remove the topsoil (if the spillage/leakage occurs on bare ground); and  
+ Depending on the nature and extent of the chemical spill, evacuation of the activity site may be necessary;  
+ Spilled chemicals must not be flushed to local surface drainage systems. Instead, sawdust or sandbags used for clean-up and removed contaminated soil shall be disposed of by following the procedures for chemical waste handling and disposal already described;  
- The Contractor(s) shall prepare a report on the incident detailing the accident, clean up actions taken, any pollution problems and suggested measures to prevent similar accidents from happening again in future. The incident report shall then be submitted to the Supervision Engineer and PMU for review and keep in the records. The incident report shall also be submitted to DONRE, if required. | - QCVN 14:2008/BTNMT: National technical regulation on domestic wastewater;  
- QCVN 08-MT: 2015/BTNMT: National technical regulation on surface water; | - Contractor | - PMU, CSC, IEMC |

5. Water pollution - The Contractors are responsible for controlling surface water quality when discharging it out of construction sites, in accordance with QCVN 08-MT:2015/BTNMT and QCVN 14:2008/BTNMT;  
- Store used and unused oil and petrol on impermeable grounds covered with roofs, with warning (flammable and danger) signs, and contained within surrounding fences for easy access. | - QCVN 14:2008/BTNMT: National technical regulation on domestic wastewater;  
- QCVN 08-MT: 2015/BTNMT: National technical regulation on surface water; | - Contractor | - PMU, CSC, IEMC |
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<td>control and collection in case of leakage. Locate oil and petrol storage areas at least 25m from any ponds, lakes, rivers, and streams. Restrict accessibility to these temporary storages to only authorized persons; - Perform concrete mixing on impermeable ground only, at least 20m far from any water sources. Collect wastes and wastewater containing cement at sedimentation traps and drainage ditches regularly to limit number of solids entering receptors; - Maintain vehicles and replace oil at designated workshops only. Do not perform these activities at sites; - Collect and keep used/waste oil and materials polluted with oil/chemicals in containers, store in safe places (on impermeable grounds, roofed, fenced and with warning signs) for regular collection by licensed dealers; - Carry out concrete mixing on impermeable grounds only. Collect wastes and wastewater containing cement at the sedimentation traps and drainage ditches regularly to limit number of solids entering receptors; - Provide sedimentation pits and ditches at big construction sites; - Provide appropriate toilets for the workers; - Avoid carrying out excavation and backfilling in rainy weather; - Collect and transport materials and wastes generated during excavation and backfilling</td>
<td>- QCVN 40: 2011/BTNMT: National technical regulation on industrial wastewater; - WB's EHS standard</td>
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### Environmental –social issues

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<td>materials to designated sites for reuse or final disposal as soon as possible; - Collect and transport excavated soil out of construction sites within 24 hours. Dredged materials must be transported away from temporary disposal sites as soon as they are dry sufficiently; - Maintain vehicles and equipment, including oil replacement or lubrication, at designated areas only. Ensure that no chemicals, petrol, oil, or grease are leaked into the soil, drains or water sources. Use trays to hold rags and materials used in maintenance. Collect and dispose wastes in accordance with hazardous waste management requirements.</td>
<td>- Environment Protection Law 55/2014/QH13</td>
<td>- Contractor</td>
<td>- PMU, CSC, IEMC</td>
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### 6. Impacts on Biological

- The Contractor shall prepare a Clearance, Re-vegetation and Restoration Management Plan.
- Avoid disturbances and damage to the existing vegetation and green trees.
- Do not load materials and wastes at places having vegetation cover. Load them on barren land instead;
- If trees can be replanted somewhere, move them instead of cutting the trees down;
- If any invasive species are found during construction phase, burn them before disposed of to prevent them from regrowing at disposal site;
- Chemicals must not be used to clear vegetation;
- Minimise the areas disturbed, especially in locations having trees or vegetation; Determine areas to be undisturbed for protection during construction.
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<td>- Do not remove or damage the vegetation without direct instructions.</td>
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<td>- Do not hurt, trap, feed or harm any animal - including birds, frogs, snakes, etc.</td>
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<td>- Do not cut trees outside the approved construction area for any reason</td>
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<td>- Do not buy any wildlife for food;</td>
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<td>- Birds and animals must not be kept in cages in camps</td>
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<td></td>
<td>- No collection of firewood.</td>
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<td>- Do not burn litter that damages vegetation.</td>
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<td>- Limit disturbances to areas with construction operations, especially in locations covered with green trees or vegetation.</td>
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<td>- Do not gather materials and wastes at places covered with vegetation or with green trees, but on vacant land instead.</td>
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<td>- Trees cannot be cut down unless explicitly authorized in the vegetation clearing plan.</td>
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<td>- When needed, temporary protective fencing will be erected to efficiently protect the preserved trees before commencement of any works within the site.</td>
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<td>- The Contractor shall ensure that no hunting, trapping, shooting, poisoning of fauna takes place.</td>
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### 7. Impacts on urban landscape and beauty

- Place the signboard “Sorry to disturb” at the construction sites located in popular areas;
- Keep the disturbed areas to be minimal; re-establish vegetation covers as soon as construction is completed;

- Law on environmental protection No. 55/2014/QH13
- TCVN 4447:1987 Construction regulation
- Contractor
- PMU, CSC, IEMC
### Environmental and Social Impact Assessment

**Vinh Long Urban Development and Climate Resilience Project**

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<td>- All facilities are maintained in neat and tidy conditions and the sites shall be kept free of litter; - Fence the construction sites with solid materials if the construction sites are exposed to sensitive sites or exposed to tourist areas; - Do not load construction materials or wastes within 10 m from the gates of any public buildings or cultural structures such as government offices, temples, schools, etc.; - Collect and transport excavated materials and construction wastes to the disposal sites within 24 hours; - Clean up the construction sites daily if the sites are located in populated areas; - Wash vehicles periodically to prevent dust dispersion onto roads.</td>
<td>- Circular No. 22/2010/TT-BXD on construction safety</td>
<td>- Contractor</td>
<td>- PMU, CSC, IEMC</td>
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### 8. Sedimentation, erosion, flooding, subsidence

**Management of Flooding Risks**
- Periodically and thoroughly remove soils, stones and wastes from drainage sewers and ditches inside and around the construction site.
- Neatly gather materials and wastes so as to limit them being swept away by stormwater.
- Carry out ground levelling and rolling after discarding materials at disposal sites.
- Install supports to protect the walls where excavation is deeper than 2 m.
- Check the existing drains within and surrounding the construction sites, improve before levelling to ensure rainwater can be drained properly.
- Load construction material and wastes at least 10 m from any existing drainage ditches or water.

- Circular No.22/2010/TT-BXD on construction safety
- QCVN 08-MT:2015/BTNMT – National technical regulation on surface water quality;
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<td>Sources to minimise materials from entering the channels which may lead to sedimentation and blockage; - Clean up the existing drains regularly. <strong>Sedimentation Control</strong> - Transport the waste out of the site within the shortest time possible but this operation should not last more than 2 days; - Install and maintain sedimentation traps within and/or surrounding centralised construction sites. Remove the soil, stone and waste periodically from the traps to maintain their functions; - Gather the materials and waste neatly to limit the amount of materials being swept away by stormwater; - Carry out levelling and rolling after waste disposal at the disposal sites in order to minimise erosion; - Use Larsen sheet piles for protecting the walls/slopes when excavation is deeper than 2.5m. Reinforcing piles must be checked and maintained to ensure stability of excavated trenches and holes; - Levelling the disturbed areas to prevent erosion; - Strictly avoid disturbance or damages to the existing vegetation and trees. <strong>Measures to Control Subsidence</strong> - Limit disturbances to construction areas, especially in locations currently with green trees or vegetation; - Use Larsen sheet piles for building prop walls when excavation is performed to a depth of 2.5m and more;</td>
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<td>- Reinforce weak slopes and protect them with sandbags when there are high risks of erosion and landslides or in case of visible gully erosion.</td>
<td>- 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 labor safety in construction</td>
<td>- Contractor</td>
<td>- PMU, CSC, IEMC</td>
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#### 9. Traffic management

- Install and maintain sign boards, fences, signal lights to direct traffic to ensure traffic safety. Ensure adequate lighting at night time;
- Only use vehicles with valid registration. Trucks must be covered to prevent materials from dropping along the routes to cause dusts and accidents; Arrange and provide separate passageway with safe and easy access for pedestrian and for people with disability and mobility issues especially the areas in proximity of schools, including easy wheel chair access and hand rail. Make staff available any time for helping people with disability if needed.
- Set up traffic and maintain instruction signs and warnings to secure safety for people and means of transport during construction.
- Put speed limit signs at a distance of 200m from the construction site.
- Carefully cover materials on trucks. Do not load to a height of 10cm higher than the truck body so as not to spill out and scatter materials onto roads, giving rise to dust and endangering road users. Collect spilt soils and materials at the construction site each day to avoid slippery incidents for vehicles.
- Do not park vehicles in the roads longer than necessary. Do not allow construction vehicles and materials to encroach upon the pavements.
- Water the roads to prevent dust, limit the speed of
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<td>traveling trucks, do not allow flared horns, and do not dispose the waste and wastewater onto areas near office areas of the existing universities under UD.</td>
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<td>- Install night lighting of all construction sites.</td>
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<td>- Significant increases in number of vehicle trips must be covered in a construction plan previously approved. Routing, especially of heavy vehicles, needs to take into account sensitive sites such as schools, hospitals, and markets.</td>
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<td>- Installation of lighting at night must be done, if necessary, to ensure safe traffic diversion.</td>
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<td>- Avoid material transportation for construction during rush hours.</td>
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<td>10. Impacts on existing infrastructure and services</td>
<td>- Planned and unplanned interruptions to water, gas, power, internet services: the Contractor must undertake prior consultation and contingency planning with local authorities about the consequences of a particular service failure or disconnection.</td>
<td>- Decree No. 167/2013/ND-CP on administrative penalty for violations related to social security, order and safety issues</td>
<td>- Contractor</td>
<td>- PMU, CSC, IEMC</td>
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<td>- Coordinate with relevant utility providers to establish appropriate construction schedules.</td>
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<td>- Provide information to affected households on working schedules as well as planned disruptions (at least 5 days in advance).</td>
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<td>- The contractor should ensure alternative water supply to affected residents in the event of disruptions lasting more than one day.</td>
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<td>- Any damages to existing utility systems of cable shall be reported to authorities and repaired as soon</td>
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| 11. Social impacts           | - Conduct temporary residence for workers with local authorities;  
- Inform the community of commencement date 02 weeks in advance. In case of water and power outage for construction, affected will be notified 02 days in advance by the PMU.  
- Limit construction activities at night. If construction at night is unavoidable or interruption to service supply (water and power cut-off), the community must be informed at least 02 days in advance and the information will be repeated 1 day.  
- Place planks on constructed ditches which was completed but not reinstated for travelling along the construction route.  
- Use local labors to implement simple jobs. Training on environmental sanitation, safety and health of workers before assigning jobs. Nonlocal workers must be introduced with custom, traditions in the area to avoid community conflicts.  
- Prepare conducts codes and request workers to comply with:  
  - Use PPE during working period  
  - Only smoke in regulated areas  
  - The following activities will be banned:  
    - Storing and using weapons and poisons  
    - Cutting trees outside the construction area, burning | - Decree No. 167/2013/ND-CP on administrative penalty for violations related to social security, order and safety issues | - Contractor | - PMU, CSC, IEMC |
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<td>fire, burning waste and plants after clearing (except for invasive plants, but there must be agreed by the Environmental Specialist in the supervision consulting team and PMU)</td>
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<td></td>
<td>- Using alcohol in working period</td>
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<td>- Fighting</td>
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<td>- Participating in gambling and social evils such as drugs, prostitution</td>
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<td>- Littering waste</td>
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<td>- Operate vehicles, motorbike and construction means without tasks assigned.</td>
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<td></td>
<td>- Maintenance of vehicles, construction machines and equipment outside the permitted area;</td>
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<td>Child labor and forced labor:</td>
<td>The minimum age of project workers eligible for any jobs provided by Vinh Long project (including construction works) is 18</td>
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<td></td>
<td>The contractor shall not employ child labor and forced labor, which consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labor, such as indentured labor, bonded labor or similar labor-contracting arrangements</td>
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<td>To prevent the participation of underage workers, all contracts must integrate the provisions on worker’s age commitment, including penalties for non-compliance. The contractor shall maintain a list of contracted workers with their age.</td>
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<tr>
<td>Gender equality:</td>
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Jobs of workers under Vinh Long city will be based on the gender equality and will have no discrimination for any gender-related employment, recruitment, conditions for recruitment (including jobs, salary and benefits), termination and access to training courses.

In order to address the risk of excluding vulnerable groups (such as women and people with disabilities) from employment opportunities, the Contractors are required to recruit such groups as part of unskilled employees.

Contractors will be required to comply with the National Law on gender equality in the workplace, which includes adequate and appropriate maternity and nursing leave; and restrooms and toilets must be separate from men and women.

Contractors will also be requested to address potential sexual exploitation or harassment issues in recruiting or keeping skilled or unskilled female workers for supporting the project.

**The main supplier's workforce:**
- Give priority to recruiting local labor.
- Ensuring the workforce is contracted under the current regulations.
- Training and raising the awareness of the local people in traffic to limit risks and accidents.

If the Contractor discovers archaeological 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

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<tr>
<td>- Jobs of workers under Vinh Long city will be based on the gender equality and will have no discrimination for any gender-related employment, recruitment, conditions for recruitment (including jobs, salary and benefits), termination and access to training courses.</td>
<td>- Law on Cultural Heritage (2002)</td>
<td>- Contractor</td>
<td>- PMU, CSC, IEMC</td>
</tr>
<tr>
<td>- In order to address the risk of excluding vulnerable groups (such as women and people with disabilities) from employment opportunities, the Contractors are required to recruit such groups as part of unskilled employees.</td>
<td>- Law on Cultural Heritage (2009) for supplementary</td>
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<tr>
<td>- Contractors will be required to comply with the National Law on gender equality in the workplace, which includes adequate and appropriate maternity and nursing leave; and restrooms and toilets must be separate from men and women.</td>
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<tr>
<td>- Contractors will also be requested to address potential sexual exploitation or harassment issues in recruiting or keeping skilled or unskilled female workers for supporting the project.</td>
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12. Control of impacts on physical cultural resources

<p>| 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 | - Law on Cultural Heritage (2002)                                                  | - Contractor              | - PMU, CSC, IEMC             |</p>
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<td>chance find;</td>
<td>- Delineate the discovered site or area; - Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the Department of Culture, Sport and Tourism 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 should 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 shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration and salvage; - If the cultural sites and/or relics are of high value and site preservation is recommended by the professionals and required by the cultural relics authority, the Project’s Owner will need to make necessary design changes to accommodate the findings.</td>
<td>and reformation - Decree No. 98/2010/ND-CP for supplementary and reformation</td>
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<td>request and preserve the site;</td>
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<td>- Decisions concerning the management of the finding shall be communicated in writing by relevant authorities;</td>
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<td>- Construction works could resume only after permission is granted from the responsible local authorities concerning safeguard of the heritage.</td>
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### 13. Community’s safety and health

- The Contractor will have to conform to regulations in Circular No. 04/2017/TT-BXD by the Ministry of Construction on safety in construction.
- The Project owner and contractor are to cooperate closely with the local government in performing effective community sanitation in case of epidemic symptoms breaking out in the area.
- The Project owner and contractor are to cooperate with local authorities in preventing and fighting against social evils.
- Do not disturb or cause trouble to community
- Fence of excavation pits and open channels and make off with luminous cordon and warning signs. Provide sufficient lighting when carry out construction at night.
- Limit the speed of transport means to 20km/h within 200m from the construction site so as to minimize dust and noise.
- Keep noise-generating machines and vehicles at such suitable distances that noise transmitted to residential areas will not be higher than 70dBA.
- Use static compacting when the road base is constructed near areas with many households and
- Circular No. 22/2010/TT-BXD on construction safety
- Directive No.02 /2008/CT-BXD on safeguards and sanitation in construction units
- TCVN 5308-91: Technical regulation on safety in construction
- Decision No 96/2008/QD-TTg on clearance of UXOs
- Contractor
- PMU, CSC, IEMC
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<td></td>
<td>weak temporary works to restrict vibration.</td>
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<td></td>
<td>- The Project will cooperate with the local health agency in developing and implementing plans for control of diseases among workers.</td>
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<tr>
<td><strong>Basic protective measures against COVID-19</strong></td>
<td>1. Health care settings</td>
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<td></td>
<td>• <strong>Minimize Chance of Exposure (to staff, other patients and visitors)</strong></td>
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<td></td>
<td>- Upon arrival, make sure patients with symptoms of any respiratory infection to a separate, isolated and well-ventilated section of the health care facility to wait, and issue a facemask</td>
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<td>- During the visit, make sure all patients adhere to respiratory hygiene, cough etiquette, hand hygiene and isolation procedures. Provide oral instructions on registration and ongoing reminders with the use of simple signs with images in local languages</td>
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<td></td>
<td>- Provide alcohol-based hand sanitizer (60-95% alcohol), tissues and facemasks in waiting rooms and patient rooms</td>
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<td></td>
<td>- Isolate patients as much as possible. If separate rooms are not available, separate all patients by curtains. Only place together in the same room patients who are all definitively infected with COVID-19. No other patients can be placed in the same room.</td>
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<td>• <strong>Adhere to Standard Precautions</strong></td>
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<td></td>
<td>- Train all staff and volunteers to undertake standard precautions - assume everyone is potentially infected and behave accordingly</td>
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<tr>
<td>- Minimize contact between patients and other persons in the facility: health care professionals should be the only persons having contact with patients and this should be restricted to essential personnel only</td>
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<td>- A decision to stop isolation precautions should be made on a case-by-case basis, in conjunction with local health authorities.</td>
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<td><strong>Training of Personnel</strong></td>
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<tr>
<td>- Train all staff and volunteers in the symptoms of COVID-19, how it is spread and how to protect themselves. Train on correct use and disposal of personal protective equipment (PPE), including gloves, gowns, facemasks, eye protection and respirators (if available) and check that they understand</td>
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<td>- Train cleaning staff on most effective process for cleaning the facility: use a high-alcohol based cleaner to wipe down all surfaces; wash instruments with soap and water and then wipe down with high-alcohol based cleaner; dispose of rubbish by burning etc.</td>
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<tr>
<td><strong>Manage Visitor Access and Movement</strong></td>
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<tr>
<td>- Establish procedures for managing, monitoring, and training visitors</td>
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<td>- All visitors must follow respiratory hygiene precautions while in the common areas of the facility, otherwise they should be removed</td>
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<td>- Restrict visitors from entering rooms of known or suspected cases of COVID-19 patients Alternative communications should be encouraged, for</td>
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<td>example by use of mobile phones. Exceptions only for end-of-life situation and children requiring emotional care. At these times, PPE should be used by visitors. - All visitors should be scheduled and controlled, and once inside the facility, instructed to limit their movement. - Visitors should be asked to watch out for symptoms and report signs of acute illness for at least 14 days.</td>
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2. Construction settings in areas of confirmed cases of covid-19

- **Minimize Chance of Exposure**
  - Any worker showing symptoms of respiratory illness (fever + cold or cough) and has potentially been exposed to COVID-19 should be immediately removed from the site and tested for the virus at the nearest local hospital.
  - Close co-workers and those sharing accommodations with such a worker should also be removed from the site and tested.
  - Project management must identify the closest hospital that has testing facilities in place, refer workers, and pay for the test if it is not free.
  - Persons under investigation for COVID-19 should not return to work at the project site until cleared by test results. During this time, they should continue to be paid daily wages.
  - If a worker is found to have COVID-19, wages should continue to be paid during the worker’s convalescence (whether at home or in a hospital).
If project workers live at home, any worker with a family member who has a confirmed or suspected case of COVID-19 should be quarantined from the project site for 14 days, and continued to be paid daily wages, even if they have no symptoms.

- **Training of Staff and Precautions**
  - Train all staff in the signs and symptoms of COVID-19, how it is spread, how to protect themselves and the need to be tested if they have symptoms. Allow Q&A and dispel any myths.
  - Use existing grievance procedures to encourage reporting of co-workers if they show outward symptoms, such as ongoing and severe coughing with fever, and do not voluntarily submit to testing
  - Supply face masks and other relevant PPE to all project workers at the entrance to the project site. Any persons with signs of respiratory illness that is not accompanied by fever should be mandated to wear a face mask
  - Provide handwash facilities, hand soap, alcohol-based hand sanitizer and mandate their use on entry and exit of the project site and during breaks, via the use of simple signs with images in local languages
  - Train all workers in respiratory hygiene, cough etiquette and hand hygiene using demonstrations and participatory methods
  - Train cleaning staff in effective cleaning procedures and disposal of rubbish

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<tr>
<td>- If project workers live at home, any worker with a family member who has a confirmed or suspected case of COVID-19 should be quarantined from the project site for 14 days, and continued to be paid daily wages, even if they have no symptoms.</td>
<td>- Training of Staff and Precautions</td>
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| worker on the project site, visitors should be restricted from the site and worker groups should be isolated from each other as much as possible;  
- Extensive cleaning procedures with high-alcohol content cleaners should be undertaken in the area of the site where the worker was present, prior to any further work being undertaken in that area. | - Directive No. 02/2008/CT-BXD on labour safety and sanitation in construction agencies;  
- Circular No. 22/2010/TT-BXD on regulation on labour safety in construction  
- QCVN 18:2014/BXD: Technical regulation on safety in construction | - Contractor                                                                                               | - PMU, CSC, IEMC |

### 14. Workers’ health safety

- Provide training in EHS to workers for raising their awareness of infectious diseases especially HIV/AIDS within 2 weeks prior to the commencement of packages for construction items lasting at least 6 months.  
- Provide training in first-aid skill and first-aid kit to workers and site engineer  
- Regularly exam worker’s health to ensure occupational health  
- Provide workers with PPE such as masks, gloves, helmets, shoes/boots, goggles, safety belt, etc. and enforce wearing during working especially working at heights and in dangerous areas.  
- Limit or avoid 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
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<td>fumes at the source may also be required.</td>
<td>Special hot work and fire prevention precautions and Standard Operating Procedures (SOPs) should be implemented if welding or hot cutting is undertaken outside established welding work stations, including 'Hot Work Permits, stand-by fire extinguishers, stand-by fire watch, and maintaining the fire watch for up to one hour after welding or hot cutting has terminated. Special procedures are required for hot work on tanks or vessels that have contained flammable materials.</td>
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<td>- 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.</td>
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<td>- Provide sufficient lighting when carrying out construction activities at night.</td>
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<td>- Locate noise-generating sources and concrete mixing plants far enough from and downwind of residential areas and camps.</td>
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<td>- 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.</td>
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<tr>
<td>- Provide training in fire-fighting to workers and fire-extinguishers for the camps.</td>
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<tr>
<td>- Prepare an emergency plan for chemical/fuel spill incident risk before construction begins.</td>
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<td>- Provide the camps with sufficient supplies of clean water, power, and sanitary facilities.</td>
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<td>at least one toilet compartment for every 25 workers, with separate toilets for males and females. Workers’ beds must be provided with mosquito nets so as to prevent dengue fever. Temporary tents will be unacceptable. - Clean camps, kitchens, baths, and toilets and sanitize regularly, and keep good sanitation. Provide dustbins and collect wastes daily from the camps. Clear drainage ditches around the camps periodically. - Stop all construction activities during rains and storms, or upon accidents or serious incidents. - Contractor to ensure compliance with the requirements and procedures of the project Labor Management Procedure (LMP) included in Appendix 2</td>
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<td>- Contractor</td>
<td>- PMU, CSC, IEMC</td>
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### 15. Management of Stockpiles, Quarries and Borrow Pit

**General mitigations**

- All locations must be identified in accordance with technical specifications. Sensitive areas such as nature reserve, landscape areas and areas near the receiving sources or other areas near the water sources. Open ditch shall be built around the stockpile site to intercept wastewater.
- Wall around the disposal site must be built.
- The use of additional areas for storage, gathering or material exploitation for the construction must be approved in advance by construction engineers.
- When landowners are affected when their land use for stockpiling, or material exploitation, these owners must be included in the project’s
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<td>resettlement plan.</td>
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<td>- If access road to the site is required, it must be included in the environmental assessment.</td>
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<td><strong>Mitimize risks from the material sources:</strong></td>
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<td>- The main suppliers must produce a license to exploit and transport materials.</td>
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<td>- Give priority to recruiting local labor.</td>
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<td>- Materials must be tested before construction.</td>
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<td>- Do not purchase materials from Suppliers that do not have a approval environmental license.</td>
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<td>16. Communication to local community</td>
<td>- Maintain open communications with the local government and concerned communities; the contractor shall coordinate with local authorities (leaders of local wards or communes, leader of villages) for agreed schedules of construction activities at areas nearby sensitive places or at sensitive times (e.g., religious festival days).</td>
<td><strong>- Decree No. 167/2013/ND-CP on administrative penalty for violations related to social security, order and safety issues</strong></td>
<td>- Contractor</td>
<td>- PMU, CSC, IEMC</td>
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<td></td>
<td>- Copies in Vietnamese of this ESCOP and of other relevant environmental safeguard documents shall be made available to local communities and to workers at the site.</td>
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<td>- Reduced playground space, loss of playing fields and car parking: The loss of amenities during the construction process is often an unavoidable source of inconvenience to users in sensitive areas. However, early consultation with those affected, provides the opportunity to investigate and implement alternatives.</td>
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<td>- Disseminate Project information to affected parties (for example local authority, enterprises and</td>
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|                              | affected households, etc.) through community meetings before construction commencement.  
|                              | -Provide a community relations contact from whom interested parties can receive information on site activities, Project status and Project 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 news release, when major findings become available during Project implementation phase.  
|                              | -Monitor community concerns and information requirements as the Project progresses.  
|                              | -Respond to telephone inquiries and written correspondence in a timely and accurate manner.  
|                              | -Inform local residents about construction and work schedules, interruption of services, traffic detour routes and provisional bus routes, blasting and demolition, as appropriate.  
|                              | -Limit construction activities at night. When necessary ensure that night work is carefully scheduled and the community is properly informed so they can take necessary measures.  
|                              | -At least five days in advance of any service interruption (including water, electricity, telephone, bus routes) the community must be advised through postings at the Project site, at bus stops, and in affected homes/businesses.  
|                              | -Provide technical documents and drawings to local |
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<td>Authority and community, especially a sketch of the construction area and the ESMP of the construction site. Notification boards shall be erected at all construction sites providing information about the Project, as well as contact information about the site managers, environmental staffs, health and safety staffs, telephone numbers and other contact information so that any affected people can have the channel to voice their concerns and suggestions</td>
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**Workers and Workforce Management**

A Labor Management Procedure (LMP) was developed and included in Appendix 2 for addressing the impacts on and of labor and working conditions of the project. The LMP identifies the main labor requirements and risks associated with the project and help the PMU and Contractor to determine the resources necessary to address project labor issues. The LMP will enable different project-related parties, for example, staff of the project management unit, contractors and sub-contractors and project workers, to have a clear understanding of what is required on a specific labor issue. The LMP is a living document, which is initiated early in project preparation, and is reviewed and updated throughout development and implementation of the project. The LMP has 12 chapters. Chapter 1 served as Introduction. An overview of labor use in the project is presented in Chapter 2. Key potential labor risks are listed in Chapter 3. Legislative Framework governing labor employment in Vietnam 2 is discussed in Chapters 4 and 5. Implementation Arrangements, Age Requirement, Policies and Procedures and Timing of labor requirements follows in the subsequent chapters. Grievance Redressal Mechanism and Contractor Management are presented in the last two chapters 10 and 11 respectively, while Chapter 12 relates to primary supply workers.

A concern during construction phase of the project is the potentially negative impacts of the workforce interactions with the local communities. For that reason, a Code of Conduct shall be established to outline the importance of appropriate behavior, alcohol abuse, and compliance with relevant laws and regulations. Each employee shall be informed of the Code of Conduct and bound by it while in the employment of the Client or its Contractors. The Code of Conduct shall be available to local communities at the project information centers or other place easily accessible to the communities.

The Contractor is responsible for providing appropriate training to all staff according to their level of responsibility for environmental, health and safety matters.

*The Code of Conduct* shall address the following measures (but not limited to them):

- All of the workforce shall abide by the laws and regulations of the Socialist Republic of Vietnam;
Illegal substances, weapons and firearms shall be prohibited;
- Pornographic material and gambling shall be prohibited;
- Fighting (physical or verbal) shall be prohibited;
- Creating nuisances and disturbances in or near communities shall be prohibited;
- Disrespecting local customs and traditions shall be prohibited;
- Smoking shall only be allowed in designated areas;
- Maintenance of appropriate standards of dress and personal hygiene;
- Maintenance of appropriate standards hygiene in their accommodation quarters;
- Residing camp workforce visiting the local communities shall behave in a manner consistent with the Code of Conduct; and
- Failure to comply with the Code of Conduct, or the rules, regulations, and procedures implemented at the construction camp will result in disciplinary actions.

Prohibitions. The following activities are prohibited on or near the project site:
- Cutting of trees for any reason outside the approved construction area;
- Hunting, fishing, wildlife capture, or plant collection;
- Buying of wild animals for food;
- Use of unapproved toxic materials, including lead-based paints, asbestos, etc.;
- Disturbance to anything with architectural or historical value;
- Building of fires;
- Use of firearms (except authorized security guards);
- Use of alcohol by workers during working hours;
- Gambling should be strictly forbidden.
- Washing cars or machinery in streams or creeks;
- Doing maintenance (change of oils and filters) of cars and equipment outside authorized areas:
- Disposing trash in unauthorized places;
- Driving in an unsafe manner in local roads;
- Having caged wild animals (especially birds) in camps;
- Working without safety equipment (including boots and helmets);
- Creating nuisances and disturbances in or near communities;
- The use of rivers and streams for washing clothes;
- Indiscriminate disposal of rubbish or construction wastes or rubble;
- Littering the site;
- Spillage of potential pollutants, such as petroleum products;
- Collection of firewood;
- Poaching of any description;
- Explosive and chemical fishing;
- Latrine outside the designated facilities; and
- Burning of wastes and/or cleared vegetation.

Security. Some security measures shall be put into place to ensure the safe and secure running of the camp and its residents. Some of these security measures include:

- The list of workers must be registered to local authorities in accordance with existing Vietnamese regulations
- Children under 14 years of age will not be hired under the project
- Adequate, day-time night-time lighting shall be provided;
- Control of camp access. Access to the camp shall be limited to the residing workforce, construction camp employees, and those visiting personnel on business purposes;
- Prior approval from the construction camp manager for visitor’s access to the construction camp;
- A perimeter security fence at least 2m in height constructed from appropriate materials;
- Provision and installation in all buildings of firefighting equipment and portable fires extinguishers.
- Any construction worker, office staff, Contractor’s employees or any other person related to the project found violating these prohibitions will be subject to disciplinary actions that can range from a simple reprimand to termination of his/her employment depending on the seriousness of the violation.
5.1.5. Specific Mitigation Measures in the construction phase

Depending on the scope of work and type of auxiliary items of each bid package, the Contractors will be required to comply with the specific requirements described below. The IEMC, CSC and PMU shall monitor the Contractor’s compliance.

Table 66: Mitigation measures of site-specific impacts during the construction phase

<table>
<thead>
<tr>
<th>Site-specific impacts</th>
<th>Mitigation measures</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
</table>
| 1) Impacts on water environment                           | - The dredging operation is conducted only during the dry season;  
| Dredged canal; embankment of Long Ho river,                | - 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;  
| tidal sluice gate, bridges on connection road between      | - Leachate from sediments must be first deposited in sedimentation hole/trap before entering the river.  
| ward 8 and 9; urban main road 1 and 2                      | - Strictly prohibit contractors to discharge waste into canal  
|                                                            | - 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 canal. Gathering small quantities of materials fit with the schedule. Materials must be covered with tarpaulin, avoiding the upwind location, near the canal.  
|                                                            | - Strictly prevent hazardous waste, waste oils or particularly greasy rags from entering the flow.  
| 2) Impacts caused by erosion, subsidence and damages to    | - Before dredging, reinforcement will be conducted. This construction method must be proposed and submitted to the authorities concerned for approval by the construction contractors.  
| existing structures                                        | - Ensure that land acquisition and house relocation at the site boundary is completed prior to commencing construction work.  
| Areas which are prone to the risks: the area surrounding   | - Use appropriate construction methods with each construction site location.  
| Long Ho river embankment; tidal sluice 4, 5, 6, 7 and 9;   | - Closely monitoring the vibration level  
| bridge construction area which cuts existing roads and    | - Construction of side slope is made in accordance with the design  
| canals                                                     | - Do not carry out dredging works in rainy season.  
|                                                            | - Do not place heavy machineries and transportation vehicles near the canal banks. Inspection and supervision on land subsidence risks must be taken regularly in order to prepare the appropriate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Contractor     | PMU, CSC, IEMC      |
### Environmental and Social Impact Assessment
#### Vinh Long Urban Development and Climate Resilience Project

<table>
<thead>
<tr>
<th>Site-specific impacts</th>
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<th>Supervision</th>
</tr>
</thead>
</table>
| 3) Impacts by malodor from dredged materials                          | - Notify the construction progress of each section dredging for surrounding people.  
- Dredged materials are transported to the disposal site by specialized vehicles.  
- Do not gather dredged material along the ditches.  
- Use lime powder to limit malodor dispersion, if necessary.  
- Do not construct at the rest time, limit construction after 18h.  
- Consult closely with local people and communities for appropriate mitigation measures.  
- Provide adequate personal protective equipment for all workers.  
- Comply with QCVN 18:2014/BXD.  | Contractor                                  | PMU, CSC, IEMC |
| Dredging 22.0km of rehabilitated canals                               |                                                                                                                                                                                                                  |                |                      |
| 4) Leaking water from dredging                                        | - Dredging activities are only carried out in the dry season;  
- Water leaking from sediment must be deposited in settling tank/trap before discharging into river;  
- The process of transporting dredged materials must use specialized vehicles with containers.  
- No dredging at the time of water intaking for agricultural production activities of the local people.  
| Dredging 22.0km of rehabilitated canals                               |                                                                                                                                                                                                                  |                |                      |
| 5) Impacts on agricultural production                                 | - Informing the community of the construction schedule at least two weeks before the construction.  
- Arrange drainage around the construction sites to prevent soil erosion and sedimentation into the rice fields and irrigation canals.  
- Regularly check the affected on-field irrigation canals to ensure they are not blocked by construction spoil or waste and if they are affected, provide alternative irrigation water from canals to the locations the local people request.  
- Immediately rehabilitate irrigation canals if they are damaged by construction activities to ensure that water supply for the rice fields is maintained.  
- Closely consult with the local community to ensure that suitable solutions to problems are taken and communities’ concerns related to construction  | Contractor                                  | PMU, CSC, IEMC |
<p>| Connection road between ward 8 and 9, urban main road 1, 2, WWTP area |                                                                                                                                                                                                                  |                |                      |</p>
<table>
<thead>
<tr>
<th>Site-specific impacts</th>
<th>Mitigation measures</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
</table>
| 6) Impacts on groundwater quality | - 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).  
- Comply with QCVN 09-MT:2015/BTNMT, QCVN 18:2014/BXD. | Contractor | PMU, CSC, IEMC |
| 7) Business interruption | - Inform the street household businesses of the construction activities and their potential impacts such as 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 manholes.  
- 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 project.  
- Immediately address any issue/problem caused by the construction activities and raised by the local household businesses.  
- In coordination with local authorities, propose alternative location for street vendors, satisfactory to them, during the construction period;  
- Follow-up impacts on street vendors livelihood, | Contractor | PMU, CSC, IEMC |
<table>
<thead>
<tr>
<th>Site-specific impacts</th>
<th>Mitigation measures</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>and propose mitigation measures if livelihoods are affected.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 8) Risks of erosion and landslide, subsidence during embankment and construction of tidal sluice gate) Embankment of Long river; construction of 9 tidal sluice gates, Soft embankments of dredged canals | - Before excavation and backfilling, the tidal sluice gates and culverts must be reinforced. The construction methods must be proposed and submitted to competent agencies before construction.  
  - Use construction methods suitable to each work.  
  - Closely monitor the vibration  
  - Construction of embankment slope and culverts under the design  
  - Do not conduct excavation and embankment in rainy season.  
  - Do not place heavy machines and equipment near canals. Check and inspect the risk of subsidence regularly to prepare suitable strengthening plans.  
  - The monitoring consultant and contractor must be regularly present in the construction site to reduce the risk of erosion and subsidence and appropriate mitigation measures should be taken.  
  - Compliance with QCVN 18:2014/BXD.                                                                                                      | Contractor     | PMU, CSC, IEMC |
| Social impacts due to labor influx and prevention of GBV | - Contractor to preferentially recruit unskilled labor from the local communities.  
  - All workers from outside the project area will be registered at ward/commune level;  
  - Make all contracted workers sign code of conduct, including prevention of GBV.  
  - Make all contracted workers to follow the rules for on-site behavior (with colleagues) and conduct in the community.  
  - Conduct induction and toolbox talks outlining expected conduct and local community values including GBV.  
  - Introduce disciplinary measures for violations and misbehavior  
  - Place signs on the worksite indicated that it is an harassment free zone, and where members of the community can complain if an incident occurs.  
  - Separate sanitary facilities for both male and female workers.                                                                                           | Contractor     | PMU, CSC, IEMC |
### 5.1.6. Mitigation measures for impacts on sensitive receptors

The site-specific mitigation measures for Sensitive receptors are presented in Table below.

**Table 67: Site-specific Mitigation Measures for sensitive receptors**

<table>
<thead>
<tr>
<th>Sensitive receptors</th>
<th>Impacts and Risks</th>
<th>Specific mitigation measures</th>
<th>Responsibility</th>
<th>Supervision</th>
</tr>
</thead>
</table>
| Thanh Duc market                         | - Dust.                                                                          | - Try to schedule construction activity avoid the market hours  
- Minimise the number of trucks leaving construction sites during the peak hours.  
- Arrange staff to direct traffic on this section on peak hours during peak construction period (7h-7h30; 11h-11h30; 13h-13h30; 16h30 - 17h30)  
- Place warning and speed limit signs at the market  
- Water the transportation roads, if any, in a hot, dry day.  
- Limit pressing horn when transporting through the market  
- Closely work with local community to ensure the best solution to issues and complaints related to the construction activities  
- Compensation for business households if the Project’s activities cause interruption to their business in the long run.  
- Use of temporary market area (if required) to remain the trading activities of local people. | Contractors    | PMU, CSC, IEMC                                                                                     |
| Thanh Duc C Primary School               | - Dust and emissions.                                                            | - Try to schedule construction activity before or after class hours to avoid noise, vibration, and school                                                                                                                | Contractors    | PMU, CSC, IEMC                                                                                     |

1. Construction of urban drainage system: no sensitive receptors

2. Construction of wastewater collection and treatment system: there is 01 sensitive receptors
### Sensitive receptors

<table>
<thead>
<tr>
<th>Impacts and Risks</th>
<th>Specific mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Solid waste.</td>
<td>- Minimise the number of trucks leaving construction sites during the peak hours</td>
</tr>
<tr>
<td>- Traffic jams, traffic accidents.</td>
<td>- Arrange staff to direct traffic on this section on peak hours during peak construction period (7h-7h30; 11h-11h30; 13h-13h30; 16h30 - 17h30)</td>
</tr>
<tr>
<td>- Impede the access of parents and school staff.</td>
<td>- Place warning and speed limit signs and reflective fences along the areas passing the school</td>
</tr>
<tr>
<td>- Community conflict.</td>
<td>- Water the construction areas located within 100 m from the residential area at least triple times in a hot, dry day.</td>
</tr>
<tr>
<td>- Impact on extracurricular activities.</td>
<td></td>
</tr>
<tr>
<td>children distraction</td>
<td></td>
</tr>
</tbody>
</table>

### 3. Flood control in urban core areas: There are 06 sensitive structures

**Cua market**

<table>
<thead>
<tr>
<th>Impacts and Risks</th>
<th>Specific mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Dust.</td>
<td>- Try to schedule construction activity avoid the market hours</td>
</tr>
<tr>
<td>- Noise, vibration.</td>
<td>- Minimise the number of trucks leaving construction sites during the peak hours</td>
</tr>
<tr>
<td>- Solid waste.</td>
<td>- Arrange staff to direct traffic on this section on peak hours during peak construction period (7h-7h30; 11h-11h30; 13h-13h30; 16h30 - 17h30)</td>
</tr>
<tr>
<td>- Traffic jams, traffic accidents.</td>
<td>- Place warning and speed limit signs at the market.</td>
</tr>
<tr>
<td>- Obstruct the access and trading activities of local people to Cua market.</td>
<td>- Water the transportation roads, if any, in a hot, dry day</td>
</tr>
<tr>
<td>- Community conflict.</td>
<td>- Limit pressing horn when transporting through the market</td>
</tr>
<tr>
<td>- Impacts on trading and goods exchange of local people.</td>
<td>- Closely work with local community to ensure the best solution to issues and complaints related to the construction activities</td>
</tr>
<tr>
<td></td>
<td>- For waterway, signs and officials must be arranged to direct the traffic flow</td>
</tr>
</tbody>
</table>

**Contractors**: PMU, CSC, IEMC
<table>
<thead>
<tr>
<th>Sensitive receptors</th>
<th>Impacts and Risks</th>
<th>Specific mitigation measures</th>
<th>Responsibility</th>
<th>Supervision</th>
</tr>
</thead>
</table>
| Tran Phu Secondary School               | - Dust and emissions.  
- Noise and vibration.  
- Traffic jams, traffic accidents.  
- Obstruct parents’s approach to the teacher  
- Community conflict.  
- Impact on extracurricular activities | - Conduct successive construction to minimize the business activities in the market  
- Boats suitable with the area must be arranged so that the loading and unloading activities are facilitated  
- Compensation for business households if the Project’s activities cause interruption to their business in the long run.  
- Use of temporary market area (if required) to remain the trading activities of local people. | Contractors    | PMU, CSC, IEMC |
| Van Thanh Temple of Vinh Long           | - Dust and emissions.  
- Noise, vibration.  
- Spillage of solid waste affects the spiritual and social activities of the locals when they leave home.  
- Obstruct people’s approach to the Van Thanh Temple  
- Risk of community conflict. | - Minimise the number of trucks leaving construction sites during the peak hours  
- Arrange staff to direct traffic on this section on peak hours during peak construction period (7h-7h30; 11h-11h30; 13h-13h30; 16h30 - 17h30)  
- Place warning and speed limit signs at the along the construction site  
- Water the construction areas located within 100 m from the residential area at least triple times in a hot, dry day.  
- Do not load materials and waste within 20 m from the temple  
- Water the construction areas located within 100m from the temple in hot, dry day  
- Minimise the volume of materials and wastes temporarily loaded in the area and minimize the activities that generate noise in the 1st and 15th of lunar month  
- Enforce compliance to the workers of conduct particularly with regards to language and behaviors | Contractors    | PMU, CSC, IEMC |
<table>
<thead>
<tr>
<th>Sensitive receptors</th>
<th>Impacts and Risks</th>
<th>Specific mitigation measures</th>
<th>Responsibility</th>
<th>Supervision</th>
</tr>
</thead>
</table>
| Tran Quoc Toan Primary School       | - Dust and emissions.  
- Noise and vibration.  
- Traffic jams, traffic accidents.  
- Obstruct parent’s approach to the teacher  
- Community conflict.  
- Impact on extracurricular activities | - Try to schedule construction activity before or after class hours to avoid noise, vibration, and school children distraction  
- Minimise the number of trucks leaving construction sites during the peak hours  
- Arrange staff to direct traffic on this section on peak hours during peak construction period (7h-7h30; 11h-11h30; 13h-13h30; 16h30 - 17h30)  
- Place warning and speed limit signs and reflective fences along the areas passing the school.  
- Water the construction areas located within 100 m from the residential area at least triple times in a hot, dry day. | Contractors  
PMU, CSC, IEMC |                                                                                   |
| Phap Hai Pagoda                     | - Dust and emissions.  
- Noise, vibration.  
- Spillage of solid waste affects the spiritual and social activities of the locals when they leave home.  
- Obstruct people’s approach to the Phap Hai Pagoda  
- Risk of community conflict. | - Do not load materials and waste within 20 m from the temple  
- Water the construction areas located within 100 m from the temple in hot, dry day  
- Minimise the volume of materials and wastes temporarily loaded in the area and minimize the activities that generate noise in the 1st and 15th of Lunar month  
- Enforce compliance to the workers of conduct particularly with regards to language and behaviors when present in the area near the temple | Contractors  
PMU, CSC, IEMC |                                                                                   |
| Giac Thien Pagoda                   | - Dust and emissions.  
- Noise, vibration.  
- Spillage of solid waste affects the spiritual and social activities of the | - Do not load materials and waste within 20 m from the temple  
- Water the construction areas located within 100 m from the temple in hot, dry day | Contractors  
PMU, CSC, IEMC |                                                                                   |
### Sensitive receptors

<table>
<thead>
<tr>
<th>Sensitive receptors</th>
<th>Impacts and Risks</th>
<th>Specific mitigation measures</th>
<th>Responsibility</th>
<th>Supervision</th>
</tr>
</thead>
</table>
| locals when they leave home. | - Obstruct people’s approach to the Giap Thien Pagoda  
- Risk of community conflict. | - Minimise the volume of materials and wastes temporarily loaded in the area and minimize the activities that generate noise in the 1st and 15th of Lunar month  
- Enforce compliance to the workers of conduct particularly with regards to language and behaviors when present in the area near the temple | PMU, CSC, IEMC | Contractors |
| University of Economics Ho Chi Minh City – Vinh Long Branch |  
- Dust and emissions.  
- Noise and vibration.  
- Traffic jams, traffic accidents.  
- Obstruct student’s approach to the teacher  
- Community conflict.  
- Impact on extracurricular activities |  
- Minimise the number of trucks leaving construction sites during the peak hours  
- Arrange staff to direct traffic on this section on peak hours during peak construction period (7h-7h30; 11h-11h30; 13h-13h30; 16h30 - 17h30)  
- Place warning and speed limit signs and reflective fences along the areas passing the University.  
- Water the construction areas located within 100 m from the residential area at least triple times in a hot, dry day. | University of Economics Ho Chi Minh City – Vinh Long Branch | Contractors |

4. New construction of connection road between ward8 to Ward 9: No sensitive structures

5. Construction of main road No. 1: No sensitive structures

6. Construction of main road No. 2: No sensitive structures

7. Construction of infrastructure for the Resettlement Area in Ward 8: There is 01 sensitive receptors

| Pho Minh Pagoda |  
- Dust and emissions  
- Noise, vibration.  
- Spillage of solid waste affects the spiritual and social activities of the locals when they leave home.  
- Obstruct people’s approach to the temple |  
- Do not load materials and waste within 20 m from the temple  
- Water the construction areas located within 100 m from the temple in hot, dry day  
- Minimise the volume of materials and wastes temporarily loaded in the area and minimize the | University of Economics Ho Chi Minh City – Vinh Long Branch | Contractors |
<table>
<thead>
<tr>
<th>Sensitive receptors</th>
<th>Impacts and Risks</th>
<th>Specific mitigation measures</th>
<th>Responsibility</th>
<th>Supervision</th>
</tr>
</thead>
</table>
| Pho Minh Pagoda     | - Risk of community conflict. | activities that generate noise in the 1st and 15th of Lunar month  
- Enforce compliance to the workers of conduct particularly with regards to language and behaviors when present in the area near the temple | | |
5.1.7. Mitigation measures in Operation Phase

5.1.7.1. Mitigation of general impacts

Table 68: Mitigation plan of generic impacts during the operation phase

<table>
<thead>
<tr>
<th>Site-specific impacts</th>
<th>Mitigation measures</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
</table>
| Dust and emission Roads, bridges, culverts, resettlement areas, improvement of drainage canals | - Regularly clean sand and soil on roads, bridges to reduce dust generation;  
- Spraying water, washing roads at least once a day in the dry season to minimize dust swept from the surface of bridges/roads;  
- Transportation vehicles must be covered to avoid material dropping on roads;  
- Vehicles must be registered to meet the requirements issued by the State;  
- Plant and maintain trees on both road sides to prevent dust from spreading into people’s houses along the roads | - Operation management unit  
- Local government | - Operation management unit  
- Local government |
| Noise from vehicles  
The road connecting Ward 8 to Ward 9; the main urban roads No.1 & No.2 | - Training and raising the awareness of traffic participants.  
- To arrange suitable speed limit signs in the residential areas.  
- To arrange signs to prohibit honking when passing sensitive areas as if.  
- Plant and maintain trees on both road sides to prevent noise from spreading into people’s houses along the roads | - Operation management unit  
- Local government | - Operation management unit  
- Local government |
| Domestic wastes and wastewater  
Resettlement site in ward 8, WWTP | - Raise awareness of people and workers operating WWTP of economically using water and limiting wastes  
- Arrange waste collection area in resettlement area of ward 8. Waste bins must be arranged in the campus of the wastewater treatment plant.  
- Collect daily waste and hire a functional unit for waste transportation and treatment as regulations.  
- At each house in the resettlement area of ward 8, it must design and build a 3-compartment septic tank.  
- Domestic wastewater is collected to the common drainage system of Vinh Long City and led to the wastewater treatment plant. | - Operation management unit  
- Local government | - Operation management unit  
- Local government |
| Sludge from periodic dredging of drainage system | **Dredged sludge from drainage system**  
- The management unit must ensure the budget for maintenance of alleys and drainage system in the resettlement sites;  
- Conduct periodic maintenance on Long Ho embankment at least once a year, especially prior to rainy season;  
- Raise people’s awareness of environmental | - Operation management unit  
- Local government | - Operation management unit  
- Local government |
### Site-specific impacts

<table>
<thead>
<tr>
<th>Mitigation measures</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanitation, discharge wastes in regulated areas to avoid blocking drainage ditches and canals in the residential areas.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Equip labor proactive equipment for workers dredging sludge in manholes, drainage canals to be protected from bad smells and exhausted gases ($CH_4$, $H_2S$,…);</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Odors from drainage system</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- The sewers must be designed as sealed system;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Sanitation, cleaning road daily should take consideration into the cover of drainage sewers/manholes to prevent the flow from being blocks due to wastes and things;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Regularly dredge culverts to avoid accumulative and sediment of organic substances.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in ecological landscape and land use purpose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Improving people knowledge on socio-economic development opportunity and risks related to social issues.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Coordinate with local authorities in management, migration and use of land on 02 sides of the roads and ditches.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Propagandize, raise awareness of people living near the Project area about the sense of keeping environmental sanitation, ecological landscapes and protection of works.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risks and incidents in operation phase</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Road safety during operation of road and embankment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Improving knowledge of local people on road use regulations and practices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Monitoring and enforcement of driver speed and behavior.</td>
<td></td>
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</tr>
<tr>
<td>- 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.</td>
<td></td>
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</tr>
<tr>
<td><strong>Risks of falling from height (into rivers, streams and drowning)</strong></td>
<td></td>
<td></td>
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<tr>
<td>- Design and erect fences or barrier gate at the up and down steps to the walking paths under the embankment,</td>
<td></td>
<td></td>
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<tr>
<td>- Build handrail for bridge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Plug warning signs and install lighting system in the positions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Place warning signs at high-rise areas and bridges</td>
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<td></td>
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<tr>
<td>- Take propaganda about this risk in the first operational phase for local people accustomed to this situation.</td>
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<tr>
<td>- Taking first aids for persons who get accidents and transporting them to the nearest hospitals and</td>
<td></td>
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</tbody>
</table>
### 5.1.7.2. Mitigation of specific impacts

**Table 69: Mitigation plan of site-specific impacts during the operation phase**

<table>
<thead>
<tr>
<th>Site-specific impacts</th>
<th>Mitigation measures</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
</table>
| 1. Change of the drainage flow, regime in canals | - The Project Owner coordinates with local authorities, people in regularly checking the status of works to timely detect the risks of landslide, erosion by the flow.  
- Carry out periodical maintenance, arrange adequate budget for maintenance work. | - Operation management unit  
- Local government | - Operation management unit  
- Local government |
| 2. Impacts on aquatic ecosystem                | - Communicate, raise local awareness of environmental protection, especially water quality in canals.  
- Collect packages, excessive foods during the production period; prohibit littering in surrounding area or water sources  
- Communicate, raise local people’s awareness of maintenance of transportation means (boats, ferries) to limit oil leakage in canals.  
- Radically collect and prevent domestic wastewater of local people from flowing into surrounding canals. | - Operation management unit  
- Local government | - Operation management unit  
- Local government |
| 3. Impacts on waterway transportation          | - Communicate, raise local people’s awareness of transporting agricultural products; strictly comply with traffic safety, ensure transportation load under regulations  
- Erect suitable signs at the positions where the traffic density is high  
- Communicate, raise people’s awareness of maintenance of waterway vehicles. | - Operation management unit  
- Local government | - Operation management unit  
- Local government |
### Site-specific impacts

<table>
<thead>
<tr>
<th>Site-specific impacts</th>
<th>Mitigation measures</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Impacts from operation of WWTP</td>
<td>Measures to minimize impact on receiving waters&lt;br&gt;- Since the combined sewers will be used, minimize bypass of the treatment system by providing capacity sufficient to treat peak flows.&lt;br&gt;- An online monitoring system is to be installed at the WWTP for controlling the wastewater inflow, quality of the influent and effluent at the WWTP.&lt;br&gt;- The quality of sample effluent from the WWTP must be analyzed once every 3 months.&lt;br&gt;- Treatment facilities are to be periodically checked and maintained to ensure highest performance of the system.&lt;br&gt;- Troubleshooting plans must be prepared to respond promptly to incidents in due time (standby generators, standby pumps, discharge incident …) in order not to disrupt the operation of the plant.&lt;br&gt;- Based on an assessment of risks to human health and the environment, consider re-use of treated effluent, especially in areas with limited raw water supplies. Treated wastewater quality for land application or other uses should be consistent with the relevant public health-based guidance from the World Health Organization (WHO)3 and applicable national requirements.&lt;br&gt;<strong>Odor control</strong>&lt;br&gt;- Odor control system in the WWTP includes deodorizing tower, high-pressure ventilation fan and piping system that conveys the gases from the WWTP to the deodorizing tower.&lt;br&gt;- The pipeline system will collect the gases emitted from primary treatment stage (such as sewage pumping stations, garbage trap) to the sludge treatment stage (such as sludge decomposition tanks, sludge tanks, sludge belt press, etc.) and convey to deodorizing tower where ventilation fans are installed. Odor-filtering equipment are capable of oxidizing pollutants such as H2S, VOC, Ammonium, Sulfur based, Amine ... and other odorous gases into harmless substances. The treated gases then will be discharged through the air vents without causing odors.&lt;br&gt;- Constructing the fence surrounding the WWTP with brick 2.5m high to facilitate the operation management and contributing to minimize odor emission arising to surrounding areas.&lt;br&gt;- To design the green trees fence of 3m - 5m wide surrounding the WWTP, this measure will create a green landscape on the WWTP to minimize dust</td>
<td>- Operation management unit&lt;br&gt;- Local government</td>
<td>- Operation management unit&lt;br&gt;- Local government</td>
</tr>
</tbody>
</table>

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Environmental and Social Impact Assessment
Vinh Long Urban Development and Climate Resilience Project

<table>
<thead>
<tr>
<th>Site-specific impacts</th>
<th>Mitigation measures</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>and odors dispersed to residential areas.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Cover emission points (e.g., aeration basins, clarifiers, sludge thickeners, tanks, and channels), and vent emissions to control systems (e.g., compost beds, biofilters, chemical scrubbers, etc.) as needed to reduce odors and otherwise meet applicable national requirements and internationally accepted guidelines.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- The waste (sludge and domestic solid waste) will be contained in standardized containers to minimize dispersion and gases and solid waste into the environment.</td>
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<td></td>
<td>- There will be plans to periodically test and monitor air concentrations to obtain proper evaluation and control operation processes in a logical manner.</td>
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<tr>
<td><strong>Sludge</strong></td>
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<tr>
<td></td>
<td>- Sludge will be periodically monitored to identify any possible hazard: The quality of sludge is monitored periodically 3 months per time with heavy metal parameters are analyzed As, Cu, Cd, Pb, Zn according to QCVN 50:2013/BTNMT - national technical regulation on Hazardous Thresholds for Sludges from Water Treatment Process.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>- Sludge will be compacted with gravity compactors and dewatered with gravity belt compressors. Dried mud cakes will be stored in a roofed warehouse at the sludge dewatering area. Periodically one time per month, the plant will hire URENCO to transport this sludge amount way to serve the planting of urban green trees or to be dumped at Hoa Phu or Phuong Thao solid waste landfill of the city.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Compressed raw waste will be put in 6m³ containers. Full containers will be replaced with empty ones and disposed of at Hoa Phu or Phuong Thao landfill.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>- Land application or other beneficial re-use of the WWTP residuals should be considered but only based on an assessment of risks to human health and the environment. Quality of residuals for land application should be consistent with the relevant public health-based guidance from the World Health Organization (WHO) and applicable national requirements.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Processing, disposal and re-use of wastewater treatment plant residuals should be consistent with applicable national requirements.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- URENCO will be employed to periodically dredge sludge from sewer systems and transport</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Site-specific impacts

### Mitigation measures

- this sludge for disposal at Hoa Phu or Phuong Thao landfill. Transportation will be carried out by specialized tank trucks to avoid odor emission and sludge spillage along the route.

### Implementation

- Operation management unit

### Supervision

- Operation management unit

<table>
<thead>
<tr>
<th>Site-specific impacts</th>
<th>Mitigation measures</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
</table>
| 5. Risks of congestion and flooding in the WWTP | - As assessed in Chapter 3, the existing ditch can completely secure the reception of 15,000 m³/day from the WWTP (with a water level rise by about 10cm). To prevent stormwater from over flowing into the plant, protection and drainage solutions have also been integrated in the design.  
- The project proposal has also mentioned the construction of a pumping station to pump stormwater into Cai Sao Lon canal when the water level in the plant area rises high. | - Operation management unit  
- Local government | - Operation management unit  
- Local government |
| 6. Risks of flooding when formation of roads | - Supplement horizontal sewers with sizes suitable for the intensity of rain and the flow of stormwater over the Project area, if necessary.  
- Regularly check the areas at risk of flooding to design additional horizontal sewers (if necessary).  
- Consult with local authorities and local authorities in the areas at risk of flooding in order to take measures to supplement sewers in time.  
- Clear the flow at the places at risks of flooding before, during and after the rainy/storm season.  
- Regularly carry out maintenance of works, bridges and sewers. | - Operation management unit  
- Local government | - Operation management unit  
- Local government |
| 7. Incidents from operation of WWTP | Emergency wastewater discharge in case of WWTP failure.  
- Prepare an emergency plan for incidental discharge of untreated waste water and conduct emergency training for the operators.  
- Inform the residents of the incident and mitigation measures.  
- The WWTP system includes the components of biological treatment tank, flocculation tank, biological aeration tank, and bio-filters which will be designed with the two modules running in parallel to remedy any incident when it happens, specifically:  
- In case incidents due to breakage, damage, or leakage: Normally, a problem – if any - happens in only one module, the WWTP Company will operate the remaining module while repairing the malfunctioning one. If fixing the incident takes too much time, exceeding the storage time of work items in the system, the Company will suspend operation to solve the said incident problem.  
- In case of incidents with devices (wastewater | - Operation management unit  
- Local government | - Operation management unit  
- Local government |
Environmental and Social Impact Assessment  
Vinh Long Urban Development and Climate Resilience Project

<table>
<thead>
<tr>
<th>Site-specific impacts</th>
<th>Mitigation measures</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pumps, air blowers...): All the devices in the WWTP system are equipped with one backup device. Thus, if case of errors occurring with a device, the Company will make use of the standby device and have the faulty one repaired.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- In case of incidents caused by operation: When a problem occurs, the technical division and the operating worker will have to review all operational parameters and make adjustments in conformity with the design.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- In case of serious incidents, e.g. the system is unable to work and the treated wastewater fails to meet the standards of discharging treated water and pollutes the environment for a long time, the Company will report this incident to the management agency, i.e. Vinh Long Department of Natural Resources and Environment, and suspend production to fix the problem. The Company will employ an expert on wastewater treatment to make inspection and adjustments to the system.</td>
<td></td>
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<tr>
<td></td>
<td>- Corrective measures are to be promptly carried out for the treatment plant to be operated again in the soonest possible time.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Standby generators must be always available.</td>
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</tr>
</tbody>
</table>

**Broken and blocked pipeline**

- Consider the installation of separate sewer systems for domestic wastewater and storm water runoff in the overall planning and design of new sewerage systems.
- When on-site sanitation systems where excreta are mixed with water predominate, consider use of small-diameter sewerage system to collect water effluent from septic systems or interceptor tanks.
- Limit the sewer depth where possible (e.g., by avoiding routes under streets with heavy traffic). For shallower sewers, small inspection chambers can be used in lieu of manholes.
- Use appropriate locally available materials for sewer construction. Spun concrete pipes can be appropriate in some circumstances but can suffer corrosion from hydrogen sulfide if there are blockages and/or insufficient slope.
- Ensure sufficient hydraulic capacity to accommodate peak flows and adequate slope in gravity mains to prevent buildup of solids and hydrogen sulfide generation.
- Design manhole covers to withstand anticipated loads and ensure that the covers can be readily replace if broken to minimize entry of garbage.
and silt into the system.
- Equip pumping stations with a backup power supply, such as a diesel generator, to ensure uninterrupted operation during power outages, and conduct regular maintenance to minimize service interruptions. Consider redundant pump capacity in critical areas.

**Occupational, health and safety during WWTP operation**
- Ensuring that the personnel involved in the WWTP operation process have appropriate knowledge and qualifications.
- Reasonable personnel arrangement, alternate operation of WWTP, ensuring continuous operation activities.
- Ensure that WTTP operates properly according to technical procedures and instructions.
- Arranging human resources and funding ensures the regular inspection, supervision and maintenance process.
- Consider to buil the incident lake consistent with the capacity of WWTP.

<table>
<thead>
<tr>
<th>Site-specific impacts</th>
<th>Mitigation measures</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
</table>

**Table 70: Mitigation plan of Cumulative Impacts**

<table>
<thead>
<tr>
<th>Cumulative Impacts</th>
<th>Mitigation measures</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Phase</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air quality</td>
<td>- Raise workers’ awareness of saving energy for operation of machines.&lt;br&gt;- Regularly clean the construction site.&lt;br&gt;- Limit the operation of machines wastefully. Machines must be turned off if not using.&lt;br&gt;- Do not use unqualified machines, equipment.&lt;br&gt;- Regularly maintain equipment.</td>
<td>- Contractor</td>
<td>- PMU&lt;br&gt;- CSC&lt;br&gt;- IEMC</td>
</tr>
<tr>
<td>Traffic congestion and accidents</td>
<td>- Raise people’s awareness of regulations and practices of road use;&lt;br&gt;- Monitor and comply with speed and driving behaviors;&lt;br&gt;- Raise people’s awareness of chance on socio-economic development and risk related social issues through programs, training of the project in the area;&lt;br&gt;- Assign an officer to regulate the traffics in the construction area;&lt;br&gt;- Do not transport materials at peak hours, in early morning and late afternoon;&lt;br&gt;- Raise workers’ awareness of transport</td>
<td>- Contractor</td>
<td>- PMU&lt;br&gt;- CSC&lt;br&gt;- IEMC</td>
</tr>
</tbody>
</table>
## Cumulative Impacts

<table>
<thead>
<tr>
<th>Cumulative Impacts</th>
<th>Mitigation measures</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Phase</strong></td>
<td>regulations, especially drivers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Operation Phase</strong></td>
<td>Mostly the positive impacts when the works come into operation, however the following measures are proposed:</td>
<td>- Operation management unit</td>
<td>- Operation management unit</td>
</tr>
<tr>
<td>Quality of water and aquatic ecosystem</td>
<td>- Disseminate information and raise people’s awareness about wastewater collection and prohibit releasing wastes directly into nearby canals</td>
<td>- Local government</td>
<td>- Local government</td>
</tr>
<tr>
<td></td>
<td>- Do not encroach canal bed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- The management and operation unit must regularly maintain the canals and set plan on dredging the canal bed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Mostly the positive impacts when the works come into operation, however the following measures are proposed:</td>
<td>- Operation management unit</td>
<td>- Operation management unit</td>
</tr>
<tr>
<td></td>
<td>- Planting trees in residential areas, on roads and wastewater treatment plant.</td>
<td>- Local government</td>
<td>- Local government</td>
</tr>
<tr>
<td></td>
<td>- Unblocking the flow, do not discharge wastes and wastewater into nearby water bodies.</td>
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</tbody>
</table>

### 5.1.8. Induced Impact mitigation measures

#### Table 71: Induced impact mitigation measures

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Mitigation measures</th>
<th>Implementation</th>
<th>Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embankment of Long Ho river</td>
<td>- Work with local authorities to disclose information about environmental sanitation for local community and abandon on discharge of untreated wastes into Long Ho river and canals;</td>
<td>- Operation management unit</td>
<td>- Operation management unit</td>
</tr>
<tr>
<td></td>
<td>- Trash bins must be placed along canals, and the campaign of raising people’s awareness of environment must be conducted;</td>
<td>- Local government</td>
<td>- Local government</td>
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<tr>
<td></td>
<td>- Conduct periodic maintenance on Long Ho embankment at least once a year, especially prior to rainy season</td>
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<td></td>
</tr>
<tr>
<td>Urban main roads</td>
<td>- Planning and subdivision of functional areas on both roadsides.</td>
<td>- Operation management unit</td>
<td>- Operation management unit</td>
</tr>
<tr>
<td></td>
<td>- Work with local authorities to disclose information about infrastructure planning in residential areas to avoid encroaching road corridor.</td>
<td>- Local government</td>
<td>- Local government</td>
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<tr>
<td></td>
<td>- Communicate with people on policies and planning of the provinces and cities, avoiding investment in land that cause disturbance to the community.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Assign signs, speed limit signs that are Design</td>
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<td></td>
</tr>
</tbody>
</table>
Impacts | Mitigation measures | Implementation | Supervision
--- | --- | --- | ---
wastewater and waste collection system after residential and functional areas are formed.

5.2. Environmental and Social Commitment Plan

The project owner has developed and will implement an Environmental and Social Commitment Plan (ESCP), which will set out measures and actions required for the project to achieve compliance with the ESSs over a specified timeframe. The ESCP has been agreed with the Bank and will form part of the legal agreement. The ESCP has been disclosed locally at the project sites and at the WB external website.

The ESCP takes into account the findings of the environmental and social assessment, the Bank’s environmental and social due diligence, and the results of engagement with stakeholders. It is an accurate summary of the material measures and actions required to avoid, minimize, reduce or otherwise mitigate the potential environmental and social risks and impacts of the project. The ESCP also sets out a process that allows for adaptive management of proposed project changes or unforeseen circumstances.

The project owner will implement diligently the measures and actions identified in the ESCP in accordance with the timeframes specified, and will review the status of implementation of the ESCP as part of its monitoring and reporting.

The project owner will notify the Bank promptly of any proposed changes to the scope, design, implementation or operation of the project that are likely to cause an adverse change in the environmental or social risks or impacts of the project. The project owner will carry out, as appropriate, additional assessment and stakeholder engagement in accordance with the ESSs, and propose changes, for approval by the Bank, to the ESCP and relevant management tools, as appropriate, in accordance with the findings of such assessments and consultation. The updated ESCP will be disclosed.

The project owner will monitor the environmental and social performance of the project in accordance with the legal agreement (including the ESCP). The extent and mode of monitoring will be agreed upon with the Bank, and will be proportionate to the nature of the project, the project’s environmental and social risks and impacts, and compliance requirements. The project owner will ensure that adequate institutional arrangements, systems, resources and personnel are in place to carry out monitoring. Where appropriate and as set out in the ESCP, the project owner will engage stakeholders and third parties, such as independent experts, local communities or NGOs, to complement or verify its own monitoring activities. Where other agencies or third parties are responsible for managing specific risks and implementing mitigation measures, the project owner will collaborate with such agencies and third parties to establish and monitor such mitigation measures.

5.3. Roles and Responsibilities for ESMP Implementation

5.3.1. Institutional Arrangements

Contractors will be responsible for implementing mitigation measures. These measures will be included in bidding documents and their costs are included in construction bid packages;

CSC will be responsible for monitoring the day-to-day implementation of mitigation measures. Related costs are included in the CSC’s service contract;

IEMC will be responsible for overall environmental monitoring which includes support to the PMU in implementing environmental supervision and monitoring, and responsible for reporting on the implementation through monitoring reports.
5.3.2. Roles and Responsibilities

Specific responsibility of stakeholders is shown in Table below.

**Table 72. Annotation on Roles and Responsibilities**

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPC</td>
<td>Overall responsible for environmental safeguard compliance of the Project</td>
</tr>
<tr>
<td>PMU</td>
<td>Be responsible for monitoring the overall Project implementation, including environmental compliance. PMU will be responsible for ESMP implementation and environmental performance of the Project during the construction and operational phases:</td>
</tr>
<tr>
<td></td>
<td>(i) Close coordinate with local authorities in the participation of the community during Project implementation;</td>
</tr>
<tr>
<td></td>
<td>(ii) Ensure that the detailed design include all environment mitigation measures proposed in the ESMP;</td>
</tr>
<tr>
<td></td>
<td>(iii) Monitor and supervise to ensure adequate contents of ESMP are incorporated into bidding and contractual documents;</td>
</tr>
<tr>
<td></td>
<td>(iv) Ensure that an environmental management system is set up and functions properly;</td>
</tr>
<tr>
<td></td>
<td>(v) Report on ESMP implementation to DONRE and the WB.</td>
</tr>
<tr>
<td></td>
<td>(vi) Implement diligently the measures and actions identified in the ESCP in accordance with the timeframes specified, and will review the status of implementation of the ESCP as part of its monitoring and reporting.</td>
</tr>
<tr>
<td></td>
<td>PMU will assign Environmental Staff(s) (ES) to oversee and coordinate environmental aspects of the Project.</td>
</tr>
<tr>
<td></td>
<td>PMU will assign two Social Staffs (SS). One social staff will oversee and coordinate social/resettlement aspects of the Project. The second staff will be the focal point for grievances and will also be in charge of relations with the community (i.e. street vendors).</td>
</tr>
<tr>
<td>Stakeholder</td>
<td>Responsibilities</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>PMU Environmental and Social Staff(s) (ES)</td>
<td>Beresponsible for monitoring the implementation of the Project ESMP. Specifically, ES will be responsible for:</td>
</tr>
<tr>
<td></td>
<td>(i) Monitor the incorporation of ESMP into the detailed technical designs and civil works bidding and contractual documents;</td>
</tr>
<tr>
<td></td>
<td>(ii) Monitor the incorporation of ESMP and RAP monitoring and supervision into the TORs, bidding and contractual documents for the Construction Supervision Consultant (CSC) and other safeguard consultant (IEMC);</td>
</tr>
<tr>
<td></td>
<td>(iii) provide inputs to the consultant selection process;</td>
</tr>
<tr>
<td></td>
<td>(iv) review reports submitted by the CSC and safeguard consultants;</td>
</tr>
<tr>
<td></td>
<td>(v) conducting periodic site checks;</td>
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<td></td>
<td>(vi) propose solutions to handle social and resettlement issues of the Project; and</td>
</tr>
<tr>
<td></td>
<td>(vii) prepare environmental and social performance section on the progress and review reports to be submitted to the DONRE and the World Bank.</td>
</tr>
<tr>
<td>Contractors</td>
<td>- Assign Environmental, Social Health and Safety (EHS) staff to monitor contractor’s compliance to ESIA/ESMP.</td>
</tr>
<tr>
<td></td>
<td>- Prepare Contractor ESMP (CESMP) for each construction site area, submit to PMU and CSC for review and approval before commencement of construction.</td>
</tr>
<tr>
<td></td>
<td>- Obtain all permissions for construction (traffic control and diversion, excavation, labor safety, etc. before civil works) following current regulations.</td>
</tr>
<tr>
<td></td>
<td>- Implement the mitigation measures specified in the ESMP, CESMP, bidding documents etc.</td>
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<tr>
<td></td>
<td>- Actively communicate with local residents and authorities and take actions to address their ESHS concerns during construction.</td>
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<td></td>
<td>- Ensure that all staff and workers understand the procedure and their tasks in the environmental management program.</td>
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<tr>
<td></td>
<td>- Report to the PMU and CSC on any difficulties and their solutions.</td>
</tr>
<tr>
<td></td>
<td>- Report to PMU and CSC if environmental accidents occur and coordinate with agencies and keys stakeholders to resolve these issues.</td>
</tr>
<tr>
<td></td>
<td>- Assign a Safety, Social and Environmental Officer (SEO)</td>
</tr>
<tr>
<td></td>
<td>- Assign a focal point for grievances</td>
</tr>
<tr>
<td>Construction Supervision Consultant (CSC)</td>
<td>- Assign qualified Environmental and Social Staff(s) to supervise the implementation of ESMP and ensure compliance</td>
</tr>
<tr>
<td></td>
<td>- The CSC will assign a social staff to oversee and coordinate social/resettlement aspects of the Project;</td>
</tr>
<tr>
<td></td>
<td>- Be responsible for routine environmental supervision and reporting during construction phase.</td>
</tr>
<tr>
<td></td>
<td>- Assist the PMU in reporting and maintaining close coordination with the local community.</td>
</tr>
<tr>
<td></td>
<td>- Arrange, implement training on HIV/AIDS awareness raising for all workers, CSC team and PMU staff. The cost for this training included in the consulting service contract.</td>
</tr>
<tr>
<td></td>
<td>- Carry out the periodical environmental quality monitoring during construction period and first-year-operation, prepare periodical environmental monitoring and supervision reports for submission to Vietnamese authorities.</td>
</tr>
<tr>
<td>Independent Environmental Monitoring</td>
<td>- Provide support to PMU to establish and operate an environmental management system, coordinate with the CSC team to provide trainings to the Contractors on project environmental management requirements</td>
</tr>
<tr>
<td>Stakeholder</td>
<td>Responsibilities</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------</td>
</tr>
</tbody>
</table>
| Consultants (IEMC) | - Provide trainings, implement capacity building activities for relevant agencies during Project implementation, carry out random field visits to certify compliance or recommend corrective/improvement actions.  
- Prepare monitoring reports after each visit. |
| Local community | - Participate in volunteer community environmental and social monitoring. |
| Vinh Long DONRE | Monitoring compliance with the Government environmental requirements. |
| District Natural Resources and Environment Division of Vinh Long City PC | - Monitor and inspect environmental safety assurance activities in the project area  
- Check and handle violations.  
- Guide ward/communal staff in charge of environmental management in the locality.  
- Periodically report to the Department of Natural Resources and Environment on arising environmental issues.  
Coordinate with stakeholders, participate in research and inspection, and resolve arising environmental incidents. |
| Environmental police division | - Coordinate with relevant departments and agencies to monitor, control and resolve violations to the Environment Law.  
Handle serious violations, investigate responsibilities of related parties as well as take part in solving serious environmental incidents. |
| Public utility companies (electricity, water supply, drainage, telecommunications, etc.) | - Coordinate with the PMU and the Contractor to carry out relocation of underground works and set up temporary connections at proposed crossings to ensure the continuous provision of basic services for people’s lives.  
Take part in dealing with related incidents (fire and explosion of electric cables, breaks of telecommunication cables, water pipe cracks, etc.). |

5.4. Environmental and Social Compliance Framework

5.4.1. Environmental Duties of the PMU/Detail Design Consultants

During the preparation of TORs for consulting services and construction bidding documents, the Vinh Long PMU will also work closely with the consultants to ensure that: i) contract packaging and cost estimations includes ESMP implementation, including the services on independent safeguard monitoring, environmental sampling/monitoring and compliance supervision, reporting etc.; ii) ESCOPs and relevant common as well as site-specific mitigation measures are incorporated into the bidding documents; iii) environmental supervision and training are included in the scope of works assigned to the construction supervision consultant.

At feasibility study/detail engineering design stage, the Vinh Long PMU shall work closely with the feasibility study consultants and detail design engineers to ensure that the greening/landscaping, environmental friendly solutions and relevant mitigation measures proposed in the ESIA/ESMP are considered and incorporated into the engineering design as appropriate.

During construction phase, the Vinh Long PMU shall work closely with the supervision consultant to monitor the compliance of contractors and report to relevant authorities. The Vinh Long PMU will also direct the supervision consultant and contractors on the actions to be undertaken in case when issues are arisen, incidents or accidents etc. The PMU is also responsible for ensuring effective implementation of the LMP during construction.

The Vinh Long PMU will assign at least one staff with suitable qualifications to be Environmental Officer (EO) and one staff with suitable qualification to be Social Officer (SO) throughout project implementation.
The EO will oversee environmental issues and monitor safeguard compliance of the Project. The EO will be supported by the Independent Environmental Monitoring Consultant, the Environmental Officers of the construction supervision team as well as the contractors.

- The SO will oversee and coordinate social/resettlement aspects of the Project. The SO will be supported by the Independent Resettlement Monitoring Consultant, the social staffs of the construction supervision team/contractors.

5.4.2. **Environmental and Social Duties of the Contractor**

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

Remedial actions that cannot be effectively carried out during construction should be implemented upon completion of the works (and before issuance of the Works Acceptance Certificates).

The Contractors’ duties include but not limit to:

- Comply with relevant legislative requirements governing the environment, public health and safety;
- Ensure satisfactory implementation of the project LMP;
- 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 Supervisors (ES) of the CSC;
- Carry out any corrective actions instructed by the Environmental Officer (EO) Social Officer (SO) of the PMU and the ES;
- In case of non-compliances/discrepancies, carry out investigation and submit proposals on mitigation measures, and implement remedial measures to reduce environmental/social impacts;
- Stop construction activities, which generate adverse impacts, upon receiving instructions from the EO and the ES. Propose and implement corrective actions and carry out alternative construction methods, if required, 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 EO and the ES.
- In case the contractor proposes to use source of raw materials that have not been covered in Project ESIA, the contractor will report to the CSCs and PMUs and coordinate with them in carrying out due-diligence environmental review of these materials sources to assess their compliance to national environmental requirements. Only complied sources can be used under this project.
- The contractor shall be responsible for implementation of corrective measures at his costs. The contractor shall also be responsible for paying the costs of damages caused by non-compliance to ESMO and/or applicable environmental regulations.

5.4.3. **Contractor's Environmental and Social Management Plan (CESMP)**

After contract signing, the contractor will be required to prepare and submit a contractor’s site-specific Environmental and Social Management Plan (CESMP) for each contract package and submit to the CSC and PMU for review and clearance.

The objective of the Contractor Environmental and Social Management Plan (CESMP) is to
provide information for environmental management during the proposed works/activities on site of Vinh Long Project. This is to ensure that the Contractor (and any subcontractors) have minimal impact on the environment. The CESMP will detail how the contractor will mitigate construction impacts and documents the contractor’s response to inspecting, monitoring, verifying, internal auditing and correcting or improving environmental performance. The CESMP must be site-specific and should include details of control measures that will be implemented on site to minimize any potential environmental impacts from the proposed works/activities. If the proposed works/activities contained within the CESMP are altered during the Contract, the CESMP will be required to be modified by the Contractor to reflect these changes or modifications. The contents of the CESMP should include the followings:

(i) A statement of policy, providing a definition of the Contractor’s environmental policy and an indication of commitment to the execution of its Site Environmental Management Plan.

(ii) A brief document description; Date of issue; Revision status; Distribution list; and preparation personnel details and signoff.

(iii) Applicable laws and regulations associated with the requirements in the Project ESMP. Identification of the contractor licenses, permits and approval associated with the CESMP.

(v) Details on how the environmental and social impacts identified in the Project ESIA will be managed on site, including: 1) the site-specific measures to mitigate impacts during construction; 2) ESCOPs; 3) the Contractor ESMP to be developed after the contractor is selected and before construction starts; and 4) the Contractor’s Dredging Management Plan that the contractor is required to develop.

(vii) Detailed environmental and social training that all site contractor personnel (including subcontractors) are required to undertake. As a minimum all contractor personnel working at the Project sites must: i) be familiar and understand the CESMP for the works; ii) be aware of their environmental responsibilities and legal obligations on site; and iii) undertake health and safety and emergency response training.

(viii) Specific capabilities, support mechanisms and resources necessary to satisfactorily implement the CESMP. Detailed environmental responsibilities of all contractor personnel including subcontractors working on site with appropriate knowledge, skills and training for specific tasks shall be identified.

(ix) The contractor shall be responsible for preparing monthly environmental reports, as a section within the Progress report required in the bidding document, including accidental report if any, for submitting to the Project owner. The contents of these reports may include following details:

- Implementation of the Contractor’s CESMP complying with the agreed program;
- Any difficulties encountered in the implementation of the CESMP and recommendations for remedying them for the future;
- The number and type of non-compliances and proposed corrective actions;
- Reports from the Subcontractors involved in the implementation of the CESMP, including minutes of meetings and discussions held by the Contractor;
- Minutes of meeting from discussions held with the Project owner regarding implementation of the CESMP.

5.4.4. 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 environment 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 PMU and CSC;
- Inform the contractor and ES (of PMU and CSC) of environmental issues, submit contractor’s ESMP Implementation Plan to the ES of PMU and CSC, and relevant authorities, if required;
- Keep detailed records of all site activities that may relate to the environment.

5.4.5. Independent Environmental Monitoring Consultant (IEMC)

An IEMC shall be contracted PMU to provide some environmental safeguard training for PMU staff and carry out environmental auditing. The IEMC shall carry out the monitoring, including:

- Provide support to PMU to establish and operate an environmental management system, coordinate with the CSC team to provide trainings to the Contractors on project environmental management requirements
- Provide trainings, implement capacity building activities for relevant agencies during Project implementation, carry out random field visits to certify compliance or recommend corrective/improvement actions
- Provide training for PMU and the CSC, and the representatives of the Contractors on socio-environmental, health and safety issues related to construction;
- Evaluate environmental quality at the areas affected by the construction activities (including site observations, reviewing environmental quality data provided by the CSC, review of other available documents, and supplement sampling if necessary);
- Review contractor’s environmental compliance including the implementation of mitigation measures and documentation;
- Review PMU and CSC compliance to ESMP.
- The IEMC will also provide technical advice and assistance to the PMU and the EO in environmental matters.

5.4.6. Environmental Supervision during Construction (CSC)

During construction phase, a qualified CSC reporting to the PMU 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 Project are minimized. The CSC shall engage sufficient number of Environmental Supervision Engineers with adequate knowledge on environmental protection and construction project 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 PMU whether the construction design meets the requirements of the mitigation and management measures of the ESMP;
- Review and clear contractor’s SEMP;
- Coordinate with PMU Environmental Officer (EO) in reviewing environmental compliance at newly proposed borrow pits and quarries and advise PMU on whether these are eligible for use by the Project;
- Verify and confirm with PMU environmental supervision procedures; parameters, monitoring locations, equipment and results;
- Supervise contractor’s implementation of its CESMP including their performance, experience and handling of site environmental issues, and provide corrective instructions;
- Arrange, implement training on HIV/AIDs awareness raising for all workers, CSC team and PMU staffs;
- Arrange, implement training on COVID-19 awareness raising for all workers, CSC team and PMU staffs;
- Implement the environmental quality sampling and prepare periodical environmental monitoring reports, including reports on ESMP implementation status to the PPMU and prepare environmental supervision statement during the construction phase; and
- Review payment requests related to environmental mitigation costs if applicable.

5.4.7. Compliance with Legal and Contractual Requirements

The constructions activities shall comply not only with general contractual condition on environmental protection and pollution control requirements in the bidding document, the Project ESMP, and the CESMP, 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 PMU for approval to see whether sufficient environmental protection and pollution control measures have been included.

The CSC and PMU 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 PMU. 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 PMU 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 PMU accordingly.

5.4.8. Penalty System

In the compliance framework, if non-compliance with the Contractor's ESMP and environmental regulations are discovered by CSC/ES/IEMC/PMU during the site supervision, up to 2% values of interim payment of the contractor of this month will be held back. The Contractor will be given a grace period (determined by CSC/PMU) to repair the violation. If the Contractor satisfactorily performs the repairs within the grace period (confirmed by CSC/PMU), no penalty is incurred and the upholding money will be paid to the Contractor. However, if the Contractor fails to successfully make the necessary repairs within the grace period, the Contractor will pay the cost for a third party to repair the damages (deduction from keeping money).

In case of IEMC/CSC/PMU not detected of non-compliance with environmental regulations of the contractor, they will be responsibility payment to repair the violation.

Based on this Environmental and Social Compliance Framework including the penalty system the CSC will develop a detailed penalty system for environmental and social non-compliance and submit it to the PMU for approval to put into implementation.

5.4.9. Reporting Arrangements

The Project Management Unit (PMU) is responsible for conducting internal monitoring the implementation of the RP. In addition, the PMU will hire an external monitoring agency (EMA) to undertake independent monitoring of the process of RP implementation and to assess living standard of the affected people during and after the completion of the resettlement.

Both internal and external (independent) monitoring will regularly (on a monthly basis for internal and biannual basic for independent monitoring). An end-of-project evaluation on the implementation of resettlement is required and report will be prepared to confirm whether the objectives of OP 4.12 were achieved.

ESMP monitoring and reporting requirements are summarized in table below.

<table>
<thead>
<tr>
<th>No.</th>
<th>Report Prepared by</th>
<th>Submitted to</th>
<th>Frequency of Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Contractor to the Employer</td>
<td>PMU</td>
<td>Once before construction commences and monthly thereafter</td>
</tr>
<tr>
<td>2</td>
<td>Construction Supervision consultant (CSC)</td>
<td>PMU</td>
<td>Weekly and monthly</td>
</tr>
<tr>
<td>4</td>
<td>Community</td>
<td>PMU</td>
<td>After each periodical monitoring</td>
</tr>
<tr>
<td>5</td>
<td>IEMC</td>
<td>PMU</td>
<td>Every six-month</td>
</tr>
<tr>
<td>6</td>
<td>PMU</td>
<td>DONRE</td>
<td>Every six-month</td>
</tr>
<tr>
<td>7</td>
<td>PMU</td>
<td>WB</td>
<td>Every six-month</td>
</tr>
</tbody>
</table>

5.5. Environmental and Social Monitoring Program

5.5.1. Scope of Environmental Monitoring in Construction Phase

The environmental monitoring and supervision for construction phase for the entire project is presented in Table 74.

The environmental management and monitoring will be carried out by the Project Owner (Vinh Long city PC).
### Table 74: Environmental Monitoring Program in the Construction Phase

<table>
<thead>
<tr>
<th>No</th>
<th>Monitored items</th>
<th>Construction phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Monitoring of air quality, noise, vibration</td>
<td>TSP, CO, NO₂, SO₂, Noise (Lₜₚₑₙ), vibration</td>
</tr>
<tr>
<td></td>
<td>1. Monitoring parameters</td>
<td>Measurements taken every six-months, the first monitoring at each work item will be within one month since construction commencement</td>
</tr>
<tr>
<td></td>
<td>4. Monitoring positions</td>
<td>12 samples, of which: Contruction No.1: 1 sample, Contruction No.2: 2 samples, Contruction No.3: 2 samples, Contruction No.4: 2 samples, Contruction No.5: 2 samples, Contruction No.6: 2 samples, Contruction No.7: 1 sample, (Sampling locations are presented in Appendix)</td>
</tr>
<tr>
<td>II</td>
<td>Surface Water Quality Monitoring</td>
<td>pH, DO, COD, BOD₅, N-NH₄⁺, N-NO₃⁻, P-PO₄³⁻, oil &amp; grease, Coliform, Cl⁻, Fe, TSS</td>
</tr>
<tr>
<td></td>
<td>1. Monitoring parameters</td>
<td>Measurements taken every six-months, start as early as possible after contract signing and continue during the entire construction phase</td>
</tr>
<tr>
<td></td>
<td>3. Applied Regulation</td>
<td>QCVN 08-MT:2015/BTNMT</td>
</tr>
<tr>
<td></td>
<td>4. Monitoring Locations</td>
<td>7 samples, of which: Contruction No.1: 1 sample, Contruction No.2: 1 sample, Contruction No.3: 1 sample, Contruction No.4: 1 sample, Contruction No.5: 1 sample, Contruction No.6: 1 sample, Contruction No.7: 1 sample, (Sampling locations are presented in Appendix)</td>
</tr>
<tr>
<td>III</td>
<td>Wastewater quality monitoring</td>
<td>pH, BOD₅, TSS, TDS, Sunfuu, N-NH₄⁺, N-NO₃⁻, P-PO₄³⁻, oil &amp; grease, total surfactants, Coliforms</td>
</tr>
<tr>
<td></td>
<td>1. Monitoring parameters</td>
<td>Measurements taken every three-months start as early as possible after contract signing and continue during the entire construction phase</td>
</tr>
</tbody>
</table>
4. Monitoring Locations

7 samples, of which:
- Construction No.1: 1 sample
- Construction No.2: 1 sample
- Construction No.3: 1 samples
- Construction No.4: 1 samples
- Construction No.5: 1 samples
- Construction No.6: 1 samples
- Construction No.7: 1 samples

Remark: wastewater after treatment from worker's camps (if any)

(Sampling locations are presented in Appendix)

IV Sediments on the canals

1. Monitoring parameters
Total Hydrocarbon, heavy metal (As, Hg, Pb, Cd, Cr, Cu, Zn)

2. Monitoring frequency
Measurements taken every three-months start as early as possible after contract signing and continue during the entire construction phase

3. Applied Regulation
QCVN 03-MT:2015/BTNMT; QCVN 43:2017/BTNMT

4. Monitoring positions
6 samples
- Construction No.1: 2 samples
- Construction No.2: 2 samples
- Construction No.3: 2 samples

(Sampling locations are presented in Appendix)

5.5.2. Scope of Environmental Monitoring in the Operation phase

The environmental monitoring and supervision for operation phase for WWTP is presented in Table 75.

The environmental management and monitoring will be implemented by the WWTP operating unit.

Table 75: Environmental monitoring program in the operation phase

<table>
<thead>
<tr>
<th>No</th>
<th>Monitored items</th>
<th>WWTP operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Monitoring of air quality, noise</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Monitoring parameters</td>
<td>Odor, NH₃, H₂S, TSP, CO, NO₂, SO₂, Noise (Lₐₑq)</td>
</tr>
<tr>
<td></td>
<td>2. Monitoring frequency</td>
<td>Measurements taken every six-months</td>
</tr>
</tbody>
</table>
|    | 4. Monitoring positions | 2 samples, including:
- 1 sample in the factory of WWTP;
- 1 sample in the nearest residential area toward the end of the main wind direction

(Sampling locations are presented in Appendix) |
| II | Surface Water Quality Monitoring |                      |
|    | 1. Monitoring parameters | pH, DO, COD, BOD₅, N-NH₃⁺, N-NO₃⁻, P-PO₄³⁻, oil & grease, Coliform, Cl⁻, Fe, TSS |

(Sampling locations are presented in Appendix)
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<table>
<thead>
<tr>
<th>No</th>
<th>Monitored items</th>
<th>WWTP operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Monitoring frequency</td>
<td>Measurements taken every six-months</td>
</tr>
<tr>
<td>3.</td>
<td>Applied Regulation</td>
<td>QCVN 08-MT:2015/BTNMT, column B1</td>
</tr>
</tbody>
</table>
| 4. | Monitoring positions | 3 samples: 01 sample at the discharge point, 01 sample - 100m from the upstream; 01 sample - 50 - 100 m from the downstream  
(Sampling locations are presented in Appendix) |

III Wastewater quality monitoring

1. Monitoring parameters  
pH, BOD₅, TSS, TDS, Sunfua, N-NH₄, N-NO₃, P-PO₄, oil & grease, total surfactants, Coliforms

2. Monitoring frequency  
Measurements taken every three-months

3. Applied Regulation  
QCVN 14:2008/BTNMT, column B

4. Position monitoring  
2 samples: 01 sample before treatment and 01 sample after treatment  
(Sampling locations are presented in Appendix)

IV Slugde from WWTP

1. Monitoring parameters  
Heavy metal (As, Hg, Pb, Cd, Cr, Cu, Zn) according to QCVN 50:2013/BTNMT – national technical regulation on Hazardous Thresholds for Sludges from Water Treatment Process.

2. Monitoring frequency  
Measurements taken every three-months start as early as possible after contract signing and continue during the entire construction phase

QCVN 50:2013/BTNMT  
QCVN 50:2013/BTNMT

4. Monitoring positions  
2 samples  
(Sampling locations are presented in Appendix)

5.6. Training and Capacity Building

5.6.1. Current PMU’s Capacity on Environmental and Social Management

The PMU has limited environmental and social management capacity as existing staff do not have experience in projects applying ESF. Meanwhile, while at the same time they are also managing a Bank-financed SUUP Project which has to comply with the Safeguard Policies. Therefore, there is a risk that the resources allocated for managing environmental and social issues of this Project may not be adequate, affecting the environmental performance/compliance to the ESSs of both projects. However, there is also an opportunity to encourage to hire qualified ES staff and pool resources for various projects. Although the PMU participated in a two-day ESF training organized by the World Bank in December 2019, its E&S capacity assessment conducted during project preparation revealed the need for further capacity building in specific ESSs during project implementation.

So that, currently PMU staffs have limited knowledge on WB safeguard requirements as well as limited knowledge of environment and social issues. Such gaps will be addressed through capacity building program as part of the ESMP.

5.6.2. Environmental and Social Capacity Building Program

The Table below provides a typical training program on E&S requirements. Training programs will be developed and implemented by IEMC team in coordination with the CSC
- **Trainee groups:** the PMU staff, the ESO department staff, the field engineers (FE), construction supervision consultants (CSC), the contractors, representatives of relevant stakeholders and local communities in the project area. The contractors take the responsibility for training workers and drivers.

- **Training Schedule:** Training will be given at least one month before performing the first construction contract. Subsequent training sessions can be modified to suit the construction schedule for project components.

- **Frequency of training:** The basic training programs given in the table below will be provided every 6 months annually, and the contents will be updated and tailored to items to be implemented. Training programs for PMU staff are expected to continue in the first years of the Project. Three-day training for CSC and contractors is also planned to take place twice a year for at least 2 years.

### Table 76: Advanced Environmental/Social Training Program

<table>
<thead>
<tr>
<th>I. Subjects</th>
<th>PROJECT MANAGEMENT UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training course</td>
<td>Environmental/social monitoring and reporting</td>
</tr>
<tr>
<td>Participants</td>
<td>Staff in charge of environmental and social issues; environmental managers</td>
</tr>
<tr>
<td>Training frequency</td>
<td>Immediately after the project becomes valid effective, but at least one month prior to the first bid package. The next training will be planned on demand.</td>
</tr>
<tr>
<td>Duration</td>
<td>One day</td>
</tr>
<tr>
<td>Content</td>
<td>Project-related general environmental/social management including the request from World Bank, Department of Natural Resources and Environment, in collaboration with competent authorities and concerned stakeholders; Environmental monitoring for the Project includes: Requirements of environmental/social monitoring; Monitoring and implementation of mitigation measures; Guiding and monitoring contractors, CSC and community representatives in the implementation of environmental monitoring; Forms used in environmental monitoring processes; Reaction and risk control; Guiding and monitoring contractors, CSC on management of grievances Manner of receiving and submit forms; Other issues to be determined.</td>
</tr>
<tr>
<td>Responsibility</td>
<td>With the help of the Technical Assistance Team, the Independent Environmental Monitoring Consultant (IEMC) and PMU implement safety policies.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II. Subjects</th>
<th>CSC, CONTRACTORS, REPRESENTATIVES OF LOCAL AUTHORITIES (WARDS/COMMUNES), COMMUNITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training course</td>
<td>Implementation of mitigation measures</td>
</tr>
<tr>
<td>Participants</td>
<td>CSC; construction engineers, site construction field manager. Staff in charge of environment and social issues, the contractor; representatives of local authorities; representatives of urban groups (i.e. street vendors)</td>
</tr>
<tr>
<td>Training frequency</td>
<td>Shortly after awarding contracts to the contractors with updates on demand</td>
</tr>
<tr>
<td>Duration</td>
<td>Two-day training for CSC and contractors, and one-day training for others</td>
</tr>
<tr>
<td>Content</td>
<td>Overview of the overall environmental/social monitoring; Requirements of environmental/social monitoring; The roles and responsibility of the contractors and CSC;</td>
</tr>
</tbody>
</table>
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The content and method of environmental monitoring:
- Reaction and risk control;
- Introducing monitoring forms and instructing on filling out forms and reporting incidents;
- Information on the Grievance Redress Mechanism.
- Other issues to be determined
- Preparing and submitting reports

Responsibility
With the help of technical assistance teams, PMU, the independent environmental monitoring consultant (IEMC) implement safety policies.

III. Subjects

COMMUNITIES/ WORKERS

Training course
Safety and environmental sanitation

Participants
Representatives of workers (team leaders) working directly for the project components

Training frequency
As appropriate

Duration
One day of presentation and one day of on-site presentation

Content
Brief presentation on safety issues and overview on the environment;
- Key issues requiring the attention of the community and construction workers to mitigating safety risks (land roads, waterways, equipment, machinery, etc.) as well as reducing pollution (dust, exhaust gases, oil spills, waste management, etc.);
- Management of safety and environmental sanitation on site and at workers’ camps;
- Mitigation measures applied on site and camps;
- Safety measures for electricity, mechanical engineering, transportation, air pollution;
- Methods of dealing with emergency situations;
- The rights and responsibilities of environmental monitoring
- Environmental monitoring, environmental monitoring form
- Measures to mitigate the social impact and monitoring implementation
- Other issues to be determined

Responsibility
Contractors, PMU with the assistance of IEMC

5.7. Estimated Costs for ESMP Implementation
5.7.1. Estimated Costs for Environmental Monitoring Program

According to the unit price of environmental monitoring in the locality, the estimated cost for environmental quality monitoring of the project is stated in Table 77:

Table 77: Estimated Cost for Samples and Analysis

<table>
<thead>
<tr>
<th>No</th>
<th>Works</th>
<th>Unit</th>
<th>Nums of monitoring period</th>
<th>Quantity per time</th>
<th>Price (VND)</th>
<th>Sub-Total</th>
</tr>
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Environmental and Social Impact Assessment
Vinh Long Urban Development and Climate Resilience Project

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<td>10,000,000</td>
<td>40,000,000</td>
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</tbody>
</table>

5.7.2. Estimated cost for IEMC
Estimated cost for IEMC is presented in the table below:

Table 78: Estimated Costs of IEMC
(Exchange rate: 1 USD = 23,400 VND)

<table>
<thead>
<tr>
<th>No</th>
<th>Content</th>
<th>Unit</th>
<th>Amount</th>
<th>Unit price (VND)</th>
<th>Sub-total (VND)</th>
<th>Sub-total (USD)</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Experts 'salary</td>
<td>person-month</td>
<td>60</td>
<td>30,000,000</td>
<td>1,800,000,000</td>
<td>76,923</td>
</tr>
<tr>
<td>2</td>
<td>Accommodation, expenses for business trip</td>
<td>person-day</td>
<td>300</td>
<td>600,000</td>
<td>180,000,000</td>
<td>7,692</td>
</tr>
<tr>
<td>3</td>
<td>Travel expenses</td>
<td>Trip/ person</td>
<td>100</td>
<td>5,000,000</td>
<td>500,000,000</td>
<td>21,368</td>
</tr>
<tr>
<td>4</td>
<td>Office communication and communication</td>
<td>month</td>
<td>60</td>
<td>3,000,000</td>
<td>180,000,000</td>
<td>7,692</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>2,660,000,000</td>
<td>113,675</td>
</tr>
</tbody>
</table>

5.7.3. Estimated Costs for Training Program
Estimated cost for training program on environmental/social monitoring management capacity
is presented in Table 79:

Table 79: Estimated Costs for Training and Capacity Building

(Exchange rate: 1 USD = 23,400 VND)

<table>
<thead>
<tr>
<th>Training content</th>
<th>Trainee</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price VND</th>
<th>Total VND</th>
<th>Total USD</th>
</tr>
</thead>
</table>
| **A. Capacity building programs on safeguard policies (trained by IEMC)**
| **I. Environmental monitoring and reporting** | PMU | Staff in charge of environmental issues; environmental managers | course | 4 | 10,000,000 | 40,000,000 | 1,709 |
| **II. Implementation of mitigation measures** | Total work items | CSC; Construction engineers, site manager | course | 30 | 10,000,000 | 300,000,000 | 12,821 |
| **III. Safety and environmental sanitation** | Total work items | Representatives of workers | course | 16 | 5,000,000 | 80,000,000 | 3,419 |
| | | | | | Sub-total (A) | 420,000,000 | 17,949 |
| **B. HIV/AIDS, COVID-19 and GBV training (done by CSC)** | Total work items | Workers, CSC team and PMU staff | course | 10 | 20,000,000 | 200,000,000 | 8,547 |
| | | | | | Sub-total (B) | 200,000,000 | 8,547 |
| | | | | | Total: (A)+(B) | 620,000,000 | 26,496 |

5.7.4. Total Estimated Costs for 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) cost of the independent environmental monitoring consultant (IEMC), (iv) the costs of environmental quality monitoring, (v) the cost of safety management for the PMU, 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 EMP are allocated from the project management budget of the PMU, including safety training programs, and basic allowances to participants in the monitoring programs. After the project has been completed, the costs of environmental monitoring of constructed works will be taken from the operation and maintenance budget of the city.

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. The following Table below provides the estimated costs for environmental quality monitoring and IEMC (in accordance with national practices) for reference purposes. However, final costs will be updated in the detailed design phase.

---

4Excluding costs for RP implementation and independent monitoring the performance of RP/EMP
Table 80: Estimated Costs of ESMP Implementation

<table>
<thead>
<tr>
<th>Content</th>
<th>Items of the project</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Mitigation during construction</td>
<td>As a part of the contract</td>
</tr>
<tr>
<td>(b) Monitoring safeguard compliance during construction</td>
<td>As a part of the cost for Construction Supervision Consulting (CSC)</td>
</tr>
<tr>
<td>(c) Running cost of PMU social and environmental units</td>
<td>As part of the costs for the PMU</td>
</tr>
<tr>
<td>(d) Environmental quality monitoring (done by CSC)</td>
<td>737,000,000 USD</td>
</tr>
<tr>
<td>(e) Independent environmental monitoring consulting (IEMC)</td>
<td>2,660,000,000 USD</td>
</tr>
<tr>
<td>(f) Safeguard Capacity building programs (done by IEMC)</td>
<td>420,000,000 USD</td>
</tr>
<tr>
<td>(g) HIV /Aids, COVID-19 and GBV Training (done by CSC)</td>
<td>200,000,000 USD</td>
</tr>
</tbody>
</table>

Note: The costs for Independent Monitoring Agency for resettlement and social issues will be covered under the Resettlement Plans to be prepared.

5.8. Grievance Redress Mechanism (GRM)

**Project Level GRM**

Within the Vietnamese legal framework, citizen rights to complain are protected. As part of overall implementation of the project, a grievance redress mechanism (GRM) will be developed by the ESU of the PMU, according procedures, responsible persons and contact information will be developed. It will be readily accessible to ensure that grievances shall be handled and resolved at the lowest level as quickly as possible. The mechanism will provide a framework within which complaints about environmental and social issues can be handled, grievances can be addressed, and disputes can be settled promptly. The GRM will be in place before construction commencement.

During construction, the GRM will 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 project. 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. The contractors should indicate contact for any complaints when the contractors announce construction schedule to local communities.

All complaints and corresponding actions undertaken by the contractors will be recorded in project 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 PMU 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.

Grievance Redress Mechanism for affected person who lose means of income/livelihoods, are Summarised in Table 81.

**Table 81: Grievance Redress Mechanism**

<table>
<thead>
<tr>
<th>First Stage – Ward/Commune People’s Committee (WPC):</th>
<th>PAP may submit their complaint – either in written or verbal, to the office of the Ward/Commune People’s Committee. W/C PC will receive the complaints and will notify the W/C PC leaders of the complaint. The Chairman of the W/C PC will meet the complainant in person and will solve it within 15 days following the receipt of the complaint.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second Stage – City/District People’s Committee (CDPC):</td>
<td>After 15 days since the submission of the complaints, if the aggrieved person does not have any response from the W/C PC, or if the aggrieved person is not satisfied with the decision taken on his/her complaint, the PAP may take the case, either in written or verbal, to the Reception Unit of City/District People’s Committee. The City/District People’s Committee will have 30 days since the date of receipt of the complaint to resolve the case. The City/District People’s Committee will register all the complaints submitted and will inform the District Board for Compensation and Land Acquisition of the City/District PC’s resolution/assessment results. Aggrieved person may escalate the case to the Courts of Law if they wish.</td>
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<tr>
<td>Third Stage – Provincial People’s Committee:</td>
<td>After 30 days, if the aggrieved PAP does not hear from the City/District PC, or if the PAP is not satisfied with the decision taken on his/her complaint, the PAP may escalate the case, either in writing or verbal, provincial</td>
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</table>
People’s Committee, or lodge an administrative case with the City/District People’s Court for resolution. The provincial PC will have 45 days to resolve the complaint to the satisfaction of all the concerned. The provincial PC secretariat is also responsible for registering all complaints that are submitted. Aggrieved person may elevate the case to the Courts of Law if they wish.

**Final Stage - Courts of Law:**

After 45 days following the submission of the complaint at provincial PC, if the aggrieved PAP does not hear from the provincial PC, or if PAP is not satisfied with the decision taken on his/her complaint, PAP may take the case to a Courts of Law for adjudication. Decision by the court will be the final decision.

Decision on solving the complaints must be sent to the aggrieved PAPs and concerned parties, and must be posted at the office of the People’s Committee where the complaint is solved. After 3 days, the decision/result on resolution must be made available at ward level and after 7 days at the city/district level.

**GRM for Workers:** The project workers (all three categories, direct workers, contracted workers and primary supply workers) can directly register their complaints with the GRM for workers. The members of this GRM will be trained to be capable to address grievances by workers, including workplace complaints in an efficient and effective manner to meet national regulations on labors and World Bank ESS2.

<table>
<thead>
<tr>
<th>Complainants</th>
<th>GRM Functions</th>
<th>Timeframe</th>
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</table>
| Workers or labor association will submit their grievance to the GRM for Workers through one of the channels | • Refer workers related complaints to the Workers GRM.  
• Registration, classification and analysis of grievances.  
• Convene the GRM for workers meeting to analyze and resolve the complaint.  
• Provide written response to the complainant/contractor.  
• Provide guidance with recommendations to the contractor to improve working condition/labor management issues. | 10 days |

**The World Bank’s Grievance Redress Mechanism:** Communities and individuals who believe that they are adversely affected by a WB-financed project may submit complaints to the available project-level grievance redress mechanism or the WB’s Grievance Redress Service (GRS). The GRS will ensure that complaints received are promptly reviewed to address project-related concerns. The affected communities and individuals of the project may submit their complaints to the WB’s independent Inspection Panel that will determine whether harms occurred, or can occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at anytime after concerns have been brought directly to the WB’s attention, and the 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](http://www.worldbank.org/grs). For information on how to submit complaints to the World Bank Inspection Panel, please visit [www.inspectionpanel.org](http://www.inspectionpanel.org).
CHAPTER 6. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

6.1. Summary of public consultation process

The World Bank's policy on Environmental and Social Standards No.5 (ESS5) and Environmental and Social Standards No.10 (ESS10) require consultation and notification to affected people and local authority on social and environmental issues during project preparation.

The PMU has developed a Stakeholder Engagement Plan (SEP) proportionate to the nature and scale of the project and its potential risks and impacts. The SEP is a stand-alone document, and its draft was disclosed locally at the project sites on February 20, 2020 before project appraisal to seek the views of stakeholders on the SEP, including on the identification of stakeholders and the proposals for future engagement.

The SEP describes the timing and methods of engagement with stakeholders throughout the life-cycle of the project as agreed between Bank and project owner, distinguishing between project-affected parties and other interested parties. The SEP also describes the range and timing of information to be communicated to project-affected parties and other interested parties, as well as the type of information to be sought from them. The SEP includes the measures to be used to remove obstacles to participation, and how the views of differently affected groups will be captured. It also includes differentiated measures to allow the effective participation of those identified as disadvantaged or vulnerable.

During the project preparation, the public consultation and disclosure of information has followed and SEP and in line with the requirements of the relevant ESSs. The project owner will continue to engage with, and provide information to, project-affected parties and other interested parties throughout the life-cycle of the project, in a manner appropriate to the nature of their interests and the potential environmental and social risks and impacts of the project.

If there are significant changes to the project that result in additional risks and impacts, particularly where these will impact project-affected parties, the project owner will provide information on such risks and impacts and consult with project-affected parties as to how these risks and impacts will be mitigated. The Borrower will disclose an updated ESCP, setting out any additional mitigation measures.

Public consultation for ESIA report must also comply with the requirements of Decree 18/2015/ND-CP dated February 14, 2015 and Circular No.40/2019/TT-BTNMT dated May 13, 2019 of Ministry of Natural Resources and Environment for environmental impact assessment and environmental protection plan.

Public consultation is conducted with the purpose of: (i) sharing information about the project's items and expected activities with the project area community and stakeholders; and (ii) Collecting comments and concerns about local characteristics and environmental sensitive issues in the project area from the government and local communities. On that basis, public concerns can be proposed in the Social Environmental Assessment Report and project solutions.

6.2. Results of public consultation

6.3. Consultation with People’s Committee of wards and communes

Consultations with People’s Committees of wards/communes were conducted from 8 to 15, January 2020 on the following contents:

- Introduce an overview of the project, identify the area/residential group in the project area.
- Introduce the World Bank's safeguard policies on environment and resettlement.
- Current status of environmental sanitation in the wards and outstanding issues.
- Solutions from the community to mitigate the environmental impacts and associations in the process of project implementation.
- Comments on the construction of works.

Public consultation was conducted at the People's Committee of Vinh Long City and in the wards/communes in the project area. Time and contents of the consultation are presented in the following table:
### Table 82: The results of the public consultation

<table>
<thead>
<tr>
<th>No.</th>
<th>Stakeholder</th>
<th>Number of participants</th>
<th>Composition</th>
<th>Results of discussion</th>
<th>Project Owner’s feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
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</tr>
</tbody>
</table>
| 1   | Vinh Long City PC and relevant department (9h00-08/01) | 32        | 25        | - Representative of Vinh Long City People's Committee  
- Representative: Department of Natural Resources and Environment,  
- Representative of Department of Finance;  
- Representative of Department of Planning and Investment;  
- Representative of Department of Justice; | - This is an important project of the province, helping Vinh Long city in particular and Vinh Long province in general develop infrastructure, ensure environmental sanitation and improve living standards for people in urban areas. Therefore, the project implementation is regarded as the local socio-political task. | Thanks for the attention of all levels and branches to the project. The Project Owner will coordinate with the departments to build the project that brings maximum benefits to the local people. |
|     |             |                       |            | - Local authorities will create favorable conditions for the project to be implemented smoothly; | The Project Owner will quickly prepare procedures and documents for the project to be implemented as soon as possible. |
### No. | Stakeholder | Number of participants | Composition | Results of discussion | Project Owner’s feedback |
|------|-------------|------------------------|-------------|-----------------------|--------------------------|
|      |             | Male | Female | - Representative of City Land Fund Development Center;  
|      |             |      |        | - Representative of local authorities and mass organizations: Farmer's Union, Women's Union, Youth Union, Fatherland Front, ...  
|      |             |      |        | - Representative of PMU;  
|      |             |      |        | - Safeguard policy consultant.  
|      |             |      |        | - Departments contribute ideas to build a successful project; The Department of Natural Resources and Environment and the Land Fund Development Center monitor and contribute to the project's social safeguard reports.  
|      |             |      |        | - The reports will be sent to the departments and agencies for comments before submitting to obtain approval from the Provincial People's Committee and the World Bank. |
| 2   | Ward 1 (8h00-10/01) | 14   | 10     | - Local authorities and people completely support the project;  
|      |             |      |        | - Currently, waste water is an outstanding problem for the ward. The wastewater collection and treatment system project was strongly supported;  
|      |             |      |        | - The implementation of the project can solve local environmental problems. The project, with the support of local authorities and people, will soon accelerate the implementation of the project. |
## Stakeholder Engagement and Project Feedback

The table below summarizes the stakeholder engagement process and the project owner's feedback:

<table>
<thead>
<tr>
<th>No.</th>
<th>Stakeholder</th>
<th>Number of participants</th>
<th>Composition</th>
<th>Results of discussion</th>
<th>Project Owner’s feedback</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ward 2 (14h00-15/01)</td>
<td>8</td>
<td>7</td>
<td>- Representative of local organizations</td>
<td>- Engineers calculate and design a reasonable collection option of wastewater from households, without affecting the structure of people's houses;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Representative of PMU; Safeguard policy consultant's representative</td>
<td>- Items invested in ward 2 include: (i) Construction of urban water drainage systems; (ii) Establishing wastewater collection and treatment system. These 2 urgent items are invested in the ward.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Representative of People's Committee of wards/communes; Heads of residential groups; Representative of local organizations</td>
<td>- At present, the ward's drainage system faces many difficulties due to degradation and inconsistent investment. Stagnant wastewater is not collected, especially in the rainy season, causing environmental pollution and affecting people's health and daily life;</td>
</tr>
<tr>
<td></td>
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<td>- During the construction process, a good drainage system is required to avoid floods when it rains;</td>
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<td></td>
<td>- The PMU and the actual survey design consultant offer the optimal option to avoid affecting the houses and property of the local people;</td>
</tr>
</tbody>
</table>
### Stakeholders and Discussion Results

<table>
<thead>
<tr>
<th>No.</th>
<th>Stakeholder</th>
<th>Number of participants</th>
<th>Composition</th>
<th>Results of discussion</th>
<th>Project Owner’s feedback</th>
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<tbody>
<tr>
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<td></td>
<td>Male</td>
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</tr>
<tr>
<td>4</td>
<td>Ward 3 (8h00-10/01)</td>
<td>14</td>
<td>08</td>
<td>- Representative of PMU;</td>
<td>The project owner will comply with the policies of the Government and the Donor to ensure benefits for the people. Compensation policies will be developed specifically presented in the project's RAP report during FS preparation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Safeguard policy consultant’s representative</td>
<td>The project thanked the support of the local government and local people, fully agreed and acknowledged their which will be incorporated in the project documents;</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>- Representative of People's Committee of wards/communes;</td>
<td>02 items invested (i) Construction of urban drainage system; (ii) Construction of wastewater collection and treatment system. These two items will solve the problems of inadequate infrastructure of the ward;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Heads of residential groups;</td>
<td>- Agreed with the impacts and mitigation measures provided by the consultant in the project's EISA report;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Representative of local organizations</td>
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</tr>
<tr>
<td>No.</td>
<td>Stakeholder</td>
<td>Number of participants</td>
<td>Composition</td>
<td>Results of discussion</td>
<td>Project Owner’s feedback</td>
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<tr>
<td>5</td>
<td>Ward 4 (14h00-15/01)</td>
<td>22</td>
<td>17</td>
<td>- Representative of PMU; - Safeguard policy consultant’s representative - Representative of People’s Committee of wards/communes; - Heads of residential groups; - Representative of local organizations</td>
<td>- The authorities and local people thanked the attention of the city government and the PMU for investing in construction of infrastructure for the ward. Everyone agreed to support the project and expected that the project will be implemented soon; - The contractor will implement preventive and mitigation measures corresponding to each construction method.</td>
</tr>
<tr>
<td>No.</td>
<td>Stakeholder</td>
<td>Number of participants</td>
<td>Composition</td>
<td>Results of discussion</td>
<td>Project Owner’s feedback</td>
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<td>Male</td>
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<tr>
<td>6</td>
<td>Ward 5 (8h00-14/01)</td>
<td>13</td>
<td>9</td>
<td>- Representative of PMU;</td>
<td>- Items invested in ward 5 include: (i) Urban drainage system; (ii) Construction of wastewater collection and treatment system; (iii) Flood control in urban core areas. Meeting the needs of local infrastructure construction. Therefore, the Government and local people fully support the project and create favorable conditions for the project to be implemented smoothly in the area;</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>- Safeguard policy consultant’s representative</td>
<td>- The contractor shall be under the supervision of the PMU, Construction Supervisor and independent supervisor during the construction process.</td>
</tr>
<tr>
<td></td>
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<td>- Representative of People's Committee of wards/communes;</td>
<td>- The project complies with general policies of the Government and Donor;</td>
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<td>- Heads of residential groups;</td>
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<td>- Representative of local organizations</td>
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<td></td>
<td>locality;</td>
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</tbody>
</table>
### Stakeholder Engagement Table

<table>
<thead>
<tr>
<th>No.</th>
<th>Stakeholder</th>
<th>Number of participants</th>
<th>Composition</th>
<th>Results of discussion</th>
<th>Project Owner’s feedback</th>
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<td>7</td>
<td>Ward 8 (8h00-13/01)</td>
<td>14</td>
<td>13</td>
<td>- Representative of PMU; - Safeguard policy consultant’s representative - Representative of People’s Committee of wards/communes; - Heads of residential groups; - Representative of local organizations</td>
<td>- Ward 8 is invested in items including: (i) Construction of wastewater collection and treatment system; (ii) Construction of resettlement area for the project; (iii) Main road No.1; (iv) Road connecting ward 8 and 9.</td>
</tr>
<tr>
<td></td>
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<td>- The Project Owner selects a qualified contractor to ensure the construction quality and progress;</td>
<td>The project will commit to recruiting quality contractors, ensuring that the project progresses as well as the quality of the project.</td>
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<td></td>
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<td></td>
<td>- Agreed with the project’s Environmental and Social Impact Assessment reports on the expected impacts and mitigation measures. During the project implementation, it is necessary to strictly implement such mitigation measures.</td>
<td>The project receives comments from local authorities and people and thanks to their support;</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>- The reception of a large number of people from affected wards will also cause some difficulties for management work, as well as create a burden on facilities;</td>
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</tr>
<tr>
<td>No.</td>
<td>Stakeholder</td>
<td>Number of participants</td>
<td>Composition</td>
<td>Results of discussion</td>
<td>Project Owner’s feedback</td>
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<td></td>
<td>Support local laborers to work for the project.</td>
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</tr>
<tr>
<td>8</td>
<td>Ward 9</td>
<td>22</td>
<td>09</td>
<td></td>
<td>Local people and authorities fully support the project. In ward 9, two items are invested: (i) Construction of wastewater collection and treatment system and (ii) Road connecting ward 8 and ward 9.</td>
</tr>
<tr>
<td></td>
<td>(14h00-</td>
<td></td>
<td></td>
<td></td>
<td>Investment items in Ward 9 are important for socio-economic development and improvement of environmental sanitation;</td>
</tr>
<tr>
<td></td>
<td>13/01)</td>
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</tr>
</tbody>
</table>

Environmental and Social Impact Assessment
Vinh Long Urban Development and Climate Resilience Project
### Environmental and Social Impact Assessment
#### Vinh Long Urban Development and Climate Resilience Project

<table>
<thead>
<tr>
<th>No.</th>
<th>Stakeholder</th>
<th>Number of participants</th>
<th>Composition</th>
<th>Results of discussion</th>
<th>Project Owner’s feedback</th>
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<tbody>
<tr>
<td></td>
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<td>Male</td>
<td>Female</td>
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<td></td>
<td></td>
<td>11</td>
<td>08</td>
<td>groups;</td>
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</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>- Representative of local organizations</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>- During the project implementation process, it is necessary to strictly implement the project's safeguard policies. There is a close monitoring mechanism;</td>
<td></td>
</tr>
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<td></td>
<td>- PMU selects qualified contractors for quick construction and ensuring project quality;</td>
<td></td>
</tr>
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<td></td>
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<td></td>
<td>- Implementing measures to minimize social and environmental impacts as stated.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Establishing a community supervision board which is composed of local officials and affected people.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Tan Ngai commune (9h00-15/01)</td>
<td>11</td>
<td>08</td>
<td>- Representative of PMU; - Safeguard policy consultant’s</td>
<td>Vo Van Kiet extended road has been constructed in commune that helps connect the traffic of Tan Ngai commune with adjacent wards/communes. - Everyone agreed to support the project</td>
</tr>
</tbody>
</table>
### Stakeholders and Number of Participants

<table>
<thead>
<tr>
<th>No.</th>
<th>Stakeholder</th>
<th>Number of Participants</th>
<th>Composition</th>
<th>Results of discussion</th>
<th>Project Owner’s feedback</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Male</td>
<td></td>
<td></td>
<td>- Representative of People's Committee of wards/communes;</td>
<td>Implementation and create favorable conditions for the project to be implemented smoothly;</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td></td>
<td></td>
<td>- Heads of residential groups;</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Representative of local organizations</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td></td>
<td></td>
<td>- Site clearance work will be carried out smoothly if the policies of the Government and the Donor are strictly followed;</td>
<td>The site clearance of the project will comply with the Government's policies, the donor's regulations and the project's own policy (Resettlement Policy Framework and Resettlement Action Plan), ensure maximum benefits for the people. All impacts on land and property of the people are compensated at replacement cost.</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td></td>
<td></td>
<td>- During the construction process, measures to minimize impacts on the environment, activities and health of the people shall be implemented;</td>
<td>The project will strictly follow the mitigation measures mentioned above to minimize the impact on people's life and health under the supervision of independent supervisors, PMU and the Donor.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>- All impacts on local people are adequately compensated.</td>
<td>The project will ensure the maximum benefits of the people. All impacts on land and property of the people are compensated at replacement cost.</td>
</tr>
</tbody>
</table>

*Note: Public and stakeholder consultation will continue to be carried out under the project's "Stakeholder Engagement Plan" (SEP), especially during the FS preparation stage.*
SOME PICTURES ABOUT CONSULTANCY

Meeting in Ward 1

Meeting in Ward 2

Meeting in Ward 3

Meeting in Ward 4

Meeting in Ward 5

Meeting in Ward 8
Meeting in Ward 9

Meeting in Vinh Long city

Environmental and Social Impact Assessment
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6.4. Information disclosure

The first draft ESIA, RPF, SEP, LMP, and ESCP in Vietnamese were disclosed locally at the wards/communes within the project area, at the People’s Committee of Vinh Long City and the PMU on Feb 20, 2020 for public consultation. Based on the contents of ESIA, local people can get information of the Project and contribute their opinions/comments on environmental issues. The draft ESIA, and final RPF, SEP, LMP, and ESCP in English was disclosed at the WB external website on March 19, 2020 for public consultation. The final ESIA both in the local language and English will be disclosed locally at the project sites and at the WB external website.
CHAPTER 7. CONCLUSIONS AND RECOMMENDATIONS

The proposed project is expected to bring about significant positive impacts such as improving urban environmental sanitation and landscape, enhancing access for the project area thus contributing to sustainable socioeconomic development in the Project area. Most of these positive impacts are expected to be achieved during the operation phase of the Project.

On the other hand, some potential negative environmental and social impacts and risks may also happen during the construction and operation of the facilities provided under the Project. These include increased dust, noise and gas emission, vibrations, generation of solid wastes and wastewater, surface water quality reduction, traffic disturbance and increased traffic safety risks, damages to existing infrastructure (power/water supply, irrigation etc.) and disruption of related services increased localized flooding/sedimentation and erosion risks, health and safety issues for the public and the workers etc. These impacts are predicted to be at low to moderate level, and manageable through the environmental and social management plan proposed for this project. Therefore, the Project should be implemented.
APPENDIX

APPENDIX 1: VINH LONG UDCR PROJECT DREDGED MATERIALS MANAGEMENT PLAN

1. Location of Dredging, Volume and Characteristics of Dredged Materials

- Dredging and rehabilitation of 22.0km of canals: The total volume of sludge dredged is about 42,000 m³

2. Final Disposal Site

According to the analyses in chapter 2, the sediments from the canal dredging work are not hazardous, with heavy metals lower than the acceptable limits. However, the dredging soils and sediments have high amount of organic compounds and pathogenic microorganisms (e.g. Ecoli) thus should not be used directly for agricultural purpose. It is recommended the sediments would be dewatered and kept at least 03 months to allow partial biodegradation of organic substances and removal of microbial organisms. The sediments could then be used for perennial crops or planting tree for urban landscape purpose, based on the actual needs of local people. Otherwise, it will be transported and disposed at Hoa Phu Waste Treatment facility or Phuong Thao Waste Treatment Plant.

The disposal site- Hoa Phu and Phuong Thao landfill is away approximately 12 km and 14 km from dredging area.

Although a separate management plan is prepared for the excavated materials of the entire project, disposals of the excavated materials will also follow the above principles. During construction phase additional tests for deeper layer will also be carried out by the contractors.

3. Contractor’s Dredging Management Plan

The Contractor is required to prepare a Contractor’s Dredging Management Plan (CDMP) and submitted to the Environmental Consultant of the Construction Supervision team and the PMU Environmental Officer for review and approval. The CDMP will include, but not limited to the followings:

- The Scope of Works in the Contract package, construction method and schedule
- Volume and quality of water quality and sediment quality in the dredging area covered by the contract
- Water users that may be affected by the dredging and embankment lining
- Materials uploading and transportation method: indicate proposed route of the transport from the dredged site to the disposal area, time of operation, type of vehicles/trucks and proposed measures to reduce the leakage of the dredged materials from the transport 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
- Mitigation measures to address the potential impacts and risks. The mitigation measures should be proposed based on ESIA/ESCOP, ESMP, SEMP, the potential impacts and mitigation measures presented in Section 4 and 5 of this Plan and the following requirements:
- Environmental Quality Monitoring plan carried out by the contractor (particularly pH, DO, TSS, BODs, for water and heavy metals including pH, Hg, As, Cd, Cu, Pb, Zn and Cr, Organic Materials and Mineral Oils for sediments and soil
- For soil and sediment: The number of samples taken will follow the following guidelines
Table 1: The number of Sediment samples

<table>
<thead>
<tr>
<th>Volume of dredged (m³)</th>
<th>No of Sediment Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 25,000</td>
<td>3</td>
</tr>
<tr>
<td>25,000 to 100,000</td>
<td>4-6</td>
</tr>
<tr>
<td>100,000 to 500,000</td>
<td>6-10</td>
</tr>
<tr>
<td>500,000 to 2,000,000</td>
<td>10-20</td>
</tr>
<tr>
<td>For each 1,000,000 above 2,000,000</td>
<td>Additional 10</td>
</tr>
</tbody>
</table>

At least one water, soil and sediment sample must be taken for each contract package

- Consultation with affected community about the draft CDMP
- Excavated soil are separated from dredged materials from source. Excavated soils will be reused on-site and off-site as much as possible and transported to the nearest disposal site appraised under ESIA, or identified and approved during detail engineering design or construction phase;
- The mitigation measures are adequate to address the potential social and environmental impacts associated with various steps and activities, areas of influence and receptors of dredging, temporary storage, transportation and final disposal of the dredged materials.
- Field survey are carried out by the Contractor during the preparation of the CDMP in order to identify if there are additional sensitive receptors not identified previously under Vinh Long UDCR project and proposed additional site-specific mitigation measures accordingly.
- Contractor’s environmental monitoring plan are included
- Commitments to carry out corrective actions when excessive pollution is determined, or when there are complaints about environmental pollution, social impacts from any stake holders

4. Potential Impacts and Mitigation Measures for Dredging and Embankment lining

<table>
<thead>
<tr>
<th>Impacts and Description</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AT DREDGING and TEMPORARY LOADING AREAS</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Odour and air pollution, nuisance | - Inform the community at least one week before dredging is started  
- Minimise the duration of temporary loading of dredged materials on-site  
- temporary loading materials must be transported to the disposal site within 48 hours  
- Load the materials on-site tidily  
- Do not load the materials temporarily outside the construction corridor determined for each canal section  
- Avoid loading the sludge in populated residential areas or near public buildings such as kindergarten. Load the sludge as far from the houses and buildings as far as possible  
- Cover the temporary sludge loads when loading near sensitive receptors or longer than 48 hours unavoidable |
| Decomposition of organic matters under anaerobic conditions generates strong odour-generated gases such as SO₂, H₂S, VOC etc. When the muds are disturbed and excavated, these gases are released much faster into the air. Exposure to odour pollution affect the health of workers, local residents and cause public nuisance | |
| Dust and nuisance | - Avoid temporary loading of dredged materials on-site  
- Dredged materials must be transported to the final |
Environmental and Social Impact Assessment  
Vinh Long Urban Development and Climate Resilience Project

<table>
<thead>
<tr>
<th>Impacts and Description</th>
<th>Mitigation Measures</th>
</tr>
</thead>
</table>
| Temporary loading of sludge at the construction site cause nuisance to the public  
Dry and wet mud may be dropped along the dredging area and on transportation route causing nuisance to the public and traffic safety risks | disposal sites earliest possible and no later than 48 hours from dredging.  
- Use truck with water-tight tank to transport wet/damp dredged materials;  
- All trucks must be covered tightly before leaving construction site to minimise dust and mud dispersion along the road |

| Traffic Disturbance  
The placement and operation of dredging equipment and construction plants on the ground, temporary loading of the dredged materials may obstruct or disturb traffic and cause safety risks for the people travelling on the canal-side road, particularly on canal-crossing bridges which are usually very narrow | - Arrange worker to observe and direct excavators driver when traffic is busy |

| Social Disturbance  
Concentration of workers and equipment, construction plants, temporary loading of materials and wastes, traffic disturbance, dusts and odour pollution etc. will disturb daily activities and the lives of local residents  
Conflicts may also be arisen if workers, waste, materials, equipment etc. are present outside the construction corridor | - Inform the community at least one week before construction is started  
- Monitor to ensure that physical disturbances are within the construction corridors only  
- Contractor recruit local labours for simple works, brief them about project environmental and safety requirements before started working  
- Contractor register the list of workers who come from other localities to the commune at the construction site  
- Led the water leaked from wet/damp dredged materials going back to the river, not to affect garden or agricultural land  
- Keep the areas to be disturb minimal  
- Enforce workers to comply with codes of conducts |

| Landslide and soil subsiding risks at dredging area  
Relative deep excavation or cut and fills on the embankments that create slopes may lead to landslide and soil subsiding at the slopes or excavated areas, particularly in rainy weather  
Deep excavation also cause risks to the existing buildings nearby, particularly the weak structures or located too close to the deep excavation area | - During field survey for the preparation of CDMP, the contractor in coordination with the Environmental Officer of PMU and the Environmental Consultant of the CES identify weak structures that may be at risk and determine appropriate mitigation measures accordingly  
- Consider and select appropriate dredging method that allow minimising soil subsiding risks, for example carry out stepped excavation, stabilise slops in parallel to dredging  
- Apply protective measures such as sheet piles at risky locations |

| Water Quality Degradation  
Turbidity in water will be increased when the mud is disturbed; Water leaked from dredged material and surface runoff through disturbed ground also contain high solid contents. Muddy water entering irrigation ditch will cause | - Build coffer dams surrounding the dredging area and pump the water out before starting dredging  
- If dredging is carried out directly onto the water, dredge at intervals to allow suspended materials to resettle before continuing. Observe water colour at 20 m upstream and stop dredging when water colour there started to change |
<table>
<thead>
<tr>
<th>Impacts and Description</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>sedimentation. Aquatic livest in the canal would also be affected by turbid water.</td>
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</tbody>
</table>
| Increased Safety risk for the Public | - Place stable barriers along the construction corridor boundary to separate the site with nearby structures  
- Place warning signs and reflective barriers along the construction area, at dangerous locations and within sensitive receptors  
- Ensure adequate lighting at |
| Health and Safety risk to the workers | - Within two weeks before dredging is started, the contractor will coordinate with local authority to identify good swimmers or those who can dive in the locality, and hire at least one of them at each canal construction site deeper than 3 m and there are workers working on or near water surface.  
- Provide and enforce the workers to use masks. If and when working in the water, protective cloths, rubber boots, gloves and hats must be worn. |
| The health of workers may be affected due to exposure to odour and other contaminants from sludge  
Risk of being drown | |
| Others | - Other relevant measures specified in ESCOP or proposed by the contractors as necessary |
| MATERIAL LOADING AND TRANSPORTATION | |
| Dust and nuisance, traffic safety risks  
Dust or wet materials may be dropped along the transportation route | - Use water-tight tank trucks for transporting wet/dam materials  
- Cover the materials tightly before leaving the construction site  
- Do no overload material on the trucks |
| AT FINAL DISPOSAL SITE | |
| Landslide and soil subsiding risks at final Disposal site | - Level the materials after being disposed off  
- Slopes of the dumps will not be steeper than 45°  
- Build/create the walls to protect slopes  
- Create and maintain drainage at the foot of each dump higher than 2 m |
| Landslide and subsiding risk may happen on slopes created at the final disposal site of dredged materials if the slopes created are too high, steep or unstable | |
| Soil and Water Quality Pollution | - Apply measures that ensure rainwater onto the materials is not mix with the surface runoff from the surrounding to overflow uncontrolled at the site; rainwater will be infiltrated onto the ground on-site. This can be done by the following mitigation measures:  
- Build drainage ditches surrounding the designated disposal area  
- Use impermeable materials to cover the walls surrounding the materials to isolate it with the surrounding  
- Other measures proposed by the contractors to meet pollution control targets |
5. Specific Guidance for Dredging at Tan Huu, Nga Cay, Binh Lu and other canals

Identifying the available land for disposing the dredged materials. The plan should also identify the possible lands to be appropriated for the disposal of dredged materials. Public land, land for construction of rural roads, public works, private land, etc. may be used, with an agreement with the project affected households. It should also meet local plans for land use.

Preparing for a transportation plan. In case, the dredge disposal area is far away from the dredged sites, the DMP shall set out a transportation plan including: (a) methods of transportation (pipeline, barges, hopper barges) and uploading to the disposal area. If trucks are used, indicate proposed route of the transport from the dredged site to the disposal area, (b) time of operation, (c) type of vehicles/trucks and proposed measures to reduce the leakage of the dredged materials from the transport trucks, (d) contractors’ responsibilities for cleaning the roads and carry out remedial works if necessary, and (e) a communication plan for the nearby communities including contact number for possible complaints.

Plan for managing the disposal areas including: (a) plan for reducing the drainage, (b) construction of the perimeter dykes, (c) construction of sub-containment area, if applicable, (d) planned thickness of the dredged materials (typically less than 1.5 meters), (e) any measures to protect ground water and soils (e.g., installation of PVC membrane).

Designing the Draining for Disposal lands. As the dredged materials are in the state of mud at first and soil particles are suspended for 24 to 48 hours. All drainage water from disposal land shall be driven to the drains and discharged back to the river. In order to limit the negative impacts of mud (produced by dredging) on the environment as well as the water quality of the canals, the dredged sediment will be transported to a containing area which is appropriately located and properly design with an adequate size. The dredged spoil will be pumped to the disposal land and then overflow to a settlement pond, where turbidity and total suspended solids are settled. After some time, effluent is returned to the river. A typical design of the dike around each disposal may be as follows: Height: 2m, Footing width: 5 m, and Surface width: 1m. The plan should set out a basic layout.

Monitoring the Disposed Dredged Materials. A plan for monitoring the dredged materials as well as water quality of effluent would be required. As stated before, an intensive monitoring would be required if the dredged materials contain higher content of the heavy metals and other harmful materials than the national thresholds.

In order to mitigate the issue of turbidity during dredging operation, the DMP shall set out dredging equipment and/or techniques suitable to the particular site. On laying dredging machines on a barge, contractors can use a proper mud-stopping net for enclosing the dredging site and keeping back mud on land, not to let it goes back to the canal. If the disposal site for dredge materials is located far away from the dredger, a suction dredger should be used to transfer all the mud and soil in water to the disposal sites. The length of dredging sections should be limited less than 1 km and the dredging should be done one by one.

At the completion of the contract, carry out an assessment on dredged materials, and determine the use of the dredged materials for activities such as: (a) construction (roads and dykes), (b) basis for individual houses, and (c) gardening.
**APPENDIX 2: LABOR MANAGEMENT PLAN (LMP)**

**ACRONYMS AND ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>DARD</td>
<td>Provincial Department of Agriculture and Rural Development</td>
</tr>
<tr>
<td>DOC</td>
<td>Provincial Department of Construction</td>
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<tr>
<td>DONRE</td>
<td>Provincial Department of Natural Resources and Environment</td>
</tr>
<tr>
<td>DPI</td>
<td>Provincial Department of Planning and Investment</td>
</tr>
<tr>
<td>ESF</td>
<td>Environmental and Social Framework</td>
</tr>
<tr>
<td>ESIA</td>
<td>Environmental and Social Impact Assessment</td>
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<tr>
<td>ESMP</td>
<td>Management Plan</td>
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<tr>
<td>ESS</td>
<td>Environmental and Social Standards</td>
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<tr>
<td>GBV</td>
<td>Gender-based violence</td>
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<tr>
<td>GOV</td>
<td>Government of Vietnam</td>
</tr>
<tr>
<td>GRM</td>
<td>Grievance Redress Mechanism</td>
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<tr>
<td>LMP</td>
<td>Labour Management Procedures</td>
</tr>
<tr>
<td>MDR</td>
<td>Mekong Delta Region</td>
</tr>
<tr>
<td>OHS</td>
<td>Occupational health and safety</td>
</tr>
<tr>
<td>PAPs</td>
<td>Project Affected Persons</td>
</tr>
<tr>
<td>PMU</td>
<td>Vinh Long ODA Project Management Unit</td>
</tr>
<tr>
<td>RPF</td>
<td>Resettlement Policy Framework</td>
</tr>
<tr>
<td>SEA</td>
<td>Sexual Exploitation and Abuse</td>
</tr>
<tr>
<td>SEP</td>
<td>Stakeholder Engagement Plan</td>
</tr>
<tr>
<td>WB</td>
<td>World Bank</td>
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</table>
1. **INTRODUCTION**  

The Socialist Republic of Vietnam intends to apply for a loan from the World Bank to finance the proposed Vinh Long Urban Development and Climate Resilience Project hereafter referred as “the Project”. This project addresses the environmental and social aspects through the World Bank’s Environmental and Social Stands (ESS) approach/framework.

2. One of the Standard, ESS2, relates to Labor and Working Conditions and expects the Borrowers to develop labor management procedures (LMP). The purpose of the LMP is to identify the main labor requirements and risks associated with the project and help the Borrower to determine the resources necessary to address project labor issues. The LMP will enable different project-related parties, for example, staff of the project management unit, contractors and sub-contractors and project workers, to have a clear understanding of what is required on a specific labor issue. The LMP is a living document, which is initiated early in project preparation, and is reviewed and updated throughout development and implementation of the project.

3. Scope of the LMP is outlined in the World Bank’s ESS2. The engagement will be planned as an integral part of the project’s environmental and social assessment and project design and implementation. This document has 12 chapters. Chapter 1 served as Introduction. An overview of labor use in the project is presented in Chapter 2. Key potential labor risks are listed in Chapter 3. Legislative Framework governing labor employment in Vietnam 2 is discussed in Chapters 4 and 5. Implementation Arrangements, Age Requirement, Policies and Procedures and Timing of labor requirements follows in the subsequent chapters. Grievance Redressal Mechanism and Contractor Management are presented in the last two chapters 10 and 11 respectively, while Chapter 12 relates to primary supply workers.

4. **OVERVIEW ON LABOR USE ON THE PROJECT**

The proposed project will take an integrated multisectoral approach to promote the economic and demographic densification of Vinh Long’s urban core, thereby unlocking the City’s development potential and enabling the City to function as an economically and physically integrated metropolitan area. The project investments include a comprehensive set of structural and non-structural interventions to improve access to infrastructure and to reduce the flood and environmental pollution risk in the urban core area of Vinh Long city, through developing flood control systems and nature-based solutions, wastewater collection and treatment, as well as key transport links.

5. These measures will eliminate the physical constraints to development in the urban core, increase land values, stimulate private capital investments, and reduce the pressure for urban sprawl. Increased demand on land will also create an opportunity for the local government in Vinh Long to capture some of the associated land value increase from private development. By providing comprehensive improvement to infrastructures in the urban center, where the majority of poor people live and increasing the connectivity of these areas to other parts of the city, especially centers of employment, the project is expected to improve the living conditions of the poor and vulnerable populations and increase their accessibility to jobs and public
services. Citizens and community organizations will be engaged throughout the project preparation and implementation process in order to raise their awareness about flood risks and enhance their ownership of the project. Providing technical assistance to improve urban planning, transport management and the operation and maintenance of infrastructure will enable the city to become more interconnected, livable and resilient to disasters. The project is organized around four components:

- **Component 1: Flood risk management and environmental sanitation.** The objective of this component is to reduce flood related risks and improve environmental sanitation in the urban core of Vinh Long city through investments in drainage, flood protection structures, sewage networks and wastewater treatment, as well as improved institutional arrangements and Operation and Maintenance (O&M). In addition to improving the environmental sanitation conditions in the city, the upgrading of wastewater collection and treatment in Vinh Long will contribute to improving surface water quality. Design of this component was based on existing national building codes and standards and investment proposals were selected based on assessment of the flood risks, including flood hazard and the vulnerability of the affected community. Investments will consist of a balance between grey and green infrastructure (or nature-based solutions).

- **Component 2: Strategic corridors development.** Development of the core urban area is currently segmented by several national roads with the inter-city traffic flow passing through the city, leading to safety concerns and air pollution. This component will finance prioritized investments in roads as identified in the City’s Master plans, in order to increase regional and intra-city connectivity. Specifically, the project will finance three urban roads: the first two roads run through the existing built-up area, creating important vertical and horizontal links in the urban road network; the third road diverts inter-city traffic from the national roads and future expressway and serves as a development boundary to the south. Two of these three roads in the south also form part of the overall flood control scheme, serving as the boundary of the current and future polder system. The proposed roads will improve traffic safety by providing alternative routes for the inter-city traffic to bypass the city centre, provide better accessibility for residents to jobs, education, and other services, and allow for mixed land uses and densification in less flood prone areas. Increased accessibility and connectivity as a result of the new and improved transport infrastructure is likely to increase land values and investment opportunities along transport corridors, which is value-creation that the government can capture using a variety of mechanisms. Land use regulations and development control will be carefully considered along the road in the south that forms the city’s development boundary. In doing so, the city has the opportunity to proactively guide urban growth to areas with lower flood risk and densify the urban core area, while minimizing the risk of urban sprawl.

- The project will also promote non-motorized transport options as well as consider the future creation of urban public transport networks in the design of main roads. The road width will be based on sound analysis of travel and traffic demand. Traffic safety issues

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5 Draft Adjusted Construction Master Plan of Vinh Long City, and approved Adjusted Transport Development Master Plan up to 2020 with a vision to 2030 dated 2018
will be thoroughly reviewed and addressed, especially at intersections with major roads and transit roads of national highways/bypasses, as well as pedestrian crossings. To address the potential impacts of climate change, road drainage structures will be designed based on hydrologic analyses that adopt climate change scenarios while the elevation of roads will take into account projected increases in seawater levels. The design will also incorporate international experience in nature-based solutions such as “green roads” comprising pervious pavement and water absorbing tree pits and landscape, as well as universal access criteria to provide a network of accessible pedestrian routes with appropriate tactile pavement and improved sidewalk space and pedestrian crossings, while taking into account appropriate parking spaces for motorcycles to reduce the obstruction to pedestrians.

- **Component 3: Resettlement Area Development.** The project will try to minimize resettlement impacts through adopting fit-for-purpose standards and appropriate design, however, significant resettlement impacts are expected due to the proposed investments, particularly under the embankments in Component 1 and the roads in Component 2. An estimated 550 households may have to be relocated under the project. This component will ensure improved living conditions and security of tenure for those target communities who are subject to relocation and resettlement under the project. An investment for technical and social infrastructure at the resettlement site in Ward 8 of Vinh Long City will be proposed with green and nature-based solutions incorporated, such as park connectors, water absorbing tree pits and landscapes, pervious pavements, stormwater detention ponds, raingardens, etc. This resettlement site covers an area of 12.5 hectares which is currently agricultural land and not occupied by any households, easing the compensation process. In addition, the resettlement site is assessed to be appropriate, as it is just 5 km from the city centre and close to National Road 53. Services (water, drainage, electricity, access roads) are already present along the proposed resettlement area, which will facilitate the development of the site.

- **Component 4: Enhancing Climate Resilience and Leveraging Disruptive Technologies in Urban Management.** This component aims to improve urban management in a climate and risk informed manner and to set the stage for the development of Vinh Long as a smart city through leveraging disruptive technologies. The proposed project will support implementation of Vinh Long’s smart city ICT framework currently being developed, through investments in data and ICT infrastructure including software, in conjunction with counterpart fund from the province. Key investments under Component 4 include: an integrated flood risk management information system and strengthened O&M; a geospatial data sharing platform to improve data sharing across different departments; and an intelligent transportation system (ITS). Component 4 will also provide technical implementation support to the implementing agencies in Vinh Long.
2.1 Type of workers

6. ESS2 categorizes the workers into: direct workers, contracted workers, community workers and primary supply workers. As indicated in the Concept Stage Environment and Social Review Summary (ESRS) prepared for the Project, the Project’s workforce will include direct workers (directly employed by PMU), contracted workers (recruited by third parties such as contractors or as consultants), and primary supply workers. The project is not likely to engage community workers, as civil works will be the responsibility of contractors. The sections below provide detailed description of the type and number of workers to be engaged throughout the project life.

2.2 Direct workers

7. Under the Vinh Long Project, direct workers are workers directly employed by the PMU. It includes staff in Project Management Unit (PMU), as described below:

- **Project Management Unit (PMU):** The PMU is responsible for the management and supervision of overall implementation of the Project, including construction work by the contractors. The PMU will require support from the consultants in specific technical areas (i.e. in project management and coordination, financial management, procurement, construction, environmental/social safeguards, monitoring and evaluation, among others), as they are unlikely to have sufficient expertise to manage the whole project. The timing of labor requirements is from the project preparation to the completion of the project.
2.3 Contracted workers

8. The PMU will engage around 6 contractors for carrying out the implementation of the different works under component 1, 2 and 3 and 2 supervision contractors with subcontractors. The labor requirements will depend on the scale of the individual civil work under each construction package. The timing of labor requirements will fluctuate, dependent on the construction stages. The experience of SUUP in Vinh Long indicates that the contractor will engage approximately 50 workers in each LIA, 80 workers for each canal upgrading, and 70 workers for road. The different categories of anticipated contracted workers are presented below.

- **Skilled permanent staff of the contractors (construction company):** The permanent technical staff of the contractors will be engaged in the project, including project managers, project engineers, environmental engineers, construction foreman, medical officer, admin and finance officer.

- **Skilled workers engaged by sub-contractors:** Depending on the available expertise within the contractors and other factors, the contractor may engage sub-contractors for some technical work, which may include heavy machine operators for hauling, road roller/soil compaction, sand/quarry loading, and grader/excavation. The contractor may engage such subcontractors locally.

- **Unskilled community members engaged by the contractor:** The project is designed to maximize the employment generation through engaging community members as unskilled workers especially in LIAs. To ensure equal opportunities in employment, the contractor will be contractually required to coordinate with the PMU to prioritize the host communities and vulnerable groups in the engagement of such workers, including female workers and persons with disabilities. Mass organizations are expected to support the selection of unskilled workers.

- **Construction Supervision Consultant:** A construction and supervising consultant (firm or international organization) will be engaged by the PMU to provide day-to-day construction oversight for the civil works. The construction and supervision consultant team will consist of 15 to 20 national experts, including project manager, sanitation, water supply, water drainage, M&E, hydraulic and road design engineer, project support officer, geospatial technical officer, quantity and cost estimator, community liaison officer and environmental, health and safety officer. The procurement process for the consultant team will start during project preparation, but the consultant will be on board in the early stage of project implementation. The construction and supervision consultant will support the PMU until the completion of the civil works.

- **Independent Monitoring Consultants:** Independent Monitoring Consultants for environment and for social issues will be engaged by the PMU. Independent monitoring consultants are responsible to ensure compliance with approved plans and programs related to environmental and social issues. The independent monitoring consultants will be engaged at the beginning of the implementation period and will complete their works from 6 months to 1 year after all resettlement/environmental activities have been satisfactorily completed.
2.4 Primary supply workers

9. The construction work under the Project will require primary supplies essential for the functions of the priority infrastructure, such as construction materials including aggregates, bitumen and precast concrete interlocking blocks. Where the contractor will source such materials directly from primary suppliers on an ongoing basis, the workers engaged by such primary suppliers are deemed “primary supply workers”, as defined in ESS2. The number and type of primary suppliers will be determined at project implementation stage. The timing of labor use of primary supply workers will cover the construction stage of the project (see Section 12 for more details on primary supply workers).

2.5 Community workers

10. The project will not have community workers as defined under ESS2. The community members to be engaged by the contractors will be categorized and managed as “contracted workers”.

2.6 Other stakeholders working in connection with the project

11. Stakeholders working in connection with the Project other than the above project workers will include the Government civil servants. Some city and provincial government civil servants will be working in connection the Project, which will include DOC, DARD, DONRE, DPI. They will remain subject to the terms and conditions of their existing public sector employment, which are governed by the Vietnam Labor Code, the Law on Public Employees, and the Law on Civil Servants. There will be no legal transfer of their employment or engagement to the project. The Constitution and the Labor Code prohibit child labor and forced labor. The government civil servants involved in the Project are not expected to be exposed to OHS risks under the project as they will not engage in project-related civil works.

2.7 Total number of workers

12. The total number of workers is estimated at 405. The number of workers by categories is identified in Table 1.
Table 83: Estimated number of workers

<table>
<thead>
<tr>
<th>Type of project workers</th>
<th>Characteristics of project workers</th>
<th>Timing of labor requirements</th>
<th>Indicative number of workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct workers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>o PMU staff</td>
<td>o National staff</td>
<td>o From project preparation until project completion</td>
<td>o PMU staff: approx. 20 Total: 20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Contracted workers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Construction &amp; supervision consultants</td>
<td>o International and national experts</td>
<td>o From early stage of project implementation until project completion</td>
<td>o Construction supervision consultants: approx. 20 o Independent monitoring consultants approx. 15 o Skilled workers of the contractors: approx. 120 o Skilled workers of sub-contractor: approx. 10 o Unskilled workers: approx. 70 Total: 235</td>
</tr>
<tr>
<td>o Independent Monitoring consultant</td>
<td>o National experts</td>
<td>o Mostly national technical permanent staff</td>
<td></td>
</tr>
<tr>
<td>o Skilled workers engaged by the contractors</td>
<td>o National/local host community members (in LIAs), female workers and persons with disabilities.</td>
<td>o The timing of labor requirement will fluctuate, dependent on the construction stages, which will be determined by individual contractors at the contract award stage.</td>
<td></td>
</tr>
<tr>
<td>o Skilled workers engaged by subcontractors</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>o Unskilled workers</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>Primary supply workers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Workers engaged by primary suppliers at quarry sites (construction materials)</td>
<td>o They are most likely local workers.</td>
<td>o The construction stage of the project.</td>
<td>o The primary supply workers will be identified during the project implementation stage expected: approx. 150 Total: 150</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community workers</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

3. ASSESSMENT OF KEY POTENTIAL LABOR RISKS ACTIVITIES

3.1 Project activities

13. The project activities will include:

- **Under component 1:** i) rehabilitation and improvement of the canal and drainage system in the core areas, including construction of new drains, dredging of canal systems, creation of rainwater retention areas, etc. ii) construction of a wastewater treatment plant and rehabilitation and construction of sewer collection networks; iii)
embankment upgrading with tidal sluicegates/valves”, a drainage system including open canals, sewers, storm rainwater retention, and pumps (if needed).

- **Under component 2**: Construction of urban roads and bridges along with corresponding road drainage system, sidewalks, street lighting and road furniture.

- **Under Component 3**: Construction of technical infrastructures (i.e. sewage, water treatment plant, water supply, drainage, inner roads, electric poles, sidewalks etc.) and social infrastructures (i.e. kindergarten) at the resettlement site.

14. Most of the construction activities will take place within the urban core area which may involve densely populated business premises. Indicative project activities to be carried out under the Project are the following:

**Component 1:**

- Improving flood prevention infrastructure in core area;
  - Construction of a new drainage system;
  - Dredge canal system;
- Construction of a wastewater collection and treatment system
  - Laying of pipes
  - Construction of valve chambers
  - Construction of storage reservoirs
  - Construction of a booster pump station
  - Construction of a waste water treatment plant
  - Construction of sanitary facilities
  - Concrete works
- Flood control
  - Construction of embankments along the Long Ho river;
  - Construction of a tidal gate;
  - Construction of a pumping station;
  - Dredge and rehabilitate drainage routes

**Component 2:**

- Site preparation
  - After the construction site is handed over, the contractor will clean and remove the trees, surface objects such as garbage, unnecessary materials out of the site.
  - Checking existing structures
- Prepare and mobilize equipment for construction
  - Transporting and gathering specialized equipment for separate tasks. Synchronous equipment includes: (i) Geodetic survey equipment with sufficient accuracy as required; (ii) Equipment for soil work, excavation, grading, and compaction; (iii) Equipment for production, transportation, testing of construction materials and concrete in the field; (iv) Other related management equipment;
  - Making plan to use equipment completely and synchronously for each stage of construction;
Transportation of construction material including excavated soil, gravel, sand, rocks and water to the construction sites;
- Protecting construction site and structures, installing signage.
- Construction work: After cleaning and clearing the construction site, infrastructure items will be constructed from low to high priority. Construction activities include:
  - Clean the site, dredge organic and sludge, demolish the old road foundation (within the road structure);
  - Organize sand blasting K95 to the elevation of the road bottom;
  - Monitor subsidence and subsidence compensation;
  - Construct water supply and drainage systems, lighting; planting trees ...
  - Construct road structure including: (K98 soil layer, crushed aggregate base course, crushed aggregate subbase course; asphalt concrete for lower and upper layers);
  - Complete sidewalks, curbs, paths up and down for the disable persons if any; Road marking and, installing road signs, etc.

Component 3:
- Potentially any of above construction activities.

3.2 Key labour risks

15. Drawing upon the experience and lessons learned from the SUUP and other similar projects, the following are key labor risks anticipated and assessed during the implementation of the Project.

(1) Occupational health and safety (OHS) risks:

Component 1:

a) Accidents due to falling: Incorrectly installed scaffolding, open walls, manholes on roadbeds, uninsured ladders and unprotected steel bars are the most common risks leading to labor accidents for construction workers.

b) Risks of working on water surface: It may occur during the construction intersecting with canals, constructions of tidal sluicegates, river embankments and rehabilitation of drainage ditches.

c) Falling objects: During construction process, it is necessary to mobilize many types of construction machinery, equipment and materials. All heavy tools and equipment and supplies may fall from the high level and helmets are not effective. If the site area is not enclosed or something may fall from a crane out of the construction area, the pedestrians may also be hit by these objects.

d) Accident due to ditches and trenches: During the process of excavation and construction of drainage system, collapse may occur. If the excavated material is too close to the trench, the material may fall back and cause serious injury.

e) Electrical shock: Exposure to overhead or underground high voltage lines may cause death. Damaged power tools or conductors can also cause injury due to electric shock.

f) Physical injury due hard work: Back injuries caused by lifting heavy objects or improper posture.
g) Heavy equipment: Injury may start from heavy equipment. The machineries may malfunction or fall down. Careless operation of the crane can also be one of the common devices that cause accidents. In addition, the construction activities involving heavy machineries will be quite noisy. Loud, repetitive, and excessive noise causes long term hearing problems, such as deafness. Noise can also be a dangerous distraction and may distract the worker from the task at hand, which can cause accidents.

h) Contamination during infectious disease outbreaks if frequent and proper hygiene practices are not consistently applied (in particular frequent and proper hand hygiene and wearing masks to serve as barriers to human-to-human transmission of virus).

16. The impact level of above risks is assessed from small to medium as: (i) the impacts are localized within the construction site and scattered in the local areas; (ii) short construction period from 15-24 months; (iii) workers are provided with protective equipment, reasonable construction time; (iv) mitigation measures for these risks have been provided in the ECOP in ESIA and workers will be trained on labor safety, traffic safety, sanitation before starting any civil works.

**Component 2:**

a) Road or bridge construction sites pose risks to the workers of constantly moving heavy vehicles and dump trucks maneuvering around on an uneven terrain.

b) The construction activities involving heavy machineries will be quite noisy. Loud, repetitive, and excessive noise causes long term hearing problems, such as deafness. Noise can also be a dangerous distraction and may distract the worker from the task at hand, which can cause accidents.

c) Heavy materials and equipment are expected to be constantly lifted and moved around by workers at site, which poses health and safety risks.

d) Collapsing of material borrow excavation with workers inside is also a risk with the type of prevailing materials in the area.

e) Working at height for the bridge construction will also pose the risk of falling.

f) Risks of traffic accidents, labor accident, fire, explosion, short circuit and electric shock posed by the construction activities will also affect the safety of the community.

g) Contamination during infectious disease outbreaks if frequent and proper hygiene practices are not consistently applied (in particular frequent and proper hand hygiene and wearing masks to serve as barriers to human-to-human transmission of virus).

17. According to the calculation results in ESIA, the noise level and risk from heavy machineries at the construction sites is low, generating in short time and scattering over 11 wards under the project. Construction machinery and equipment will not work simultaneously but in shifts and phases depending on the progress and construction volume of items, of which each type of machine will be used different, so the resonance impact is very low. Moreover, all vehicles and equipment will be checked periodically and noise will cease when construction is completed. Noise can be minimized by measures such as labor protection equipment and noise protection devices.

**Component 3:**
a) Potentially any of above risks.

(1) **Lack of awareness on occupational health and safety requirements:** As it is common at work site in Vietnam, there is often a lack of use of personal protective equipment (PPE) and safe workplace practices. Materials for handwashing and hygiene and masks are often not provided at work sites.

(2) **Child labor:** Even if in Vietnam, it is forbidden to hire child, the risk of engaging under-aged children in the project activities will require particular attention. Contractors and suppliers may tend to use children for economic reasons and convenience. The forced labor risks are less likely as it is expected that in Vinh Long there will not be shortage of labor supply.

(3) **Labor influx:** Due to the availability of labor supply in Vinh Long city, a large scale of labor influx is not expected. However, the construction activities may bring some workers from other cities who may have diverse backgrounds, different cultures and dissimilar behaviors to the local communities. They may not integrate well with the local cultures and values, and could risk the local social values and harmony. All these could lead into conflict between locals and migrant workers. Labor influx could also increase the risk of Gender Based Violence (GBV).

(4) **Labor disputes over terms and conditions of employment:** Labor disputes in a new construction environment are common in Vietnam. Likely causes for labor disputes include demand for limited employment opportunities; labor wages rates and delays of payment; disagreement over working conditions; and health and safety concerns in work environment. In turn, there is also a risk that employers such as contractors/subcontractors may retaliate against workers for demanding legitimate working conditions, or raising concerns regarding unsafe or unhealthy work situations, or any grievances raised, and such situations could lead to labor unrest.

(5) **Discrimination and exclusion of vulnerable/disadvantaged groups:** Vulnerable/disadvantaged groups of people may be subject to increased risk of exclusion from employment opportunities under the Project. Such groups will include women and persons with disabilities. Lack of equal pay for equal work for men and women is also an issue in Vietnam. Sexual harassment and other forms of abusive behavior by workers will also have the potential to compromise the safety and wellbeing of the vulnerable groups of workers and the local communities, while adversely affecting project performance. This will also include potential sexual exploitation or harassment in recruitment or retention of skilled or unskilled female workers supported under the project.

18. The above social impact is assessed to be low as: (i) workers will be trained on labor safety, traffic safety, sanitation before starting any civil works; (ii) the workers concentrated scatteredly in different areas, the impacts are localized within the construction areas; (iii) Local labor will prioritized to use for construction activities, at the same time measures to control the age of hired workers must be taken; (iv) The Contractor committed not to hiring child labor for the project-related jobs; (v) The project Owner will coordinate with local authorities and related units to strictly control the Contractor's labor use; (vi) Commitment not to use child labor is one of the required conditions in the bidding documents; Especially, the impact on
women is assessed as minor because: (i) According to the socio-economic survey results, no negative impacts related to women were recorded. At the construction sites: (ii) The number of women workers is not large as local workers are prioritized by the Contractor; (iii) Information about social diseases and prevention methods will be provided to workers through training programs and information disclosure; (iv) Regulations, penalties for the violated workers at the site must be developed; (v) The contractor must be closely work with local authorities to manage the number of workers at the construction site.

4. BRIEF OVERVIEW OF LABOR LEGISLATION: TERMS AND CONDITIONS

19. The workers in Vietnam are managed and protected under a relative comprehensive labor framework. The key Vietnamese labor legislations are presented below.

- **The Laws:**
  - The Labor Code No. 10/2012/QH13 passed by the National Assembly of Vietnam on 18 June 2012;
  - The Social Security Law No. 58/2014/QH13 passed by the National Assembly of Vietnam on 20 November 2014;
  - The Law on Occupational Safety and Health No. 84/2015/QH13 passed by the National Assembly of Vietnam on 25 June 2015;
  - The Law on Public Employees No. 58/2010/QH12 dated 15 November 2010;
  - The Law on Civil Servants No. 22/2008/QH12, dated 13 November 2008;

- **Decrees:**
  - Decree No.41/2013/ND-CP dated June 23, 2013 of the Government detailing Article 220 of the Labor Code on the list of employees that are not allowed to go on strike and settle requests of the labor collective in these units;
  - Decree No.44/2013/ND-CP dated May 10, 2013, detailing the implementation of a number of articles of the labor code regarding labor contracts;
  - Decree No. 45/2013 / ND-CP of May 10, 2013, detailing a number of articles of the Labor Code on working time, rest time and occupational safety and health;
  - Decree No.46/2013/ND-CP dated 10/05/2013 of the Government detailing a number of articles of the Labor Code on labor mortgage;
  - Decree No.49/2013/ND-CP dated May 14, 2013 of the Government detailing the implementation of a number of articles of the Labor Code on wages;
  - Decree No.27/2014/ND-CP dated May 25, 2014 of the Government detailing a number of articles of the Labor Code on labor as domestic workers;

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o Decree No.05/2015/ND-CP dated March 1, 2015 of the Government detailing and guiding the implementation of some contents of the Labor Code;

o Decree No.61/2015/ND-CP dated September 1, 2015 of the Government on regulations on employment support policies and National employment fund;

o Decree No.85/2015/ND-CP dated November 15, 2015 of the Government detailing a number of articles of the Labor Code on policies for female workers;

o Decree No.11/2016/ND-CP dated April 1, 2016 of the Government detailing the implementation of a number of articles of the Labor Code on foreign workers working in Vietnam;

o Decree No.39/2016/ND-CP dated May 15th, 2016, detailing the implementation of some articles of the Law on occupational safety and sanitation;

o Decree No.44/2016/ND-CP dated May 15, 2016 of the Government detailing a number of articles of the Law on occupational safety and sanitation regarding technical inspection of occupational safety and training of occupational safety and hygiene and working environment observation;

o Decree No.24/2018/ND-CP dated February 27, 2018 of the Government stipulating the settlement of complaints about denunciations in the labor force, vocational education and activities, Vietnamese guest workers, safety, environmental sanitation;

o Decree No.148/2018/ND-CP dated October 24, 2018 of the Government amending and supplementing a number of articles No.05/2015/ND-CP dated January 12, 2015 of the Government detailing and guiding the implementation of some contents of the labor code;

o Decree No.149/2018/ND-CP dated November 7, 2018 of the Government: detailing Clause 3, Article 63 of the Labor Code on the implementation of democracy regulations at the workplace;

o Decree No.157/2018/ND-CP dated November 16, 2018 of the Government: Regulations on regional minimum wage for employees working under labor contracts;

o Decree No.121/2018/ND-CP dated September 13, 2018 of the Government: Amending and supplementing a number of articles of the Government's Decree No.49/2013/ND-CP dated May 14, 2013 detailing the implementation of a number of articles of the labor code on wages;

o Decree No.29/2019/ND-CP dated May 5, 2019 of the Government: detailing the implementation of Clause 3, Article 54 of the Labor Code on licensing of labor sublease and deposit and the list of jobs to be subleased;

o Decree No.38/2019/ND-CP dated May 9, 2019 of the Government: Providing basic salaries for cadres, civil servants, public employees and armed forces;
20. **Labor Code.** The main law regulating employment relationships in Vietnam is the 2012 Labor Code. As indicated above, a new Labor Code No. 45/2019/QH14 was adopted on 20 November 2019 by the National Assembly of Vietnam. When the new Labor code will be in
force on January 1st, 2021, the LMP will be updated. The Labor Code grants certain protections to particular groups of employees (women, child, etc.) as presented in the followings:

- **Gender Equity.** Chapter X of the Labor code identifies Specific Provisions on Women's Labor. Article 154 states that “Employers shall ensure the implementation of gender equality and measures to promote gender equality in recruitment, employment, training, working hours and rest periods, wages and other policies.”. This Article also states that: “Employers shall consult with female employees or their representatives when taking decisions which affect the rights and interests of women”.

- **Prevent Child Labor.** Article 162 states that: “Employer shall only employ a minor employee (under 18 years old) in work suitable to the health of the minor employee in order to ensure his/her physical, mental and personality development, and shall have the responsibility to take care of the minor employee in regard to his/her work, wage, health and study in the course of his/her employment”. Article 163 lists the tasks prohibited for minor employees. Article 164 states that “An employer is only entitled to employ persons from 13 full years of age to fewer than 15 years of age to undertake light work in accordance with the list issued by the Ministry of Labor, Invalids and Social”.

- **Disabled Laborers.** Section 4 of Chapter XI of the Labor code covers disabled laborers. Under Article 176, it is indicated that: “The State shall protect the rights to work and to self-employment of workers with disabilities, adopt policies to encourage and provide incentives for employers to create work for and to employ workers with disabilities in accordance with the Law on People with Disabilities”.

21. **Social Security Law.** Under this law, the contribution of health insurance is an obligation of both the employers and all the Vietnamese and foreign employees working in Vietnam under the Labor contracts with a term of a full 03 months or more. With health insurance contribution, the employees will be entitled to medical treatment expenses and the cost for rehabilitation (partly or wholly depending on certain situations), including cases of suffering Labor accidents and occupational diseases.

5. **BRIEF OVERVIEW OF LABOR LEGISLATION: OCCUPATION HEALTH AND SAFETY**

22. The two key Vietnamese labor legislations regarding OHS are the Labor Code and the Law on Occupational Safety and Health.

23. **The Labor Code** which governs all different sectors and industries in Vietnam enacts general regulations on the occupational health and safety at the workplaces and the regime on Labor accidents, occupational disease of employees. These general regulations are applicable to all Vietnam-based employers (including international companies based in Vietnam), Vietnamese and foreign employees who are working in Vietnam. Under the Labor Code, the employers are required to implement measures to ensure OHS at the workplace, and the employees must comply with them. The main measures are as follow:

- All types of machinery, equipment and materials with strict requirements for Labor safety as detailed by the Vietnamese Government from time to time must be tested and
verified prior to being commissioned for use, and must be periodically tested and verified by an organization conducting technical Labor safety testing and verification.

- The employers must provide the employees engaged in hazardous work activities with sufficient personal protective equipment and facilities which meet quality standards as provided by the relevant laws, and the employees must use such equipment and facilities during work in accordance with the regulations of the Ministry of Labor, War Invalids and Social Affairs of Vietnam (MOLISA). The employers must hold training classes on OSH for employees, apprentices and trainees when they are recruited and when work is assigned to them.

- The employers must arrange periodic health checks for the employees once per year or once per each six months.

- The employers are also required to: (i) ensure that the workplaces meet the requirements on spaces, airiness, dust, steam, toxic gas and other harmful factors as prescribed in relevant technical regulations; (ii) ensure safe and hygienic working conditions for machines, equipment and workshops as required by the promulgated or applied national technical regulations or standards on OSH at the workplaces; (iii) check and evaluate dangerous and harmful factors at the workplaces in order to put forward measures to avert and minimize dangers and harm and improve working conditions and healthcare for the employees; (iv) examine and maintain machines, equipment, workshops and warehouses on a periodic basis; (v) display signboards of instructions regarding OHS covering the operation of machines, equipment and the workplaces at easy-to-read and visible locations at the workplaces; and (vi) obtain opinion from the organization representing the Labor collective at the grassroots level (trade union or Labor union) when formulating and implementing plans on activities ensuring OHS.

24. In addition, the Labor Code also provides obligations for the employers in the event that an employee is victim of a Labor accident or of an occupational disease, as well as the rights and benefit regimes to which the concerned employees are entitled in these cases.

25. **The Law on Occupational Health and Safety (No. 84/2015/QH13)**, seeks to assure occupational health and safety and introduces policies for victims of labor accidents and occupational diseases. It also provides state management and rights and obligations of organizations and individuals in occupational safety and hygiene.

26. The provisions of this law are applicable to all Vietnamese employers and to all Vietnamese employees (including Vietnamese employees working aboard under contracts) and foreign employees who are working in Vietnam, and also to all different sectors and industries.

27. More particularly, this law regulates the employers' obligation to contribute to insurance covering Labor accident and occupational disease insurance for the employees covered by the social insurance under the Social Security Law. Vietnamese employees who work under the Labor contracts with a total term of 03 months or more are entitled to social insurance.

28. Thus, when a Vietnamese employee working in Vietnam, who contributed to social insurance, is injured or becomes ill or even dies during the course of his or her employment,
all related costs such as payment for being unable to work, retraining and even lump sum amounts for permanent impairments or death, are paid by the Social Insurance Fund of Vietnam.

6. RESPONSIBLE STAFF

29. MOLISA/DOLISA. Enforcement of the Labor Code is the responsibility of the Ministry of Labor, War Invalids and Social Welfare (MOLISA) and of each Department of Labor, War Invalids and Social Welfare (DOLISA) in each province.

30. The Project Management Unit (PMU). The ODA PMU is located in Vinh Long City and will be responsible for overall project management and coordination of the Project, including the compliance with safeguards requirements including on labor and working condition. The PMU will hire consultant(s) with expertise in environmental, social, occupational health and safety issues. The PMU will be responsible for the following tasks relevant to labor and working conditions:

1) Undertake the overall implementation of this LMP.
2) Engage and manage contractors/subcontractors in accordance with these LMP and the applicable Procurement Documents.
3) Ensure that contractors prepare their labor management procedures (Contractor’s LMP) that comply with this LMP and Contractor’s ESMP (including OHS provisions) for approval before the contractor is allowed to mobilize to the field.
4) Monitor that contractors/subcontractors are meeting obligations towards contracted workers as included in the Contractor’s LMP and ESMP and the applicable Procurement Documents.
5) Monitor the potential risks of child labor, forced labor and serious safety issues in relation to primary supply workers.
6) Monitor training of relevant project workers.
7) Ensure that the grievance mechanism for project workers is established and implemented and that workers are informed of it.
8) Monitoring the implementation of the Worker Code of Conduct and any other measures to address risks of sexual exploitation and abuse (SEA)/sexual harassment (SH).

31. The Construction and Supervision Consultant. The PMU will be supported by the construction and supervision consultant who will be responsible for monitoring the contractors of the civil works as well as monitoring adherence to the safeguard instruments. They will oversee the performance on labor and working conditions on a daily basis on behalf of the PMU, which will be explicitly set out in their contract. The Construction and Supervision Consultant will employ qualified expert(s) for such oversight and report on performance to the PMU.

32. The Contractor will be responsible for the following:

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7 The PMU shall establish resources and procedures for managing and monitoring the performance of the contractor in relation to the LMP. The PMU will ensure that the contract with the construction and supervision consultants explicitly set out their monitoring responsibility for the contractor’s performance on labor and working conditions on a daily basis. The monitoring may include, inspections, and/or spot checks of project locations or work sites and/or of labor management records and reports compiled by the contractor. For more details, see Chapter 11 “Contractor Management”.

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1) Employ or appoint qualified environmental, social, occupational health and safety expert(s) to manage OHS issues.

2) Prepare and implement their labor management procedure (Contractor’s LMP) and Contractor’s ESMP (including OHS provisions) which will apply to the contracted workers who work on the projects. These procedures and plans will be submitted to the PMU for review and approval before the contractor is allowed to mobilize to the field.

3) Supervise their subcontractors’ adherence to the LMP and ESMP.

4) Maintain records of recruitment and employment of contracted workers (including subcontractors) with age verification to avoid child labor.

5) Provide induction and regular training to contracted workers on environmental, social and occupational health and safety issues.

6) Require the primary supplier to identify and address risks of child labor, forced labor and serious safety issues, and risks of equity and discrimination for primary supply workers.

7) Develop and implement the grievance mechanism for contracted workers, including ensuring that grievances received from their contracted workers resolved promptly, and reporting the status of grievances and resolutions.

8) Ensure that all contractor and subcontractor workers understand and sign the Code of Conduct prior to the commencement of works, take all other measures to address risks of sexual exploitation and abuse (SEA)/sexual harassment (SH) as specified in the contractor’s LMP/ESMP and supervise compliance with such measures.

9) Report to PMU on labor and occupational health and safety performance.

Table 84: Summary of the project staff/party responsible for various key issues

<table>
<thead>
<tr>
<th>Key issues</th>
<th>Direct workers</th>
<th>Contracted workers</th>
<th>Primary supply workers</th>
</tr>
</thead>
</table>
| Hiring and managing individual project workers | - PMU to engage/manage consultants  
- PMU to engage/manage Construction and Supervision consultant | - Contractor/Subcontractor (site manager and/or OHS officer) | - n/a (outside the scope of ESS2) |
| OHS                                 | - n/a (direct workers will follow OHS measures when visiting construction sites) |                                                        |                        |
| Child labor and forced labor        | - n/a (the contract for direct workers does not allow child)                   |                                                        | - Contractor to require the primary supplier to identify/address child labor/forced labor and serious safety risks. - PMU/Construction and Supervision |
7. POLICIES AND PROCEDURES

33. The Vinh Long Project will apply the following policies and procedures to address the key labor risks identified under Chapter 3. The summary of indicative procedures to implement the policies is presented in the following table (Table 3).

1) **Occupational health and safety (OHS).** Pursuant to the relevant provisions of the Labor Code (Chapter IX on Labor Safety, Labor Sanitation Articles 95-108), ESS2 (including WBG General Environmental, Health and Safety Guidelines (EHSGs)), the Project’s ESMP and WB standard procurement documents, the contractor shall manage all construction sites in such a way that the workers and the community are properly protected against possible OHS risks. Key elements of OHS measures should include (a) identification of potential hazards to workers; (b) provision of preventive and protective measures; (c) training of workers and maintenance of training records; (d) documentation and reporting of occupational accidents and incidents; (e) emergency preparedness; and (f) remedies for occupational injuries and fatalities.

2) **Child labor.** The minimum age of project workers eligible for any type of work under the Vinh Long project (including construction work) is set at 18. The engagement of

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*The WBG General EHSGs are technical reference documents with general statements of Good International Industry Practice, which provide guidance to users on general EHS issues. The applicability of the ESHGs should be tailored to the hazards and risks established for each project.

*The WB Standard Procurement Document for Work is likely to be used for the Vinh Long Project construction works, which will include relevant OHS provisions, such as the appointment of ESHS officer, development of Contractor-ESMP, compliance with OHS measures and reporting, and the use of Code of Conduct.*
project workers between the age of 15 and under 18 years may be allowed only for non-hazardous work that would not interfere with the child’s education (subject to prior risk assessment and regular monitoring on health and safety conditions, hours of work and any other aspects) in accordance with ESS2. To prevent engagement of under-aged labor, all contracts shall have contractual provisions to comply with the minimum age requirements including penalties for non-compliance. The contractor is required to maintain labor registry of all contracted workers with age verification.

3) **Labor influx.** To minimize the labor influx, the Vinh Long Project will contractually require the contractor to preferentially recruit **unskilled** labor from the local communities and especially in LIAs. All contracted workers will be required to sign the code of conduct (see Annex 1 on the Guideline on Code of Conduct) prior to the commencement of work, which includes a provision to address the risk of Gender Based Violence (GBV). The code of conduct governs both on-site behavior (with colleagues) and conduct in the community. Relevant trainings will be provided to workers, such as induction and daily toolbox talks outlining expected conduct and local community values.

4) **Labor disputes over terms and conditions of employment.** To avoid labor disputes, fair terms and conditions will be applied for project workers in the Vinh Long Project (more details are provided in Chapter 9). The Project will also have grievance mechanisms for project workers (direct workers and contracted workers) in place to promptly address their workplace grievances (more details are provided in Chapter 10). Further, the Project will respect the workers’ right of labor unions and freedom of association, as set out in the national Labor Code (Chapter XIII, Trade Union).

5) **Discrimination and exclusion of vulnerable/disadvantaged groups.** The employment of project workers under the Vinh Long Project will be based on the principle of equal opportunity and fair treatment, and there will be no discrimination with respect to any aspects of the employment relationship, such as recruitment and hiring, terms of employment (including wages and benefits), termination and access to training. To address the risk of exclusion of vulnerable groups (such as women and persons with disabilities) from employment opportunities, the Project will require the contractor to employ such groups as part of their unskilled workforce. The contractor will be also required to comply with the national Labor Code (Chapter X) on gender equality in the work place, which will include provision of maternity leave and nursing breaks and sufficient and suitable toilet and washing facilities, separate from men and women workers. The contractor will be also required to enable safety in the workplace to address potential sexual exploitation or harassment in recruitment or retention of skilled or unskilled female workers supported, and potential discrimination along ethnic lines under the project.

34. **Monitoring and reporting.** The contractor shall report to the PMU and to the construction and supervision consultants on the status of implementation of the above policies and procedures on a monthly basis. The PMU and the construction and supervision consultants will closely monitor the contractor/subcontractor on labor and occupational health and safety performance and report to the World Bank on a quarterly basis (see Chapter 11 for more details).
35. **Fatality and serious incidents.** In the event of an occupational fatality or serious injury, the PMU shall report to the Bank as soon as becoming aware of such incidents, and inform the government authorities (where available) in accordance with national reporting requirements (Labor Code Chapter IX, section 2). Corrective actions shall be implemented in response to project-related incidents or accidents. The PMU or, where relevant the contractor, will be required to conduct a root cause analysis for designing and implementing further corrective actions.

Table 85: Overview of Project policies and indicative procedures to address key labor risks

<table>
<thead>
<tr>
<th>Key labor risks</th>
<th>Policies to address risks</th>
<th>Procedures to back up the policy</th>
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<tbody>
<tr>
<td><strong>1. OHS risks</strong></td>
<td>- In conformity with OHS requirements as set out in Labor Code (Chapter IX Articles 133-152), ESS2 (including WBG EHSGs), the Project ESMP and WB standard procurement documents.</td>
<td>- Select legitimate and reliable contractor through screening OHS records. - Address adequately OHS risks with non-compliance remedies in procurement documents. - Require the contractor to engage qualified OHS staffing - Enhance workplace OHS awareness and training. - Provide materials for handwashing and hygiene at work sites. - Provide masks in case of infectious disease outbreaks; - Practice social distancing on the worksite, following national and international guidelines. - Conduct routine monitoring and reporting.</td>
</tr>
<tr>
<td><strong>2. Child labor</strong></td>
<td>- Set the minimum age of project workers eligible for any type of work (including construction work) at 18 years. - Allow the engagement of project workers between the age of 15 and under 18 years only for non-hazardous work that would not interfere with the child’s education in accordance with ESS2.</td>
<td>- Include minimum age in procurement documents. - Raise awareness on child protection with contractors and in the communities. - Maintain labor registry of all contracted workers with age verification. - Develop remedial procedures to deal with child labor incidents.</td>
</tr>
<tr>
<td><strong>3. Labor influx</strong></td>
<td>- Minimize the labor influx by prioritizing local workforce. - Minimize labor-related risks on the community</td>
<td>- Require the contractor to preferentially engage unskilled local workforce form the local communities (especially in LIAs).</td>
</tr>
</tbody>
</table>
### Key labor risks

<table>
<thead>
<tr>
<th>Key labor risks</th>
<th>Policies to address risks</th>
<th>Procedures to back up the policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>through the code of conduct, including GBV.</td>
<td>- Make all contracted workers sign code of conduct, including prevention of GBV.</td>
<td>- Make all contracted workers to follow the rules for on-site behavior (with colleagues) and conduct in the community.</td>
</tr>
<tr>
<td></td>
<td>- Make all contracted workers to follow the rules for on-site behavior (with colleagues) and conduct in the community.</td>
<td>- Conduct induction and toolbox talks outlining expected conduct and local community values.</td>
</tr>
<tr>
<td></td>
<td>- Introduce disciplinary measures for violations and misbehaviors.</td>
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</tr>
</tbody>
</table>

#### 4. Labor disputes

- Respect the national Labor Code and promptly address workplace grievances to minimize the risk of labor disputes.

- Provide workers with contracts with fair terms and conditions.
- Have grievance mechanisms in place to promptly address workplace concerns.
- Respect the national Labor Code on workers’ right of labor unions and freedom of association.

#### 5. Discrimination and exclusion of vulnerable or disadvantaged groups

- Promote no discrimination and equal opportunity with respect to any aspects of the employment relationship.

- Require the contractor to employ vulnerable groups as part of unskilled workforce.
- Provide maternity leave and nursing breaks where relevant.
- Arrange sufficient and suitable toilet and washing facilities, separate for men and women workers.
- Require the contractor to address potential sexual exploitation or harassment in recruitment or retention of skilled or unskilled female workers.
- Require the non-discrimination and harassment and should be socialized/basis for training, and covers potential ethnic discrimination.

#### 6. Security risks

- Take appropriate and proportionate security measures to minimize the potential risk to the workers.

- Arrange security protection to be determined by security authorities to address external security risks (such as terrorism and armed insurgency).
- Restrict work hours to minimize security threat.
- Maintain low profile of the site and workers.
- Address internal security risks associated with the deployment of security personnel on the community and project workers in line with the WB Good Practice Note “Assessing and Managing the Risks and
<table>
<thead>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Impacts of the Use of Security Personnel” (such as the training of security officers on the principles of proportionality in the use of force.).</td>
</tr>
</tbody>
</table>

6. AGE OF EMPLOYMENT

36. **Age limitation for hazardous work.** As indicated above, the national Labor Code (Articles 162-165) states that it is forbidden to employ children below 15 years of age, except for those professions and jobs to be defined by the Ministry of Labor, War Invalids and Social Welfare. Similarly, ESS2 (para 19) sets out further conditions on the minimum age, stating that a child over the minimum age and under the age of 18 will not be employed or engaged in connection with the Bank-financed project in a manner that is likely to hazardous\(^{11}\) or interfere with the child’s education or be harmful to the child’s health or physical, mental and any other relevant development. Considering these national and WB requirements, the minimum age for hazardous work under the Vinh Long Project (including construction) is set at 18 (for example, work at quarries to obtain construction materials; work with dangerous machinery, equipment or tools; work involving handling or transport of heavy loads; or work at height).

37. **Minimum age for project workers.** The national Labor Code as well as ESS2 allow persons under 18 and over 15 to be engage if the work is non-hazardous and does not interfere with the child’s education and not harmful to the child’s development (for example, administrative work, site cleaning or rubbish removal). Considering this, the minimum age of project workers for such (non-hazardous) work under the Vinh Long Project is set at 15 and the minimum age of project workers eligible for construction work is set at 18.

38. **The process of age verification.** In order to prevent engagement of under-aged labor, all contracts with work contractors shall have contractual provisions to comply with the minimum age requirements including penalties for non-compliance, and it will be well communicated to all potential stakeholders including the local community where the unskilled workforce will be sourced. The contractor is required to maintain labor registry of all contracted workers with age information. Verification of the age shall be undertaken prior to the engagement of labor and be documented based on the workers ID or other relevant legal documents.

9. TERMS AND CONDITIONS

39. **Direct workers.** The terms and conditions for direct workers in PMU and the construction and supervision consultants will be governed by the Standard World Bank Consultancy which set higher standards than the national Labour Code.

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\(^{11}\) Examples of hazardous work activities prohibited for persons between the minimum age and 18 under ESS2 include work: (a) with exposure to physical, psychological or sexual abuse; (b) underground, underwater, working at heights or in confined spaces; (c) with dangerous machinery, equipment or tools, or involving handling or transport of heavy loads; (d) in unhealthy environments exposing children to hazardous substances, agents, or processes, or to temperatures, noise or vibration damaging to health; or (e) under difficult conditions such as work for long hours, during the night or in confinement on the premises of the employer.
40. **Contracted workers.** Labour Code of Vietnam presented in Chapter 3 (Overview of Labour Legislation) above is the guiding legislation on employment terms and conditions for contracted workers.

41. **Provision of written individual contract of employment.** A written individual contract of employment shall be provided to workers that specify the following: (a) name of workers; (b) address, occupation, age and sex of workers; (c) employer’s name and address; (d) nature and duration of contract; (e) hours and place of work; (f) remuneration payable to the worker; (g) procedure for suspension or termination of contract. Depending on the origin of the employer and the employee, employment terms and conditions will be communicated in a language that is understandable to both parties. In addition to written documentation, an oral explanation of conditions and terms of employment will be provided to workers who may have difficulty understanding the documentation.

42. **Notice for termination of contract.** Either of the contracting parties may terminate a contract of employment by giving written notice as under: (a) not less than ten days in the case of manual workers; or (b) not less than 30 days in the case of non-manual workers. No notice needs to be given in case the duration of contract does not exceed one month.

43. **Minimum Wages.** While the mechanism to set the official minimum wage is prescribed by the State (Labour Code, Article 91) is not currently functioning, the market rate is available for each job type in different locality. The fair market rate will be identified and applied for the Vinh Long project workers.

44. **Hours of Work.** The normal hour of work of a project worker shall not exceed 8 hours a day or 48 a week (Labour Code, Article 104). Hours worked in excess of the normal hours of work shall not exceed 12 hours a week and shall entitle a worker to a proportionate increase in remuneration.

45. **Rest per week.** Every worker shall be entitled to one day’s rest each week, which should normally fall on Sunday (Article 108). It shall consist of at least 24 consecutive hours each week. Workers shall also be entitled to a rest day on public holidays recognized as such by the State.

46. **Annual leave.** Workers shall be entitled to 12 to 16 days’ leave with pay for every year of continuous service (Art. 111). An entitlement to leave with pay shall normally be acquired after a full year of continuous service.

47. **Maternity leave.** A female worker shall be entitled, on presentation of a medical certificate indicating the expected date of her confinement, to 6 months maternity leave (Art 157). During maternity leave, the female employee is entitled to maternity benefits as regulated in the Law on Social Insurance.

48. **Deductions from remuneration.** No deductions other than those prescribed by the Code (Article 101) or regulations made hereunder, or any other law or collective Labour agreement shall be made from a worker’s remuneration, except for repayment of advances received from the employer and evidenced in writing. The contractor shall not demand or accept from workers any cash payments or presents of any kind in return for admitting them to employment or for any other reasons connected with the terms and conditions of employment.
49. **Death benefit.** In case of death of a worker during his contract of employment, the employer shall pay to his heirs an amount equivalent to 30 months’ wages (Art. 145).

50. **Medical treatment of injured and sick workers.** It shall be the duty of the employer to arrange at his own expense for the conveyance to the nearest hospital of any injured or sick worker who can be so conveyed and who cannot be treated on the spot with the means available (article 144).

51. **Collective Agreements.** A collective agreement is an agreement relating to terms and conditions of work concluded between the representatives of one or more trade unions, on the one hand, and the representatives of one or more employers, on the other hand. Where collective agreements exist between the employer and project workers, such agreements will be applied, where relevant.

### 10. GRIEVANCE MECHANISM

52. **General principles.** While the Vinh Long Urban Development and Climate Resilience Project will have in place a grievance mechanism to address concerns of project-affected parties, the nature of workplace concerns of workers is usually different. For example, typical workplace grievances include demand for employment opportunities; labor wages rates and delays of payment; disagreement over working conditions; and health and safety concerns in work environment. Therefore, a separate grievance mechanism will be established for project workers (direct workers and contracted workers) as required in ESS2.

53. **Handling of grievances should be objective, prompt and responsive to the needs and concerns of the aggrieved workers.** Different ways in which workers can submit their grievances should be allowed, such as submissions in person, by phone, text message, mail and email. The grievance raised should be recorded and acknowledged within one day. While the timeframe for redress will depend on the nature of the grievance, health and safety concerns in work environment or any other urgent issues should be addressed immediately. Where the grievance cannot be addressed within a reasonable timeframe, the aggrieved worker should be informed in writing, so that the worker can consider proceeding to the State inspection on labor (see below for more details). The mechanism will also allow for anonymous complaints to be raised and addressed. Individuals who submit their comments or grievances may request that their name be kept confidential.

54. **Direct workers.** Each unit engaging direct workers (PMU and the construction and supervision consultants) will hold periodic team meetings to discuss any workplace concerns. The grievance raised by workers will be recorded with the actions taken by each unit. The summary of grievance cases will be reported to the World Bank as part of the regular report. Where the aggrieved direct worker wishes to escalate their issue or raise their concerns anonymously and/or to a person other than their immediate supervisor/hiring unit, the worker may raise the issue with responsible municipal authorities (e.g. DOLISA), where relevant. Where the construction and supervision consultants have an existing grievance system, their direct workers should use such mechanism.

55. **Contracted workers.** The site manager and the OHS officer (or any other appropriate officers) of the contractor will hold a daily team meeting with all present contracted workers at site
at the end of the daily work to discuss any workplace grievances. The grievance raised will be recorded with the actions taken by the contractor. The summary of grievance cases will be reported to the PMU and the construction and supervision consultant as part of contractor’s periodic report. Where appropriate and available, the contracted workers should be allowed to utilize an existing grievance mechanism within the contractor. Where the aggrieved workers wish to escalate their issue or raise their concerns anonymously and/or to a person other than their immediate supervisor, the workers may raise their issue with the PMU and/or the construction supervision consultant. The contracted workers will be informed of the grievance mechanism prior to the commencement of work. The contact information of the PMU and/or the construction supervision consultants will be shared with contracted workers.

56. **State Inspection on Labor, Sanctions Against Violations of Labor Legislation.** As per the Labor Code (Articles 237-239), the labor inspector is mandated to settle complaints and denunciations of employees of violations of the labor legislation and to receive and settle complaints and denunciations about violations of the labor legislation, as prescribed by law.

57. **Grievance Handling Procedure.** The table provides steps with responsibilities of grievances relating to the complaint handling linked to labor issue. The key purpose of this exercise is to present GRM process in an effective and user-friendly manner.

**Table 86: GRM procedures for complaint handling process**

<table>
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<tr>
<th>Steps</th>
<th>Complainants</th>
<th>GRM Functions</th>
<th>Timeframe</th>
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</table>
| Community level GRM/mediation: The Affected Person (AP)/workers/complainant (or his/her representative) may submit his/her complaint in several ways e.g. by written letter, phone, SMS messages and email to the GRM or, alternatively, raise his/her voice in a public or individual meeting with project staff. | Submission of complaint to the local or community level GRM/mediation | 1. Conduct public consultations among the affected communities to use grievance service.  
2. Register a grievance in the project logbook and grievance database.  
3. Segregate/sort and process.  
4. Acknowledge and follow up of grievance.  
5. Verify investigate, and act  
6. Provide written response to the complainants. | 7-14 days |
| Project or Site level GRM: (a) **Project Level GRM:** If resolution at local/community level is unsuccessful, or the Affected Person (AP) can take his or her complaint to project level GRM. | Submission of grievance to the project level GRM through one of the channels | 1. Conduct coordinating meetings among complainants/public and appropriate administration levels.  
2. Provide written response to the complainant.  
3. Provide written response to the complainant. | 15 days |
Steps | Complainants | GRM Functions | Timeframe
---|---|---|---
(b) **GRM for Workers**: The project workers (all three categories, direct workers, contracted workers and primary supply workers) can directly register their complaints with the GRM for workers. The members of this GRM will be trained to be capable to address grievances by workers, including workplace complaints in an efficient and effective manner to meet national regulations on labors and World Bank ESS2.

3 | Workers or labor association will submit their grievance to the GRM for Workers through one of the channels | • Refer workers related complaints to the Workers GRM.  
• Registration, classification and analysis of grievances.  
• Convene the GRM for workers meeting to analyze and resolve the complaint.  
• Provide written response to the complainant/contractor.  
• Provide guidance with recommendations to the contractor to improve working condition/labor management issues. | 10 days

**Provincial Level GRM**: In case the grievance is not resolved within 10 days of its receipt or it is unattended, the complainant can approach the provincial level GRM or to the court. The grievance will be examined and addressed within 30 days.

4 | Workers, labor associations or the AP can refer the complaint to the provincial GRM | • Conduct coordinating meetings/ resolution sessions with complainants.  
• Investigate the complaints.  
• Provide written response to the complainants. | 30 days

**Referee Level**: If all above fails, the last recourse is the stipulations in the Labor Code.

58. **Grievances related to Gender Based Violence (GBV)**. To avoid the risk of stigmatization, exacerbation of the mental/psychological harm and potential reprisal, the GRM shall have a different and sensitive approach to GBV related cases. The GRM equally applies to workers who experience GBV. Where such a case is reported to the GRM, it should immediately be referred to the appropriate service providers, such as medical and psychological support, emergency accommodation, and any other necessary services. It should also be reported to the safeguard staff of the PMU who can advise on relevant service providers. Data on GBV cases should not be collected through the GRM unless operators have been trained on the empathetic, non-judgmental and confidential collection of these complaints. Only the nature of the complaint (what the complainant says in her/his own words) and additional demographic data, such as age and gender, can be collected as usual.

59. **Publicizing the GRM**. The PMU will be in charge of publicizing the GRM. PMU should ensure that GRM is explained during public meetings. PMU should also ensure that leaflets on GRM are distributed during public meetings and made available at ward/commune levels with contact numbers of the focal person for the GRM. Posters will be also be posted at ward/commune levels.
60. The following procedures shall be followed while filing and processing complaints through the above described GRM structures:

- **Grievance Register Book**: A grievance register book shall be opened and kept in the office of resident engineer. All grievances shall be registered when and upon the receipt of complaints from the aggrieved. The book shall have: i) case reference number, ii) the aggrieved name, iii) the date the case is received, iv) the date the case is resolved and, v) a remarks column;

- **Responsibility for Registering Complains**: the resident focal point in the project area shall register in the Grievance Register Book all written complaints received;

- **Case Receipt**: Within 24 hours of receiving complaints, the monitoring consultant shall issue a letter to the aggrieved acknowledging receipt of the case and providing a date when the case will be reviewed as well as the venue;

- **Public Access to the book**: The book shall be accessible to the public;

- **GBV grievances**: will not be documented in the public accessible book. However, a GBV action plan will be prepared to manage related risks. The all-level women’s unions will be engaged for awareness raising and ensure a system that capture GBV/SEA and HIV/AIDS related issues will be developed;

- **PAPs**: All PAPs who have issues with their compensation and assistances are required to submit written complaints to the appropriate level of GRMs;

- **Mediation meetings and outcomes**: will be recorded and kept by the GRM person-in-charge.
THE GRIEVANCE PROCESS CHART

- Complainant
  - Inform: Local leader/Fatherland
  - Major issues: Ward/Commune People’s Committee (W/CPC)
  - If not resolved: Ward/Commune PC Office Secretariat

- Ward/Commune level
  - Ward/Commune People’s Committee (W/CPC)
  - If not resolved: Ward/Commune PC Office Secretariat

- City/District level
  - City/District People’s Committee (C/DPC)
  - If not resolved: City/District PC Office Secretariat

- Province level
  - Provincial People’s Committee (PPC)
  - If not resolved: Vinh Long ODA Project Management Unit (PMU)

- Project level
  - Follow up with GRM monitor
  - If not resolved: World Bank & Independent Monitor

- Management level
  - Follow up with World Bank Office
  - If not resolved: GRIEVANCE Redress Services (GRS)

- Local (grassroot) community level
  - Inform: Local leader/Fatherland

- Complainant
  - Inform: Provincial People’s Court
  - If not resolved: City/District People’s Court

- City/District level
  - City/District People’s Committee (C/DPC)
  - If not resolved: City/District PC Office Secretariat

- Province level
  - Provincial People’s Committee (PPC)
  - If not resolved: Vinh Long ODA Project Management Unit (PMU)

- Project level
  - Follow up with GRM monitor
  - If not resolved: World Bank & Independent Monitor

- Management level
  - Follow up with World Bank Office
  - If not resolved: GRIEVANCE Redress Services (GRS)