REPORT
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

SCALING-UP URBAN UPGRADING PROJECT (SUUP)

SOC TRANG CITY SUB-PROJECT




SOC TRANG, FEBRUARY 2017

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SCALING-UP URBAN UPGRADING PROJECT (SUUP)
SOC TRANG CITY SUB-PROJECT

PROJECT OWNER:

SOCTRANG PROVINCE
DEPARTMENT OF CONSTRUCTION

CONSULTANT:

VIETNAM CONSTRUCTION AND ENVIRONMENT JOINT STOCK COMPANY

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ABBREVIATIONS

Ahs	Affected Households
CC	Climate change
AC	Asphalt concrete
CeC	Cement concrete
CMC	Construction monitoring consultant
DED	Detailed engineering design
DOC	Department of Construction
DOF	Department of Finance
DONRE	Department of Natural Resources and Environment
DOT	Department of Transport
DPI	Department of Planning and Investment
MKD	Mekong detal
EIA	Environmental impact assessment
ESIA	Environment and Social Impact Assessment
ECOP	Environmental Code of Practice
EMC	External Monitoring Consultant
EMP	Environmental Management Plan
EMS	Environmental monitoring system
FS	Feasibility study
IEMC	Independent Environmental Monitoring Consultant
IM	Implementing Mechanism
ISMC	Independent Social Monitoring Consultant
LIA	Low-income area
MOC	Ministry of Construction
MUDP	Management of Urban Development under Urban Development Agency
ODA	Official Development Assistance
PC:	People's Committee
PMU	Project Management Unit
PPU	Project Preparation Unit
PSC	Project Steering Committee
P/CPC	Provincial/City People's Committee
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
RP	Resettlement Plan
SUUP	Scaling-up Urban Upgrading Project
UDA	Urban Development Agency
URENCO	Urban Environment Company
WB	World Bank

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CHAPTER 1. INTRODUCTION AND PROJECT DESCRIPTION

1.1. BACKGROUND AND OBJECTIVES OF SCALING-UP URBAN UPGRADING PROJECT

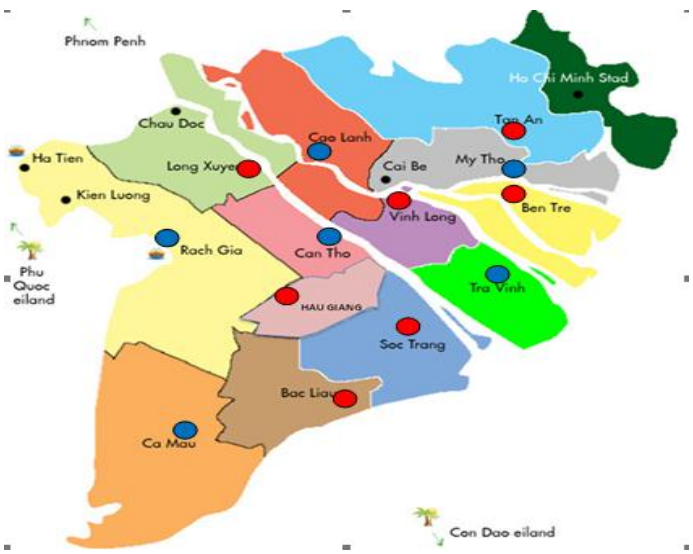
1.1.1. General Background of the Project

The Vietnamese part of the Mekong Delta (MRD) covers about 3.9 millions hectares and is the house of about 17.5 million inhabitants (account for 20% of the national population). The area is bounded with My Tho to the east, Chau Doc and Ha Tien in the northwest, Ca Mau in the southernmost tip. The delta is situated in the low lying area with the base elevation of only about 0.8 m above the mean sea level with a dense river and canal network. The two main branches of the Mekong River are Tien (Mekong) and Hau (Bassac) running though the areas out to the East Sea. The key economic driver for the region is agriculture production including paddy rice, fruit planting and aquaculture based on the fertile land and diversified livelihood options. Rice, fruits and seafoods are among the top national export commodities. It is however, majority of people in the delta is still living in poor conditions. The multidimentional poverty rate is approximately 8% in the urban areas, which is rather high compared with other regions, partly due to the lack of infrastructure and basic services.

Like other municipalities across the country, the Mekong Delta region is experiencing a rapid urbanization at a rate of 25%, bringing positive changes to cities in the area. Yet there are more development needed to address current urban challenges, including but not limited to: a) an existence of low income areas (LIAs) b) A boom but not well planned infrastructure c) An asyncronous social and technical inastructure systerm; d) A degraded drainage system; e) increasing environmental pollution. The situation in Mekong Cities is even worsened by the imminent climate change threats, namely drier dry season and wetter wet season, extreme weather events, saline intrusion and sea level rising.

Realizing these challenges in the delta, the Government clearly sets out strategic goals to gradually develop and transform urban infratructure into a system that is synchronous, modern, sustainable and climate resilient; enhance urban connectivity, promote integrated development of the technical and social infrastructure and landscape architecture, use resources efficiently, create a better living environment for residents and gradually close the gap between urban and rural areas. Spcifically, the Decision No. 939 MD/QD-TTg dated 19/07/2014 issued by the Prime Minister approves the socio-economic development master plan (SEDP) for the Mekong Delta towards 2020, paving the way for the Mekong Delta to become the economic driving force of the country, having a development-oriented infrastructure and a comprehensive socio economic development system.

Vietnam Government has operated two urban upgrading projects financed through the World Bank during the period from 2004 to 2017, namely the Vietnam Urban Upgrading Project (VUUP) in 4 cities of Nam Dinh, Hai Phong, Ho Chi Minh, and Can Tho and the Urban Upgrading Project in Mekong Delta (MDR-UUP, involving 6 cities of Can Tho, Cao Lanh, My Tho, Tra Vinh, Rach Gia and Ca Mau). The project has significantly transformed the urban areas, changing perceptions of urban management and project management for the cities involved. In view of the Government, the upgrading of cities in the Mekong Delta are special priorities as this will increase the city's resilience and help reduce the city's vulnerabilities to water related risks.



The proposed Vietnam Urban Upgrading project (SUUP) is in alignment with the Government's priority, stock taking the ongoing investments and the built up experiences in the areas. Investments under the project will promote a risk-informed approach to infrastructure design and construction (including screening disaster and climate risks, promoting green/permeable infrastructure, storm-water storage etc.). The selection of infrastructure sub-projects has been prioritized to ensure: (i) benefits to the urban poor; (ii) alignment to long-term sustainable urban development goals and attention to urban resilience; (iii) adherence to key principles of compact urban design and universal accessibility; and (iv) technical and economic soundness. These activities will be complemented by technical assistance to local governments to enhance the cities' capacities in urban planning, land management and city resilience.

Investment designs will incorporate climate and disaster risks, and all master plans developed will seek to steer future urban growth into less hazardous areas and incorporate low carbon development principles. During project preparation, the design of feasibility studies has been supported by a grant by the Global Facility on Disaster Reduction and Recovery (GFDRR), where a team of experts is working closely with the cities to ensure that resilience aspects are integrated within the technical design of investments. The GFDRR grant is also being used to carry out an overall assessment of coordinated urban planning capacity of each of the seven local governments, with an aim to highlight the needs for capacity building and recommendations for revision of the master plans. In addition, incorporation of universal accessibility for the elderly and disabled within designs of roads and upgraded urban space is being carried out in collaboration with the Tokyo Development Learning Center (TDLC).

Climate Change Co-Benefits: The primary threat that climate change poses to investments under this project is through increased flood risk. The level of exposure of infrastructure investments to flooding exacerbated by climate change varies across project cities based on elevation and proximity to the sea. Mitigation measures recommended by the GFDRR team during preparation stages and incorporated into design include (i) Increasing the drainage capacity of canal systems, and (ii) Preserving green spaces for water retention within city limits. Climate-all engineering designs will incorporate climate and disaster risks. All master plans developed will take into climate and disaster risks and seek to steer future urban growth into less hazardous areas and incorporate low carbon development principles.

1.1.2. Project objectives

The proposed project development objective is to improve access to infrastructure in priority city areas and improve urban planning in the participating cities.

1.1.3. Project components

The project comprises of 4 sub-components, as described below:

Component 1: Upgrading tertiary infrastructure in Low Income Areas (LIAs) (US$ 39.9 million)

The Project will support tertiary investments in about 30 LIAs, covering about 650 ha, including: (a) construction, rehabilitation, and upgrading of roads and lanes; (b) construction and rehabilitation of drains; (c) improvements to environmental sanitation by rehabilitating or constructing public sewers, constructing septic tanks, providing access to septic management services, and house connections to public sewers; (d) improvement of water supply including the installation of metered domestic connections; (e) provision of metered domestic connections for electricity and public lighting in residential lanes and streets; and (f) construction and rehabilitation of social infrastructure facilities such as schools, markets, community halls, public places and green spaces.

The package of tertiary investments in each LIA is determined in conjunction with a Community Upgrading Plan (CUP) based on extensive community consultations and social surveys to identify priority investments. Investments are designed with flexible standards, attention to universal accessibility and screened to minimize social and environmental impacts. Attention has also been paid to align inundation solutions at the tertiary investments with recommendations from the hydrological modelling at the primary and secondary scale. The consultation process and updating of CUPs is on-going throughout the project cycle, from upstream identification through to construction.

Component 2: Priority Primary and Secondary Infrastructures (US$ 148.6 million)

Component 2 provides support to improve priority networked infrastructure in line with the broader city development agenda, and with a view to increasing connectivity between primary and secondary infrastructure with tertiary infrastructure in LIAs. Details on project investments including length of newly constructed drainage or rehabilitated roads can be found in Annex 2. Social infrastructure facilities such as markets, community halls, public places, schools and green spaces will also be included to benefit urban poor, where needed. Assessments of disaster and climate risk will be used to inform the technical design of investments. An initial hydraulic model will be developed for the catchment areas of the upgrading sites and integrated with existing urban plans for flood and salinity intrusion control, drainage, and waterways investments. Investments that increase urban connectivity of roads and drainage networks are prioritized to encourage compact urban development and reduce flood risk within the core city and particularly for populations living in LIAs.

Component 3: Resettlement Sites

This component will include the construction of resettlement areas for affected persons, including construction of primary, secondary and tertiary infrastructure and public facilities. An estimated 1,900 households will be resettled across the seven project cities (refer to Annex 2 for further information on status of resettlement site by city).

Component 4: Implementation Support and Capacity Building (US$ 3.2 million)

The physical investments of the project will be complemented by a Technical Assistance (TA) package under Component 4, which is intended to provide implementation support as well as enhance the cities' capacity to manage urban development in a risk informed manner, thereby reinforcing urban resilience.

1.2. BASIC OF LAWS, LEGISLATIONS AND REGULATIONS

1.2.1. National Regulations and Technical Basics

a) Legislations

Administrative framework on Environmental Assessment

Law on Environmental Protection (No.55/2014/QH13) dated June 23, 2014 and Decree on Environmental Protection Planning, Strategic Environmental Assessment, Environmental Impact Assessment and Environmental Protection Plans (No. 18/2015/ND-CP) dated February 14, 2015 are key legal frameworks for environmental management in Vietnam. Law on Environmental Protection (LEP) provides statutory provisions on environmental protection activities; measures and resources used for the purpose of environmental protection; rights, powers, duties and obligations of regulatory bodies, agencies, organizations, households and individuals who are tasked with the environmental protection task. LEP is applicable to regulatory bodies, public agencies, organizations, family households and individuals within the territory of the Socialist Republic of Vietnam, including mainland, islands, territorial waters and airspace. LEP is on regulating strategic environmental assessment, environmental impact assessment and environmental protection commitment.

Furthermore, the law also indicated to consultation on, inspection and approval of the planning for environmental protection (Article 11, chapter II) as well as the list of entities subject to strategic environmental assessment in appendix I and II of the Decree No. 18/2015/ND-CP dated February 14, 2015 of the Government.

The Article 13 of the Decree (No. 18/2015/ND-CP) explains the requirement of the pertaining ESIA agencies. Clause 1: the project owner or the advisory organization conducting ESIA must meet all requirements – (a) there are staff members in charge of ESIA meeting requirements prescribed in Clause 2 of this Article; (b) there is specialist staff members related to the project obtaining at least Bachelor‘s degrees; and (c) there are laboratories, inspection and calibration devices eligible for performing measurement, sampling, processing and analysis of environmental samples serving the ESIA of the project; if there is not any laboratory with decent equipment for inspection and calibration, it is required to have a contract with a unit capable of carrying out inspection and calibration. Clause 2: the staff members in charge of ESIA must obtain at least Bachelor‘s degrees and Certificate in ESIA consultancy and Clause 3: the Ministry of Natural Resources and Environment shall manage the training and issuance of Certificates in consultancy of ESIA.

The project does not involve wetlands and natural protected areas, neither does it relate to emission of persistent organic pollutants or international trade in endangered species of wild fauna and flora. Therefore, no relevant international environmental agreements to which Vietnam is a party would apply.

- Law on Environmental protection No. 55/2014/QH13 passed by the 13th National Assembly on 23 June 2014 and took effect since 01 January 2015;
- Construction Law No. 50/2014/QH13 adopted by the 13th National Assembly of the Socialist Republic of Vietnam dated 18 June 2014 and took effect since 01 January 2015;
- Land Law No. 45/2013/QH13 passed by the 13th National Assembly of the Socialist Republic of Vietnam dated 29 November 2013 and took effect since 01 July 2014
- Law on Water Resources No. 17/2012/QH13 passed by the 13th National Assembly of the Socialist Republic of Vietnam, session 3 on 21 June 2012;
- Labour Law No. 10/2012/QH13 passed by the 13th National Assembly of the Socialist Republic of Vietnam on 18/06/2012
- Urban Planning Law No. 30/2009/QH12 passed by the 12th National Assembly of the Socialist Republic of Vietnam on 17/06/2009
- Biodiversity Law No. 20/2008/QH12 passed by the 12th National Assembly of the Socialist Republic of Vietnam on 13/11/2008;

- Law on amendment and supplementation of some articles of Law on Fire Prevention and Fighting No. 40/2013/QH13 dopted by the 13th National Assembly of the Socialist Republic of Vietnam on 22/11/2013
- Law on People's health No. 21/LCT/HĐNN8 adopted by the 13th National Assembly of the Socialist Republic of Vietnam on 30/06/1989.
- Decree No. 18/2015/NĐ-CP dated 14 February 2015 of the Government on environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental protection plans
- Decree No. 19/2015/NĐ-CP dated 14 February 2015 of the Government detailing the implementation of a number of articles of the law on environmental protection;
- Decree No. 59/2015/NĐ-CP dated 18/06/2015 of the Government on management of construction investment project;
- Decree No. 16/2016/NĐ-CP dated 16/03/2016 of the Government on management and use of official development assistance (ODA) and concessional loans provided by foreign donors;
- Decree No. 201/2013/NĐ-CP dated 27/11/2013 of the Government detailing some articles of Law on Water Resources;
- Decree No. 140/2006/NĐ-CP dated 22/11/2006 of the Government providing for the environmental protection at stages of elaboration, evaluation, approval and implementation of development strategies, planning, plans, programs and projects;
- Decree No. 59/2007/NĐ-CP dated 09/4/2007 of the Government on the management of solid waste;
- Decree No. 38/2015/NĐ-CP dated 24/4/2015 of the government on management of waste and discarded materials.
- Decree No. 80/2014/NĐ-CP dated 06/8/2014 of the Government on drainage and wastewater treatment;
- Decree No.179/2013/NĐ-CP dated 14 November 2013 of the Government on the sanction of administrative violations in the domain of environmental protection;
- Circular 27/2015/TT-BTNMT dated 29 May 2015 of Ministry of Natural Resources and Environment on strategic environmental impact assessment, environmental impact assessment and environmental protection plan;
- Circular No. 36/2015/TT-BTNMT dated 30/6/2015 of Ministry of Natural Resources and Environment on hazardous waste management;
- Circular No. 28/2011/TT-BTNMT dated 01/8/2011 of Ministry of Natural Resources and Environment on regulating technical process on environmental monitoring of ambient air and noise;
- Circular No. 29/2011/TT-BTNMT dated 01/8/2011 of Ministry of Natural Resources and Environment regulating the technical process on inland surface water monitoring;
- Circular No. 30/2011/TT-BTNMT dated 01/8/2011 of Ministry of Natural Resources and Environment regulating the technical process on underground monitoring.
- Circular No. 19/2011/TT - BYT dated 06 June 2011 of Ministry of Health guiding the management of labor hygiene, laborers' health and occupational diseases;
- Circular No. 22/2010/TT-BXD dated 03/12/2010 of Ministry of construction providing

labor safety in construction.

b) Applicable Vietnam's technical standards and regulations:

The ESIA assessment makes reference to the following technical standards and norms:

- *Water quality:*

- QCVN 01:2009/BYT– National technical regulation on drinking water quality;
- QCVN 02:2009/BYT– National technical regulation on domestic water quality;
- QCVN 08-MT:2015/BTNMT– National technical regulation on surface water quality;
- QCVN 09-MT 2015/BTNMT– National technical regulation on ground water quality.;
- QCVN 14:2008/BTNMT – National technical regulation on domestic wastewater;
- QCVN 40:2011/BTNMT – National technical regulation on industrial wastewater;

- *Air quality:*

- QCVN 05:2013/BTNMT– National Technical Regulation on Ambient Air Quality;
- QCVN 06:2009/BTNMT– National technical regulation on hazardous substances in ambient air;
- TCVN 6438:2005 - Road vehicles –Maximum allowable limits of gas emission.

- *Soil and sediment quality:*

- QCVN 03-MT:2015/BTNTM - National technical regulation on the allowable limits of heavy metals in the soils;
- QCVN 15:2008/BTNMT – Soil quality - National technical regulation on the pesticide residues in the soils.
- QCVN 43:2012/BTNTM- National technical regulation on sediment quality;

- *Noise and vibration:*

- QCVN 26:2010/BTNMT - National Technical Regulation on Noise;
- QCVN 27:2010/BTNMT – National Technical Regulation on Vibration.;

- *Solid waste:*

- TCVN 6705:2009 – Normal solid waste. classification;
- TCVN 6706:2009 – Hazardous waste. Classification;

- *Drainage and construction works:*

- TCVN 7957:2008 - Drainage and sewerage - External Networks and Facilities - Design Standard.
- TCXDVN 33:2006 – Water supply – Pipeline distribution System and Facilities.
- QCVN 07:2016/BXD: National technical regulation "infrastructure works".
- QCXD VN 01:2008/BXD – National construction regulation – construction planning;
- QCVN 04-05:2012/BNNPTNT – National technical regulation – Irrigation works – Main Regulations on design.

- *Labor safety and health*

- Decision No. 3733/2002/QĐ-BYT dated 10/10/2002 promulgating 21 labor hygiene standards, 05 principles and 07 labor hygiene measurements.

- QCVN 18:2014/BXD – National Technical regulation on safety in construction

c) Legal documents related to the project:

- Decision No. 758/QĐ-TTg dated 08/ 06/ 2009 Approving the National Urban Upgrading Program in Period of 2009-2020;
- Decision No. 1659/QĐ-TTg dated 07/11/2012 of Prime Minister approving the National Urban Upgrading Program in period of 2012-2020;
- Decision No. 445/QĐ-TTg dated 07/4/2009 of the Prime Minister approving modification of the master plan for development of vietnam's urban system by 2025 with vision to 2050;
- Decision No. 2623/QĐ-TTg in 2013 of Prime Minister on approval of the scheme "Vietnam's urban development for response to climate change;
- Decision No. 403/QĐ-TTg in 2014 of Prime Minister approving national action plan on rapid growth;
- Decision No. 11/2012/QĐ-TTg dated 10 February 2012 of Prime Minister approving the master plan on development of transport in the mekong river delta key economic region through 2020, with orientations toward 2030;
- Decision No. 1397/QĐ-TTg dated 25 September 2012 of Prime Minister approving irrigation planning in Mkeong River Delta from 2012 - 2020 and orientations to 2050 in relation to climate change, high sea rise;
- Decision No. 1581/QĐ-Ttg dated 9 October 2009 of Prime Minister approving the construction plan on MKRD toward 2020 and vision to 2050;
- Decision No. 245/QĐ-TTg dated 12 February 2014 of the Prime Minister approving the master plan on socio-economic development of the Mekong delta key economic region through 2020, with orientations toward 2030;
- Decision No. 939/QĐ-TTg dated 19 July 2014 of Prime Minister approving the master plan on socio-economic development of the mekong river delta till 2020;
- Decision No. 1810/QĐ-TTg dated 04 October 2013 of Prime Minister approving the orientation, criteria of using WB fund in period 2014-2018 and following years;
- Aide Memoire of WB team on identifcation of the Scaling-up Urban Upgrading Project from 21 to 29 March 2016;
- Aide Memoire of WB team on preparation of the Scaling-up Urban Upgrading Project from 6 to 14 October 2016;
- Pursuant to the Letter No. …./UBND dated..... 2016 of Soc Trang Provincial Peole's Committee on appointing Soc Trang Department of Construction to be the Project Owner.

d) Documents and data prepared by the project owner

- Pre-FS of the Scaling-up urban upgrading Project – Soc Trang city subproject, Soc Trang province, October 2016.
- Basic design of the the Scaling-up urban upgrading Project – Soc Trang city subproject, Soc Trang province, October 2016.
- Related legal documents provided by Soc Trang city People's Committee and Departments.

1.2.2. Safeguards Policies and Guidelines of WB

The ESIA is carried out to assess the compliance with the World Bank's safeguard policies and guidelines.

According to the Bank Operational Policy on Environmental Assessment OP/BP 4.01 (http://go.worldbank.org/OSARUT0MP0), this subproject is classified as a Category A subproject due to its significant impacts related to land acquisition and resettlement issues. Therefore, as per the Bank policy, a full ESIA is required to examine the subproject's potential negative and positive environmental impacts, compares them with those of feasible alternatives (including the "without project" situation), and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance. The negative impacts will be mitigated by the application of comprehensive mitigation measures that indicated in the Environmental and Social Management Plan (ESMP) of the Sub-project, including monitoring plan and the requirements of health and safety for construction workers. The implementation of the ESMP will be a requirement for contractors during subproject implementation.

The environmental and social screening in accordance with the criteria described in the Donor's policy on environmental assessment has been carried out, and the result shows that the following WB safeguard policies are triggered for the Soc Trang subproject: Environmental Assessment (OP/BP 4.01)[1], Involuntary Resettlement (OP/BP 4.12) [2], Natural Habitats (OP/BP 4.04) [3]; Indigenous People (OP/BP 4.10); Physical Cultural Resources (OP/BP 4.11)[4] ; OP/BP 7.50 - International Waterways[5].

World Bank Group Environmental, Health, and Safety Guidelines[6]

- 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 subproject should conform to the general EHS

[1]Full treatment of OP/BP 4.01 can be found at the Bank website: http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTSAFEPOL/0,,contentMDK:20543912~menuPK:1286357~pagePK:64168445~piPK:64168309~theSitePK:584435,00.html

[2]Detailed description of OP/BP 4.12 is available at the Bank website:http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTSAFEPOL/0,,contentMDK:20543978~menuPK:1286647~pagePK:64168445~piPK:64168309~theSitePK:584435,00.html

[3]Full description of OP/BP 4.04 is available at http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTSAFEPOL/0,,contentMDK:20543920~menuPK:1286576~pagePK:64168445~piPK:64168309~theSitePK:584435,00.html

[4] *OP/BP 4.11 is accessible at http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTSAFEPOL/0,,contentMDK:20543961~menuPK:1286639~pagePK:64168445~piPK:64168309~theSitePK:584435,00.html*

[5] OP/BP 7.50 is accessible at http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTSAFEPOL/0,contentMDK:20544007~menuPK:1286706~pagePK:64168445~piPK:64168309~theSitePK:584435,00.html

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

Guidelines and industry specific EHS Guidelines on Water and Sanitation.

1.3. DESCRIPTION OF SOC TRANG SUBPROJECT

1.3.1. Soc Trang City's Subproject Location

Soc Trang City is the capital of Soc Trang Province, laying within 9046' to 9048' North Latitude and from 105054' to 105058' East Longitude. It is bounded by major roads such as national ways NH1A, NH60, NH 91C (South Hau River) and Quan Lo - Phung Hiep, connecting Soc Trang with Can Tho and Ho Chi Minh City. The waterway includes Maspero and Dinh River, flowing to Dai Ngai and making an easy aceess to Cai Con and Cai Cui ports in the North and Tran De seaport in the South. The city borders with Long Phu to the East, with My Tu and Chau Thanh districts in the West and with My Xuyen to the South.

Soc Trang has 10 administrative units, including Ward 1 to 10 and the project site covers 6 wards of 2, 3, 4, 6, 8, 9.

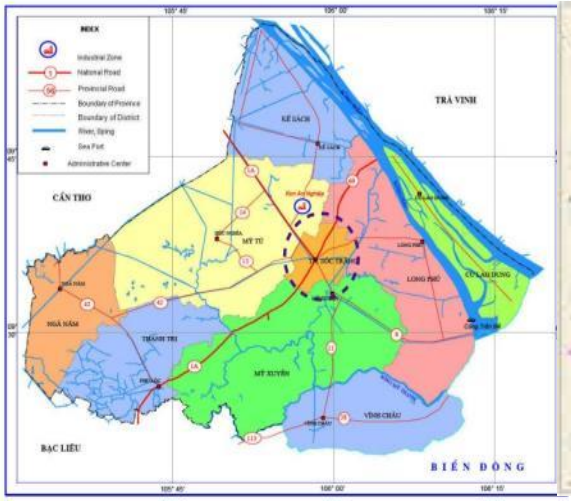


Figure 1.1: Location of Soc Trang city

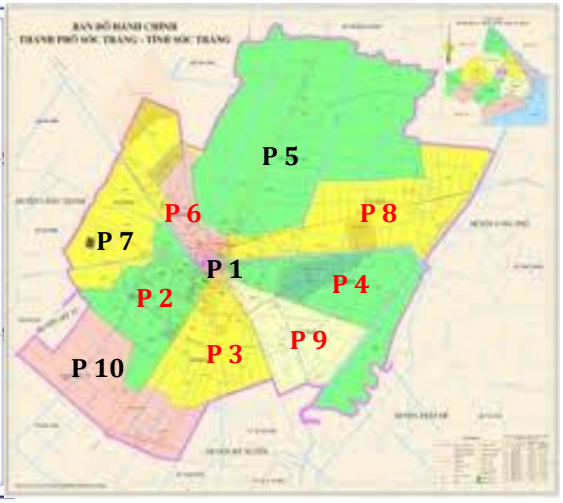


Figure 1.2: Project site including Ward 2,3,4,6,8,9.

1.3.2. Soc Trang sub-project investments

Soc Trang subproject follows the structure of the main project, having 4 components as follows:

Component 1: Tertiary infrastructure upgrade in Low Income Areas (LIA)

Tertiary infrastructure upgrading is provided for 6 LIAs (LIA1 (Ward 4), LIA 2 (Ward 6), LIA 3 (Ward 3), LIA 4 (Ward 2), LIA 5 (Ward 2), LIA 6 (Ward 8), covering total 132 hectares and 9,790 people. The main investments include upgrading alleys, installing of drainage system, and providing street lighting.

Component 2: Priority Primary and Secondary Infrastructures include:

- Construction of Ring Road and Bridge 2, section from Pham Hung to Maspero River (Ward 4 and Ward 8)
- Construction of Nguyen Van Linh Road and Bridge (Ward 2 and Ward 6)
- Dredging and embankment of Tra Men A (Ward 6), Hi Tech (Ward 3 and 9) canals and construction of roads along the 2 sides of the canal. Construct 1 tidal gate at the outlet of the cadjacentanal to Maspero canal (Ward 6)

- Rehabilitation of the drainage systems on Tran Binh Trong and Phu Loi Road (Ward 2)
- Upgrading Dien Bien Phu road section 1 and 2 (Ward 6 and Ward 8)

Component 3: Resettlement site.

A resettlement site is avalable in the 5A Mac Dinh Chi in Ward 4 annd the project will provides full intrastructure for 1 ha within the site and will purchase additioal 85 land plots. It is estimated that 247 households will be relocated to the resettlement sites.

Component 4: Implementation Support and Capacity Building

Capacity building includes technical assistance, support for implementation, enhancing capacity and mitigation measures for environmental protection and Improving capacity for urban planning integrated with resilience for climate change.

Figure 1.3 gives a snapshop about the locations of the investments in Soc Trang and Table 1.2 provides details of the investments by components.

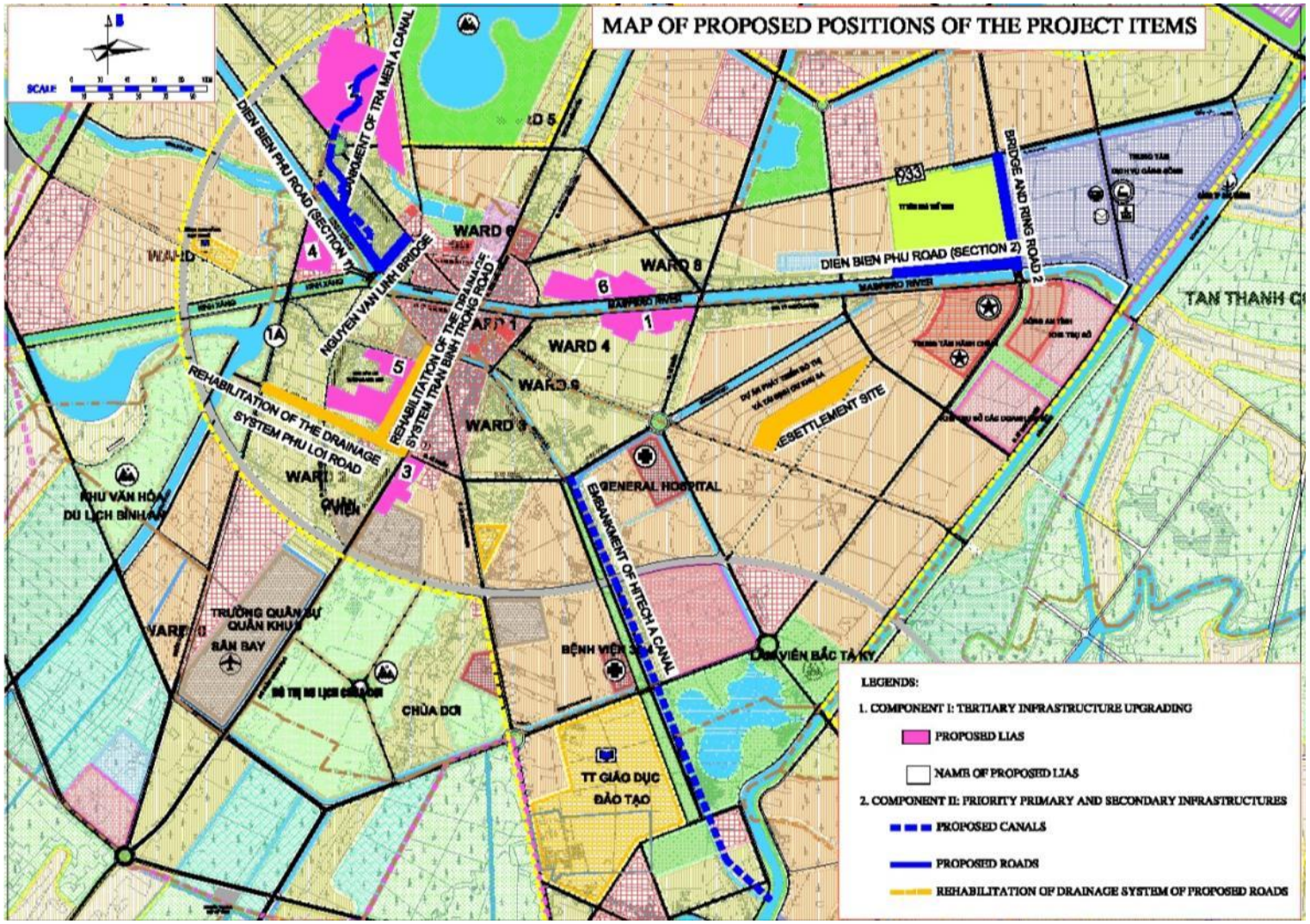


Figure 1.3: Location of Soc Trang Subproject's investments

Investments of the subproject are summarized in the following Table 1.1:

Table 1.1. Investments of Soc Trang subproject

No.	Investment Items	Description of Proposed Investments
I	**Component 1**	**Tertiary Infrastructure Upgrading in 6 LIAs (1,2,3,4,5,6) covering 132ha and involving 9,790 people**
1.1	Upgrading and widening of alleys	**Proposed work includes**: - Upgrading and widening of 2 main alleys which are Phan Huỳnh Hộ và Trần Quốc Toản from the existing 3.5m wide to the concrete asphalt of 5cm thick, 4m wide, 0.7 m sidewalk each side and total length of 1.6 km. - Widening 58 small alleys from the existing 1.5 - 3.5 m wide to the concrete asphalt of 15cm thick, 2.5 – 4m wide and total length of 10.4 km. - Installation of drainage concrete pipe D600 - D800 along the main alleys with total length of 1.6 km; and brick type drainage ditch in small alleys with width of B300 and length of 10.4 km; - Provision of lighting system for the alleys.
II	**Component 2**	**Priority Primary and Secondary Infrastructures**
2.1	Dredging and embankment of canals	**<u>Dredging and embankment of Tra Men A Canal (total length of 2.636km)</u>** *From Km0+0.00 to Km1+076 & from Km1+295 to Km2+000 with the following details:* - Dredging the canal of existing 8 m wide, 1.78 km long, +0.2m deep to the design 0.5 m; - Construction of soft embankment (2 stepped steep earth revetment with geotextile filter) with slope of 1:0.27. First step: vertical riser 2.7m. Grass is planted between sand bags. Second step: vertical riser 0.8 m, horizontal distance of 0.47 m with grass planted for green appearance - Construction of operational roads along two sides of the embankment with 2 m wide, total length of both sides is 3.5 km; installation of drainage concrete pipe B400, total length of 3.5 km; installation of lighting system along the roads. *+ From Km1+0.76 to Km1+295 with the following details:* - Dredging the canal of existing 8 m wide, 0.22 km long, +0.3m deep to the design -0.5 m deep. - Construction of concrete drainage box with 2.5x2.5m dimensions underground and a 5 m wide, 0.22km long road on top of the box pipe. *+ From Km2+000 to Km2+636:* - Dredging the canal of existing 6-8 m wide, 0.22 km long, -0.15m deep to the design 12m wide and 0.5m deep, 0.22 km long. + Construction of a sluice gate on Tra Men A canal at the receiving point with Maspero River: concrete gate with 3 m wide, 50 m long; sluice bottom at -2m deep and sluice ceiling at +3 m deep. **<u>Dredging and embankment of Hi Tech Canal (total length of 3.2 km)</u>** - Dredging the canal of existing 10-14 m wide, 3.2 km long, +0.08m deep to the design 14 m wide, 0.5 m deep; - Construction of soft embankment (2 stepped steep sandbag revetment with geotextile filter) with slope of 1:0.27. First step: vertical riser 2.7m. Grass is planted between sand bags. Second step: vertical riser 0.8 m, horizontal

No.	Investment Items	Description of Proposed Investments
		distance of 0.47 m with grass planted for green appearance; - Construction of operational roads along the two sides of the embankment with 2 m wide, total length of both sides is 6.4 km; provision of lighting systems for operational roads
2.2	Construction of Nguyen Van Linh bridge and road	- Construction of Nguyen Van Linh Y shaped bridge over the Maspero River, with of concrete structure, 11m wide and 145 m long. The bridge is comprised of 5 pillars (4 pillars with diameter of 1.5m; one of 2.5 m); 3 bridge abutments each has1.9 m long, 14 m wide. - Upgrading of the approach road from the existing +1.82 m elevation to the design height of +2.5 m. The road is made of concrete asphalt with 14 m wide, 0.552 km long and 2 sidewalks each of 5 m wide. - Provision of lighting system.
2.3	Construction of bridge and ring road No2	- Construction of a concrete asphalt road of 14 m wide, xx m long and 5 m wide sidewalks each side. - Installation of drainage concrete pipes D600-800 and manholes along both sides of the road with total length of 2.13 km. - On the road alignment, construct a concrete bridge over Maspero river of 97 m long, and 11.5 m wide. Bridge includes 4 pillars with diameter of 1.5m and 2 bridge abutments each has 1.9 m long, 14m wide. The ramps at both ends are 136.38 m wide and 14m; wide. - Provision of lighting system on bridge and road.
2.4	Upgrading of Dien Bien Phu Road	- Upgrading the Dien Bien Phu road with the total length of 2.8 km ▪ Section 1 (0.92 km): upgrading the existing 5 m dirt road into 6 m wide concrete asphalt road, 1 sided pavement of 3 m wide. ▪ Section 2 (1.9 km): Upgrading of 5m dirt road into 15 m wide concrete asphalt road, 2 sided pavements of 5 m wide. - Installation of drainage concrete pipes D600-800 and manholes along 1 side of the road with total length of 2.82 km. Installation of lighting system and tree planting on the pavement side.
2.5	Installation of drainage system in the city centre	- Upgrading of drainage system along Phu Loi Road from drainage ditch B400 into concrete pipes D2000 of 0.775 km long; D1800 of 2.21 km long; and D1500 of 0.25 km long. - Upgrading of drainage system along Tran Binh Trong Road from drainage ditch B400 into concrete pipes D1500 of 1.61 km long; D1200 of 0.2 km long;
III	**Component 3**	**Resettlement Sites**
3.1	Resettlement Site	- Construction of internal roads within the site of 7 m wide, 2 sided pavements of 4 m wide and total length of 245.81m. - Installation of storm water concrete drainage pipe D=400-600mm, 264.8 m long and a wastewater UPVC pipe D300, 245.81m long. - Installation of drinking water supply pipe by UPVC D100 with total length of 245.81m - Installation of lighting system and tree planting along 2 sidewalks of 245.81m long.

1.3.3. Construction methods

Component 1, Component 2 and Component 3 focus on the construction of connecting roads and embankments. Construction methods of these items are summarized below.

- ***Road construction methods***

The road construction measure includes the following steps:

1. Preparation

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

2. Concrete road construction

- Step 1: Digging and dredging organic soil
- Step 2: Cover ground to standard rigidity in each design layers
- Step 3: Digging the road mold following the width of each segment; placing formwork and pouring cement concrete under the mold.
- Step 4: Drawing formwork => completed.

3. Construction of asphalt concrete layer

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

- ***Embankment construction method***

As presented in Table 1.1, the embankment upgrading will include works as site preparation, dredging canal, embankment and other works behind the dyke (operation roads on both sides, drainage, lighting, trees). The construction measures for these works are presented as follows:

+ Site preparations

- Positioning and localizing works;
- Preparing construction site and workers' camps and site office;
- Mobilizing machinery and equipment;
- Locating temporary area at site to gather dredged material.

+ Dredging

The dredging is carried out based on a successive basis in the following orders:

- Construction of temporary drain system;
- Demarcate construction section on the canal by using melaleuca piles or sand sacks at the two ends of the demarcated section. On average each section is 50-100 m long;
- Dry off the section by water pump in the pile/sack coffer;

- Use specialized equipment combined with manual labor to dry dredge canal to the designed elevation;
- Dredged material will be direct transported by truck to landfill;
- Construction of embankment as designed.

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

+ Construction of embankment and auxiliary works

Construction of embankment

- The pilling test

- Casting the test pile to the designed length
- Excavating foundation to the designed elevation; positioning the test pile
- Installating positioning bracket
- Driving test pile and determining the length of mass piles

- The mass pilling

- Positioning and erecting pile driving machine
- Driving piles to the designed elevation

- Construction of embankment

- Applying geotextile layer to separate the sand filling and embankment foundation
- Constructing sand layers to the designed elevation

Construction of the on-dyke works

- Constructing drainage system and other underground structures
- Installating the embankment fence
- Constructing sidewalks, planting flower tubs, lighting systems, decorative lights.

1.3.4. Demands on materials and disposal of the project

a) Demand

- Main construction materials needed in the project include: sand, stone, brick, cement, steel, among others.

- Supplies needed for the project includes Pipeline and equipment in water sector, tranmission line and lighting, waste bins. In addition, prefabricated materials with high quality and fast installation are in need such as pre-cast concrete culvert, fresh concrete, asphalt concrete, etc.

Table 1.2. List and volume of main materials required for the project

Construction Work	Material	Volume *	Density**	Weight
		(m^3)	(ton/m^3)	(ton)
LIA 1	Macadam	14673.68	1.5	22010.53
	Sand	3040.59	1.45	4408.85
	Cement	-	-	2217.23
LIA 2	Macadam	35202.04	1.5	52803.05
	Sand	20567.47	1.45	29822.83

Construction Work	Material	Volume * (m^3)	Density** (ton/m^3)	Weight (ton)
	Cement	-	-	2501.56
LIA 3	Macadam	7966.71	1.5	11950.06
	Sand	1650.81	1.45	2393.67
	Cement	-	-	1203.79
LIA 4	Macadam	7859.99	1.5	11789.99
	Sand	1628.70	1.45	2361.61
	Cement	-	-	1187.66
LIA 5	Macadam	11567.27	1.5	17350.91
	Sand	2396.89	1.45	3475.5
	Cement	-	-	1747.84
LIA 6	Macadam	10130.06	1.5	15195.09
	Sand	2099.09	1.45	3043.67
	Cement	-	-	1530.68
Tra Men A Canal Upgrading	Macadam	6879.916	1.5	10319.87
	Sand	2459.39	1.45	3566.12
	Cement	-	-	1793.4138
Hi Tech Canal Upgrading	Macadam	9009.39	1.5	13514.09
	Sand	3197.21	1.45	4635.95
	Cement	-	-	2331.43794
Construction of Nguyen Van Linh Bridge	Macadam	63655.66	1.5	95483.49
	Sand	69761.34	1.45	101153.94
	Cement	-	-	3940.77794
Construction of bridge and ringroad No. 2	Macadam	3183.4953	1.5	4775.24
	Sand	3579.8457	1.45	5190.78
	Cement	-	-	2318.18715
Upgrading Dien Bien Phu Road- section 1	Macadam	1537.5931	1.5	2306.39
	Sand	1796.0141	1.45	2604.22
	Cement	-	-	0
Upgrading Dien Bien Phu Road- section 2	Macadam	2921.4269	1.5	4382.14
	Sand	3412.4268	1.45	4948.02
	Cement	-	-	0
Rehabilitation drainage systems in the city center	Macadam	1579.41	1.5	2369.12
	Sand	843.67	1.45	1223.32
	Cement	-	-	615.21525
Construction of Resettlement Site	Macadam	39565.53	1.5	59348.3
	Sand	48107.52	1.45	69755.9
	Cement	-	-	0

b) Supplying sources

Soc Trang subproject does not involve large scale extraction of sand, stone and earth materials, therefore, does not require opening of any new quarry. These maerial will be purchased from local traders from other nearby provinces and transported to the project sites either by waterways or roadways.

Locations of potential sources, capacities and operation permits are listed in Tables 1.3.

All the materials shall be tested for the quality according to the current regulations. If the mateials 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 1.3.

Table 1.3. Location and distances from the material supplying sources

No.	Indicators	Mines		
		Quarry	**Sand pit**	**Land bank**
1.	Location and Distance to project site	Dong Nai, An Giang	Tan Chau (An Giang)	Near the site
2.	Material quality	Usable	Usable	Usable
3.	Supplying capacity	2.000$m^3$to 5.000m^3	2.000$m^3$to 5.000m^3	2.000$m^3$to 5.000m^3
4.	Transportation means	Waterway/road	Waterway/road	Road
5.	Supply License	With licence obtained by suppliers	With licence obtained by suppliers	With licence obtained by suppliers

c) 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 from the local oil and gas company whose fuel station network is accessible to all.

d) Water Supply

Water sources for work execution will mainly come from the 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 hygenic/clean water is available for use.

e) Demands on waste treatment

- **Volume of waste from excavation**

The volume of soils and stones from upgrading, expansion and upgraded culverts and dredged material volume are estimated as:

+ Component 1: 30,450 m^3
+ Component 2: 170,000 m^3
+ Component 3: 8,000 m^3
+ Material dredged from Tra Men A canal (8,700 m3) and Hi Tech canal (13,200 m3). Total is about 22,000 m^3

- **Expected method for transport and disposal site**
  + Transport soils, stones and construction wastes by 10 ton and 15 ton truck with canvas cover, to the places where need soils and stones for leveling or to the barges.
  + Transport dredged material: dredged material will be loaded on truck of $10m^3$. During transport, water leaking from the truck is not allowed or the truck must be covered. Dredged material is transported to treat in Soc Trang city solid waste treatment plant in Phu My commune (My Tu district) and Dai Tam commune (My Xuyen district) Soc Trang province (about 12 – 15 km far from the dredging area). The due diligence reviews for Soc Trang solid waste treatment facility are presented the Annex 2.

1.3.5. Affected areas and influence area

According to OP 4.01 and project description, affected areas of the project include component 1,2 and 3 in 6 wards (Ward 2, 3, 4, 6, 8, 9) and about 500 m far from the sensitive points of affected areas such as residential areas, schools, hospitals, religious areas and transport system. The distance is selected on the basis of noise from piling works which is considered to be the most serious impacts.

Table 1.4. The sensitive areas related to activities of components and project area of influence

No.	Components	Location	Project area of influence	
			Air, Noise and Vibration	Aquatic Ecology
1.	**Tertiary infrastructure upgrading 06 LIAs (LIA 1, LIA 2, LIA3, LIA 4, LIA 5, LIA 6)**			
1.1	LIA 1	Ward No.4	Resident area (50-500 m)	Maspero river
1.2	LIA 2	Ward No.6	Resident area (30-500 m)	Tra Men A canal
1.3	LIA 3	Ward No.3	Resident area (20-300 m),	-
1.4	LIA 4	Ward No.2	Resident area (30-500 m); Huong Son Pagoda (20m)	Xang canal
1.5	LIA 5	Ward No.2	Resident area (30-500 m);	-
1.6	LIA6	Ward No.8	Resident area (50-500 m);	Maspero river
2.	**Upgrading LIA connecting roads, canal dredging and embankment improvements**			
2.1	Tra Men A canal dredging and embankment improvements	Ward No.6	Resident area (10-500 m); Long Hung pagoda (5m); Ngoc Hung monastery (25m); Ngoc Phuoc monastery (5m)	Tra Men A canal
2.2	Hi Tech canal dredging and embankment improvements	Ward No.3 and 9	Resident area (10-500 m)	Hi Tech canal and Dinh river (one branch of Hau river)
2.3	Construction of Nguyen Van Linh bridge	Ward No.2 and 6	Resident area (30-500 m); Bong Sen market (200-250m)	Maspero river

No.	Components	Location	Project area of influence	
			Air, Noise and Vibration	Aquatic Ecology
2.4	Construction of Ring No.2 road and bridge	Ward No. 4 and 8	No residential areas, there is serveral households scattered from the project area of about 100-500m;	Maspero river and Dinh river (one branch of Hau river)
2.5	Improve drainage system in Ward 3	Ward No.3	Resident area (10-500 m)	-
2.6	Upgrading Dien Bien Phu road (section 1)	Ward No. 6	Resident area (20-500 m); Long Hung pagoda (5m); Ngoc Hung monastery (25m); Ngoc Phuoc monastery (5m)	Maspero river
2.7	Construction of Dien Bien Phu road (section 2)	Ward No. 8	No residential areas, there is serveral households scattered from the project area of about 100-500m;	Maspero river
3.	**Resettlement Area**			
3.1	Resettlement Area at area No.5A - Mac Dinh Chi street	Ward No.4	Resident area (50-500 m)	Nhan Luc cannal

Apart from direct impacts from the projct in wards, following areas may be affected by the project during implementation of items by material construction transport and disposal (Figure…). Basically, main routes for material construction transport and disposal are:

- Hung Vuong road→National Highway 1A →Provincial Road 939 →Solid waste treatment plant: is the transport route for the sub-item of the project: Tra Men A dredge and embankment, rehabiliation of LIA 2 và LIA 4;

- Nguyen Van Linh road→ Tran Hung Dao road→National Highway 1A →Provincial Road 939 →Solid waste treatment plant: is the transport route for the item of Nguyen Van Linh road and bridge;

- Le Duan road→ Tran Hung Dao →National Highway 1A →Provincial Road 939 →Solid waste treatment plant: is the transport route for Ring road and bridge; resettlement area, Lia 1, Lia 6 ;

- 30/4 road→Provincial Road 934 -- >National Highway 1A →Provincial Road 939 →Solid waste treatment plant: is the transport route for the item of Hi Tech dredge and embankment.

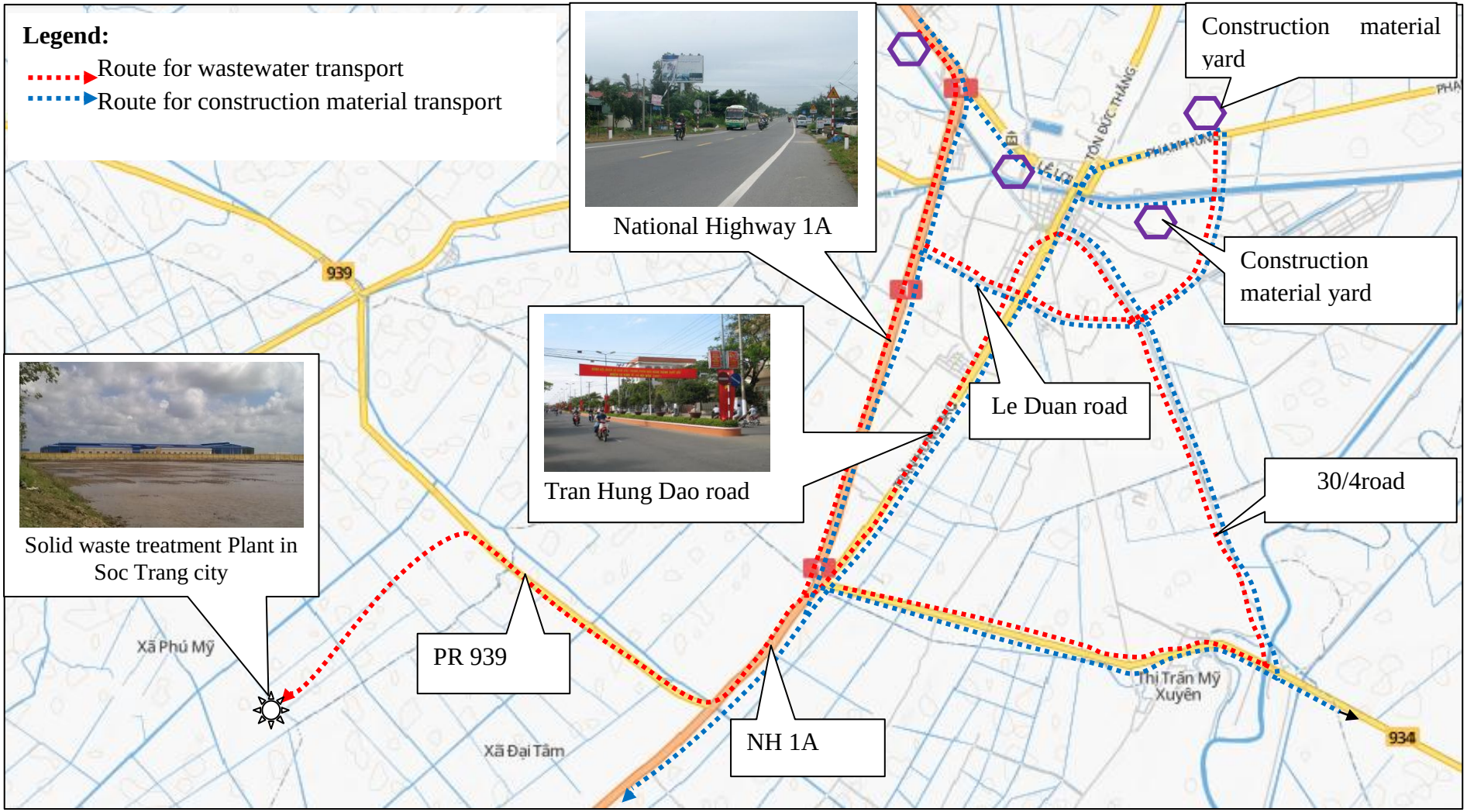


Figure 1.4: Affected are from material and waste transportation of the project

1.3.6. Total investment and project schedule

a. Total investment:

Total investment of the project is 1.041.964.000 VND.Equivalent to 46.682.975 USD

(1 USD = 22.320 VND). Financing source:

Table 1.5. Structure of financing source

	WB fund	Counterpart fund	Total
Value	781,216,226,640	254,503,978,560	1,035,720,205,200
USD	35,000,727	11,402,508	46,403,235
Percentage	**75.43%**	**24.57%**	**100%**

b. Project implementation schedule:

Table 1.6. Implementation schedule

No.	Items	Completion date
1	Preparation of project proposal	4/2016
2	Prime Minister's approval for the project proposal	10/2016
3	Prime Minister's approval of investment policy (approval of project portfolio)	12/2016
4	Completion of draft of FS, detailed design and component reports	01/2017
5	Pre-appraisal of the World Bank	01/2017
6	Completion of FS, detailed design, component reports following results of pre-appraisal	01/2017
7	Final appraisal of the World Bank	2/2017
8	Approval of FS and component reports	2/2017
9	Agreement negotiation and sign of agreement	3-4/2017
10	Approval detailed design, total estimate of bidding document for 30% working volume (phase 1)	6 – 9/2017
11	Construction of 30% working volume (phase 1)	10/2017 – 4/2019
12	Completion and put the work into use (phase 1)	5/2019
13	Approval detailed design, total estimate of bidding document for 70% working volume (phase 2)	10/2018 – 4/2019
14	Construction of 70% working volume (phase 2)	5/2019 - 12/2021
15	Completion and put the work into use (phase 2)	01/2022

(Soucre: FS, Dec 2016)

1.3.7. Organization for project implementation

The project owner with supports from the Steering Committee will be the focal contact between the donors and Central Ministries and Departments, local authorities and contractors in order for creating the connection during project implementation.

For operating mechanism, the Relationship of executive agencies, project owner, PMU, contractors, donor and shareholders for the project implementation is as follows:

- The Government of Vietnam, related central Ministries and Departments;
- Executive agency: Soc Trang Provincial People's Committee
- Project Owner: Soc Trang Province Department of Construction
- Donor: World Bank (WB)

The Government of Vietnam appoints Ministries: Ministry of Finance, Ministry of Planning and Investment, etct to work with the Donor about loans and lending mechanism;

After being approved and loan is provided to the Government of Vietnam; the Government of Vietnam authorizes Soc Trang Provincial People's Committee to manage the above loan.

The Project Owner will make disbursment for carrying out working volume as existing payment procedures.

During project implementation, from the preparation stage to project completion, Donor – WB regularly pays field visits to assess the efficiency of concessioal loans and reserves rights to request the Project Owner to have solutions for ensuring the set Project Objectives.

1.4. METHODS FOR ESIA PREPARATION

1.4.1. Methods for environmental impact assessment

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

1. ***Checklist:*** this method is a common approach which is widely to 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.
2. ***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.
3. ***Expert adjustment:*** This method was deployed with the experts' knowledge and experience, in associated 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.
4. ***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.

5. ***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.
6. ***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.
7. ***Field investigation and survey:*** Based on available environmental data and maps (topographical map, existing land use map of Soc Trang 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.
8. ***Sample analysis:*** All water, air and soil samples collected in the field were stored and brought the laboratory for analyzing.
9. ***Public consultation:*** Public consultation is used to help identify opportunities and risks, improved subproject design and implementation, and increase subproject 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 subproject that affect their lives and environment, promotes dialogue between governments, communities, and implementing agencies to discuss all aspects of the proposed subproject. The feedbacks from consultation will be incorporated into the subproject ESIA and design. Those affected by the subproject include those resettled and those in the nearby communities affected by subproject impacts, intended beneficiaries of the subproject, 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.
10. ***Disclosure of information:*** Disclosure of the subproject information including the subproject safeguards and instruments will allows the public access to information on environmental and social aspects of the subprojects. Disclosure is mandated by policies for the WB's Environmental Assessment, Involuntary Resettlement, and Indigenous Peoples. The subproject 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 subproject preparation and supervision process.
11. ***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.

1.4.2. Objectives and methods of Socio-econimc survey (SES)

The objective of the SES is to establish the baseline data on the socio- economic status of project area, to analysis and establish the project policies of compensation, assistance and resettlement. It will also be used to design the IRP for the severely AHs in order to restore their income. The baseline data will also be used as reference for the monitoring and

evaluating the project objectives and RP implementation.

The Socio – Economic data includes information on population size, religion, education, employment, income and expenditure of PAPs. The data also cover means of production and recreation of AHs, capacity of access to social and physical infrastructure services, environmental conditions, status of flooding and waterborne diseases.

The SES used a structured household questionnaire method to gather the data. The SES was conducted at the same time with IOL survey from July to August of 2016. After finishing survey period, completed questionnaires have been filtered by some criteria (i) 100% of the severely AHs and relocated households, (ii) 100% remaining ethinic minority HHs and 20 % of the other PAHs for SES. The number of PAHs selected for SES is summarized in Table 1.1

In adition, consultant also conducted desk review all related documents such as the year book, annual reports of local authority to seek background information of SocTrang city.

Table 1.7. Number of Surveyed HH in the project area

Item	Location	Smaple size	Population	Average populations
Component1: Tertiary Infrastructure upgrading (1)				
Lia 1	Cluster 4 – ward 4	32	145	4.53
Lia 2	Cluster 6 – ward 6	47	214	4.55
Lia 3	Cluster 4 - ward 3	40	184	4.60
Lia 4	Cluster 5 - ward 2	15	71	4.73
Lia 5	Cluster 3 - ward 2	19	86	4.53
Lia 6	Cluster 1 - ward 8	32	145	4.53
Component 2: Primary and secondary infrastructure upgrading (2)				
Hi Tech canal	Ward 6	9	40	4.44
Tra Men A canal	Ward 9	19	86	4.53
Dien Bien Phu road section 1	Ward 6	54	255	4.72
Dien Bien Phu road section 2	Ward 8	41	190	4.63
Bridge and ring road 2	Ward 8	58	248	4.28
Nguyen Van Linh bridge	Ward 6	37	162	4.38
Resettlment area (3)		6	27	4.50
Total		409	1853	4.53

Source: *Survey data SA of Soc Trang city. 2016*

CHAPTER 2. NATURAL, ENVIRONMENTAL AND SOCIO – ECONOMIC CONDITIONS IN THE PROJECT AREA

This chapter of the report presents information on the environmental and social baseline conditions and is structured as follows:

- General geographic, geological, climatic and natural resources of the project locality setting;
- Data including hydrological, water resources, ecological and socio-economic at the city level;
- More detailed environmental quality data from the project area, which includes data from a range of project surveys, such as air, water, wastewater, soil and sediment quality and some additional socio-economic information;
- Infrastructure conditions for the project areas, including aspects of water supply, road condition, waste management, power supply and drainage and sewage treatment;
- Specific information on environmental and social conditions from each of the work component locations, enabling a good understanding of their particular environmental and social setting; and
- Finally, information on cultural structures and sensitive sites that have potential to be affected by project implementation

2.1. GEOGRAPHIC CONDITION

2.1.1. Geographic and topological conditions

Geographic conditions:

Soc Trang is a province in the Mekong Delta, located at the end of the Mekong basin. The provincial capital of Soc Trang province is Soc Trang City, the geographical coordinates of which is 9046’ - 9048’ North Latitude and 105054’ - 105058’ East Longitude. Soc Trang City was established in pursuant to the Government Decree No. 22/2007/ND-CP dated Februray 8, 2007, on the basis of the entire natural area, population and administrative units of the former Soc Trang communal town. The administrative borders of Soc Trang City are as follows:

- East border: Long Phu district.
- West border: My Tu district and Chau Thanh district.
- South border: My Xuyen district.
- North border: Long Phu district and My Tu district, both of Soc Trang province.

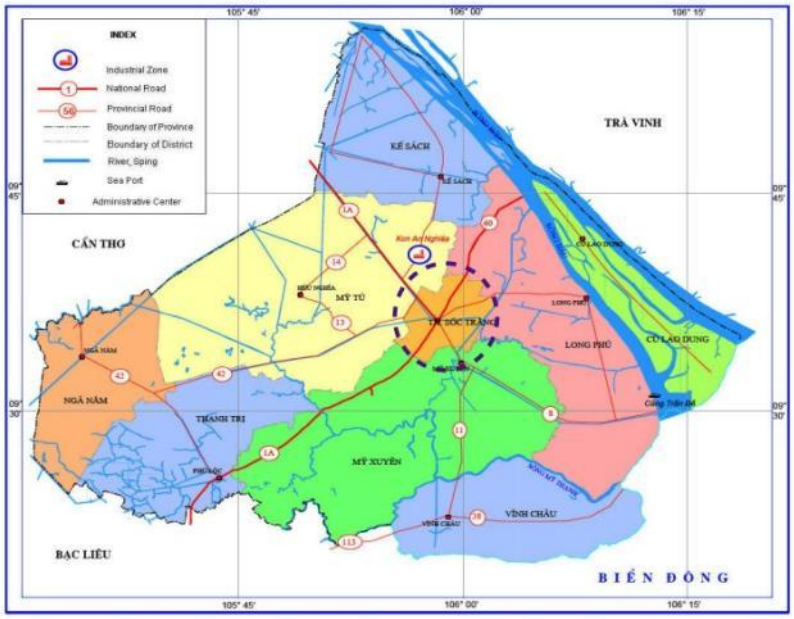


Figure 2.1: Map of Soc Trang province

Soc Trang City is located at the center of key roads such as the NH1A, NH60, lying between NH91C (South of Hau River) and National Highway Quan Lo - Phung Hiep, linking Soc Trang City with two major economic centers, that is, Can Tho City and HCMC, the Southwest region. Waterways include the Maspero and Santard rivers that flow into Dai Ngai, enabling easy traffic to Cai Con, Cai Cui ports in the North and Tran De port in the South. Soc Trang City is among the key urban cities of the Mekong Delta. It is the political, economic, cultural, scientific and technological hub, as well as economic exchange point of the province.

Topological conditions:

The topography of Soc Trang City is relatively flat with an average height of 1.2 – 1.3 m and divided into two different areas: Firstly, arable land around 150 – 500 m wide running from the North to the South along NH60. Thanks to the land's average height of around 1.8m, drainage takes place quite easily. Composed of a mixture of sand, the arable land is construction-friendly. At present, arable lands have been used for developing urban areas, residential areas, infrastructure, gardens and land for cultivating farm produce. Secondly, paddy fields located at the side of the arable land with a height of around 0.8m. Most of the paddy fields are used for agricultural production.

2.1.2. Climate

The climate regime of Soc Trang City is subequatorial tropical moonson. The temperature is evenly high throughout the year, abundant radiation, sunshine and wind, with two distinct seasons: the rainy season lasting from mid-May to late-October, and the dry season from November to late-April.

The city's average air temperature is relatively high, at 270C. The highest temperature is recorded in the dry months, ranging from 270C to 280C and highest at 29.20C in May. The absolute high temperature is 37.80C. In the rainy season, the air temperature is lower, the absolute low temperature is 16.20C and the daily temperature ranges from 80C to 100C. In the dry season, there is a higher fluctuation in the temperature throughout the day, at around 150C. The monthly temperature fluctuation is not high, at only 2^0C - 3^0C.

The air humidity of Soc Trang city ranges around 83-84%. The humidity changes from the rainy to the dry season. In the rainy season, the air humidity is relatively high, at around 88-89%. In the dry season, this can decline to an average of 79%. The humidity at night is the highest at around 92% and lowest at 62%.

The average annual rainfall of Soc Trang City is around 130-180 mm. Rainfall is distributed unevenly across the months but divided into two distinct seasons: the rainy season and the dry season. The rainy season lasts from May to November, but most rainfall is recorded in August, September and October. Rainfall in the rainy months account for 90% of the total annual rainfall. Meanwhile, the dry season, which lasts from December to April, only contribute to 10% of the total annual rainfall. There are months with nearly no rainfall (January and Februrary). Evaporation is relatively high, averaging at around 25mm per day. In the dry season, evaporation can reach up to 30-40 mm per day. The corresponding figure for the rainy season is lower, at around 16-25mm per day. Located near the South China Sea, Soc Trang City is heavily influenced by many moonson systems. The prevailing Northwest-Southeast wind system blows in November and December, creating a weather condition of no rain, dryness and high temperature. From January to April, the wind gradually changes from the South to the Southeast; from May to September, it changes from the Southeast to Southwest and West; and in October, it changes from the Southwest to Northwest and East. The average wind speed is around 3-6m/s, however, in the rain, many winds can blow at a speed of 25-35m/s. Soc Trang City is rarely affected by windstorm.

2.1.3. Hydrological conditions

Density of rivers and canals

Soc Trang City has an interlacing network of rivers and canals that are connected to each other and to the sea. The main rivers and canals include:

- Hau River running alongside the East borders, with a length of 60km. The river flows to the sea through Tran De and Dinh An river mouths. It is the province's main source of fresh water but also the channel for salinization of the South China Sea. The river section lying within Soc Trang province and running into the South China Sea has the length of 60km, 1,000-1,500m in width, 23-26m in depth.
- My Thanh river, which lies within Soc Trang province. This is a short river with a relatively large cross section, an average width of 200m (the section leading to the river mouth 240-300m), and average depth of 11.5-14.0m. Thus, My Thanh river helps with water drainage but is also a channel for salinization for the province as well as the region.
- Nhu Gia canal, the main distributary of My Thanh river, connects Quan Lo – Phung Hiep canal with My Thanh river. The section connected with the Quan Lo – Phung Hiep canal has a width of 110-130m. Nhu Gia canal brings fresh water from Quan Lo – Phung Hiep canal to a part of My Tu, Nga Nam districts, even though this also causes salinization in the area.
- Quan Lo – Phung Hiep canal, connected directly with Hau river, runs alongside the North borders of Soc Trang province. The section of the canal that runs through Soc Trang province has an average width of 60-90m and depth of 4-8m. The canal is an important carrier of fresh water into the province.

Apart from the abovementioned rivers and canals, there is also a river network connected to the Hau river such as Cai Tram, Rach Vop, So Mot, 30/4, Saintard, Tiep Nhat, etc. and a canal network connected to the Quan Lo – Phung Hiep canal such as Nhu Gia, Cai Trau – Phu Loc, Vinh Loc, etc. These canals together with the secondary canal system generate a complex and

interlacing system of canals that supply and drain water for the province.

Soc Trang City has two main canals: Maspero and Santard, and other 9 branch canals. These canals are mainly artificial canals aimed for irrigation, urban drainage and waterway transport. The width of Maspero canal (or Cau Quay canal) and Santard river is around 40-60m, meanwhile, other branch canals are around 8-20m wide.

Figure 2.2: Hydrological diagrams of Soc Trang city

Hydrological characteristics

The hydrological conditions in Soc Trang City as well as in the province is influenced by the tidal regime of the South China Sea via Hau river, with irregular semidiurnal tide having the following characteristics: high high tide, low low tide, average water level leaning toward the low tide. The tide amplitude recorded at Dai Ngai station on Hau river: 1.89m in October, 1.84m in November, and increasing gradually to 1.98m in January, to 2.07m in February, and to 2.18m in March. The lowest low tide is recorded in June (-1.03m), and highest in November (-0.24m).

Tidal characteristics of the South China Sea: South China Sea has an irregular semidiurnal tide with the following key characteristics: high high tide, low low tide, the average water level leaning towards the low tide. Most the canals in the area are two-way flows most of the time in the year. Due to these characteristics, in the rainy season, flooding usually takes place in sunken areas of districts Trach Tri, My Tu, Nga Nam, My Xuyen. On the contrary, in the dry season, the majority of the province is affected by salinization (the salinity limit 1g/l is usually seen in An Lac Thon small-town – Ke Sach district).

Hydrological characteristics of Hau river: Hau river's hydrology is heavily influenced by the flow of the upper basin and South China Sea's tides. From July to December, the flow of Hau river is regulated by the flood flow from the upper basin. From late November, early December to May, the flow of the upper basin declines, the tides of the South China Sea produce a strong impact, leading to a reverse flow. Impacts of South China Sea's tides may

reach as far as Phnompenh – Cambodia. The average annual flow of Hau river through Chau Doc is around 1,40 m3/s, the lowest monthly average is 300 m3/s (April), sometimes decreasing to 200 m3/s (once every 10 years).

2.1.4. Engineering geology and soil conditions

Engineering geology conditions:

The engineering geology of Soc Trang province shows that the soil composition includes mainly clay, clay mud, a mixture of organic impurities, usually in black and dark gray. The geological ground is relatively stable, the bearing force of the ground is low, less than 0,5 kg/cm2. Non-pressure underground water is shallow, around 0.5m below surface.

Soil conditions:

The Mekong Delta in general and Soc Trang province in particular was formed by sediments generated on the Mezoic bed rock that appears from the depth near the ground surface at the North of the Delta to the depth at 1.000m near the coastline. The sediments can be divided into the following main layers:

- Holocene layer: Located on the surface. This is young sediment, consisting of clay and sand. Grain components are from fine to medium.
- Pleistocene layer: Contains sand and gravel and clay with marine sediments.
- Pliocene layer: Contains sandy clay with medium-size particles.
- Miocene layer: Contains sandy clay with medium-size particles .

The soil of Soc Trang province is a combination of sea and marine sediments with a high content of clay and consisting of many organic substances. Because the province is located in the area affected by salt intrusion, with many sunken areas that prevents easy drainage, most of the soils suffer from salinization and acidic, alkaline. This not only affects agricultural production but also the water for irrigation and domestic use (active and potential alkaline soil are the cause of acidic water), especially in early rainy season.

2.1.5. Natural/biological resources

a. Soil resources:

The natural area of Soc Trang province is 322.330,36 ha. The soil are made of combined sea and marine sediments, with high content of organic substances and can be divided into the following main groups:

- Saline soil : 158,547 ha, accounting for 49.54%.
- Alkaline soil : 75,823 ha, accounting for 23.69%.
- Anthrosols : 46,146 ha, accounting for 14.8%.
- Sandy soil : 8,491 ha, accounting for 2.65%.
- Alluvia soil : 6,372 ha, accounting for 1.99%.
- Gley soil : 1,076 ha, accounting for 0.33%.

In general, the soil in Soc Trang province is favorable for agro-forestry-fisheries production. The natural area of the province tends to expand thanks to the process of sedimentation.

b. Water resources:

Soc Trang province has a rich water resource, including surface water and underground water. Inland surface water of the province is provided by the Mekong river system, ensuring

adequate irrigation for cultivation and for the livestock, as well as for the domestic use of local residents. As the sea area is much larger than terrain, Soc Trang province is endowed with endless sea water resources. Accompanying this vast water resource is the rich and diverse aquatic resource, including fishing fields with abundant fisheries that have brought about significant economic benefits for the local residents. Besides surface water, underground water also represent vast potential. Despite being a coastal province with a large area affected by salt intrusion, underground water in the coastal zone taken from the depth of over 80m has good quality and can meet the demand of local residents.

c. Mineral resources:

Minerals in Soc Trang are mainly Hau river's sand dunes at communes situated at the end of Hau river. The sand is exploited and used for leveling construction works. The annual output ranges from 200-300 million m^3. Figure 1.3 shows the map of mineral resources in Soc Trang Province.

d. Biological resources

Biological and habitat resources of Soc Trang province are very diverse (terrestrial habitats; wetland habitats; habitats in the corridor of rivers, canals; habitats in the coastal biological system and dunes; agricultural habitats). As of 2014, total forest area and forestry land in the province is around 16,185.4 ha (of which 4,769.5 ha is protection forest); the ecosystem of cajuput forest is around 4,000ha; the flora of mangrove forests is very rich and diverse with a variety of species (Rhizophoraceae, Sonneratia caseolaris, Avicennia, etc), and which is home to many wild animals and plants, providing favorable living conditions for aquatic species. However, due to population growth, urbanization, pollution, climate change, natural disasters, environmental incidents and the intrusion of foreign species, etc. Together with the unsustainable exploitation of natural resources, the habitats, ecosystems and biodiversity in the province have been seriously affected.

Valuable ecosystems in Soc Trang province:

According to the Report on "Environmental planning of Soc Trang province until 2010 and ooutlook to 2020" of the Department of Natural Resources and Environment of Soc Trang province in October/2008:

- ***Mangrove Ecosystem:*** The mangrove ecosystem of Soc Trang is very diverse, located in Vinh Chau, Long Phu and Cu Lao Dung districts. The total area of the mangrove forests is quite large and houses valuable fauna and flora. The total area of coastal prevention forests is 5,465 ha (natural forest 1.686 ha, artificial forest 3.767 ha). Apart national defense purposes, the system of mangrove forests and forestry also play an important role in economic development, protection of the ecosystem and environment as well as creation of beautiful landscapes for tourism.
- ***Ecosystem of the river mouths:*** In the Northeast of the coastal line, there are three river mouths pouring into the sea, namely Dinh An, Tran De and My Thanh. These are strongly affected by tides and the mixture between salty and fresh water, thus, are highly dynamic. Nevertheless, they are also vulnerable to pollution and changes in the water regime. The ecosystem of the river mouth and coastline includes marine species and brackish water species such *Acatia clause, Acartiella sinensis, Thermocyclops hyalinus,* and benthic species *such as polychaeta and crustacean.*

The ecological conditions in the project area:

For the project area in Soc Trang City, urbanization has taken place over a long period of time and has deeply penetrated most wards, including 6 wards in the project area. The natural landscape mainly consists of urban landscape with houses, infrastructure, greeneries, and

small and medium-sized parks/entertainment areas scattered across the city. For the project area, the surveys and data collected by specialized agencies indicate that:

Terrestrial ecosystems: In the 6 wards in the project area, no wild ecosystem, rare species or endangered species are found. Because the project area is land lots with agricultural land, there are no special organisms and ecological systems.

Plants include:

- Agricultural crops: rice, farm produces, etc
- Fruit trees: jackfruit, coconut, banana, mango, plum, etc
- Shade trees: tamarind tree, eucalyptus, acacia, bamboo, etc
- Species of weeds growing in abundant land, public land, etc

Animals include:

- Cattle: buffalo, cow, dog, etc
- Poultry: chicken, duck, etc
- Freshwater fish, crabs, snails naturally develop in field.

Aquatic ecosystems and aquaculture: In the 6 wards in the project area, there is no aquaculture; the freshwater ecosystem has phytoplankton, zooplankton, zoobenthos and shrimp. Typical species and number of aquatic organisms:

- Aquatic organisms that change by salinity level, including species living in coastal areas and shallow rivers, are widely found in the west of the Pacific Ocean but their distribution changes dramatically by the seasons;
- Freshwater phytoplankton and animals such as: Monia dubia, Ilyocruptus halyl, Dianaphasomona leuchtenbergianam, D.paucispinosus, Desoctclops leuckatrti, Neodiatous visnu, etc.
- The depth, bottom features, clarity, hydrological conditions and the food volume have major impact on the distribution and development of organisms and shrimp resources in the project area. Zooplanktons do not exceed 1,000 individuals/m3. Phytoplanktons do not exceed 1 million cells/m3. Zoobenthos are not very dense, around 100 - 500 individuals/m2, and may reach to thousands individuals/m3 in some places, dominated by Polycheata, amphipoda, tanaidacea and bivalvia.

2.1.6. Climate change

Over the past years, the impacts of climate change have become increasingly visibledue to the complex and abnormal changes of factors such as: Temperature, rainfall, water level, storms, tropical depressions, etc. The changes in climate have had serious effects on production and domestic activities of the people.

According to the Report on *"Climate change impact assessment, development of an action plan framework on response to climate change and rising sea level in Soc Trang province",* climate change in the province is clearly reflected in changes in temperature, rainfall, water level, extreme weather events, saline intrusion, drought, flood, particularly as follows:

a. Saline intrusion

Indicators of saline intrusion in Soc Trang province during 1985-2009 measured at stations on My Thanh river, Hau river, Nhu Gia canal and Maspero canal revealed that: salinity is mainly found in the early months of the year (from January to early-May), intruding in the river mouth areas and penetrating into mainland. Salinity intrusion in the river and canal system of

Soc Trang province tend to be progress more abnormally and complex from year to year, with changes in timing, coverage and salinity. The saline content changes by year, depending on water volume flowing into the Mekong river as well as meteorological, hydrological, tidal conditions across the region at different periods and volumes.

Figure 2.3: Comparison between the highest annual salinity at different measuring points

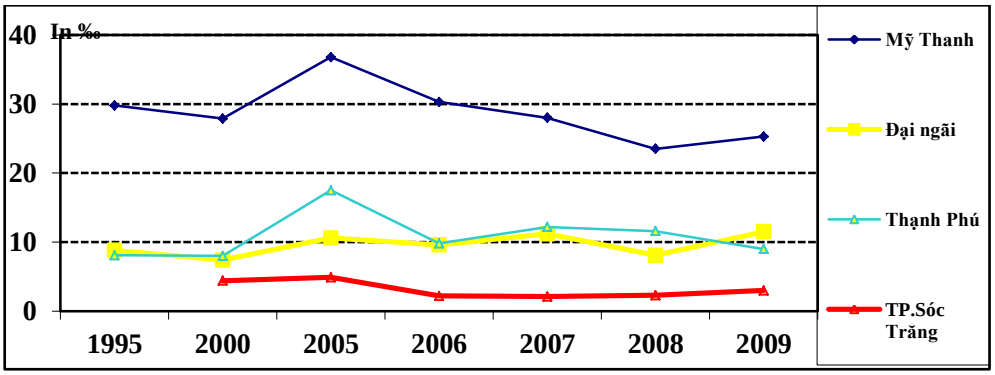


Figure 2.4: Comparison between the lowest annual salinity at different measuring points

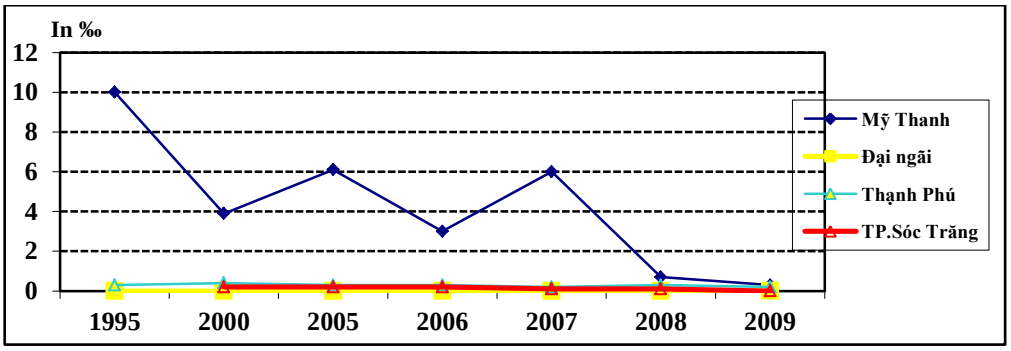
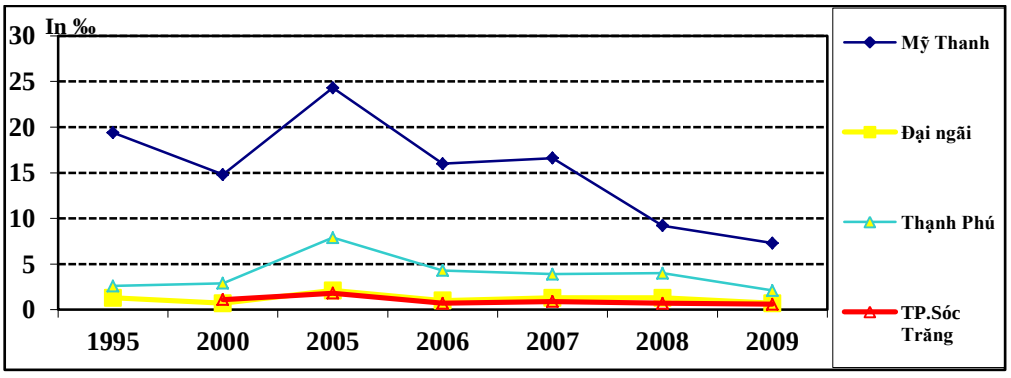


Figure 2.5: Comparison between the average annual salinity at different measuring points



Sources: Southern Regional Hydrometeorological Centre

Results from the monitoring points through the years show that the highest salinity was recorded in 2005 when Vietnam was under the impact of El Nino, a global warming phenomenon that caused prolonged dry and sunny weather. The highest salinity in 2006, 2007, 2008 and 2009 fluctuated abnormally and were lower than that in 2005. As the rainy season ended early in 2009 (late October), in 2010, Hau river's headwaters level in Chau Doc quickly lowered and was lower than in the same period the previous year. Meanwhile, due to the strong Northeast wind and high tides in the coastal area of the South China Sea, from early Januarly 2010 to date, salinity intrusion has deeply penetrated into the river mouths and further into

mainland. Under the effect of El-Nino, droughts continue to prevail in the months of February, March, April and early May, while salinity intrusion are going deeper into the rivers and canals in the province, the highest levels recorded in 2010 were: 11.6‰ in Dai Ngai; 26.6‰ in Tran De; 16‰ in Thach Phu and 5.2‰ in Soc Trang City, affecting severely agricultural production.

b. Drought

In the dry season, drought together with flows from uthe pstream reduce the water level of Hau river, causing salinity intrusion deep into mainland and water shortage for agriculture and domestic use. The increased exploitation of underground water has led to a rapid reduction in underground water level, meanwhile, drilled well without fresh water has become common. In the rainy season, rainfall increases the surface overflow, washes away fertilizers and pesticides, intensifying nutrient pollution and toxins in surface water.

Drought mainly occurs in the dry months in Soc Trang. The dry season of the province usually starts from late October or mid-November and ends in late April or mid-May the following year. However, according to statistics on the drought situation in Soc Trang province during 2006-2010, the problem has progressed more complex both in time and severity, and tends to get worse by the years. Specifically, according to data sources from the Soc Trang Department of Natural Resources and Environment: in 2006, there were two drought periods (the first one from 18-24 August, the second one in early September); in 2007, there were three drought periods (the first one from 5-9 June, the second one from 17-27 July, and the third one from 5-10 September); in 2008, there were three drought periods (the first one from 2-8 June, the second one from 10-21 July, and the third one from 22-31 August), causing serious impact on people's life and production activities. Furthermore, in some localities, there was a mixture of rainy and dry season conditions in one season: large flood-causing rainfall in the dry season and drought in the rainy season.

The coverage of flood in Soc Trang province as in the rising sea level scenario in Vietnam**, *for the average scenario (B2):***

Table 2.1. Rising sea level scenario compared to the period of 1980 – 1999 (In cm)

Scenario	Milestone of the 21st century								
	2020	2030	2040	2050	2060	2070	2080	2090	2100
Low (B1)	11	17	23	28	35	42	50	57	65
Average (B2)	12	17	23	30	37	46	54	64	75
High (A1FI)	12	17	24	33	44	57	71	86	100

Source: Scenario of climate change and rising sea level in Vietnam, 2009

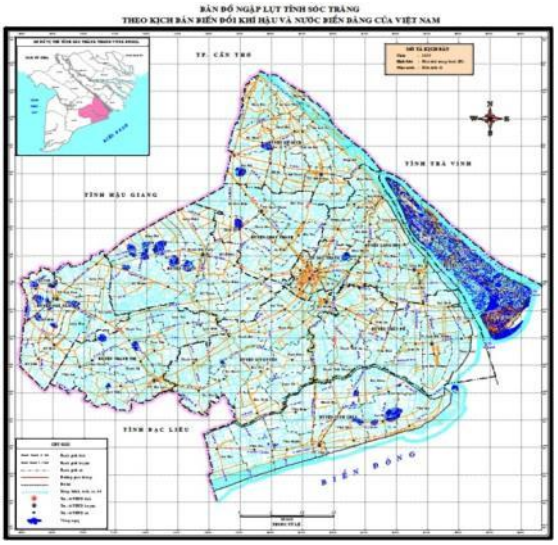


Figure 2.6: Flood coverage in Soc Trang province according to the rising sea level scenario (B2) in 2050 and highest tide

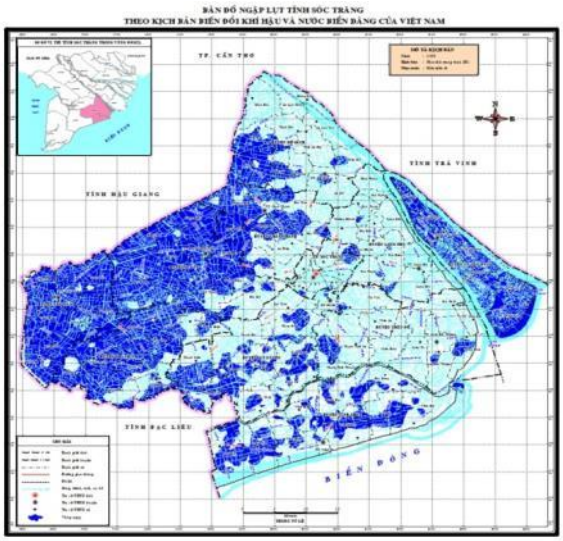


Figure 2.7: Flood coverage in Soc Trang province according to the rising sea level scenario (B2) in 2100 and highest tide

Table 2.2. Flood coverage according to the rising sea level scenario (B2) and high tides

District/city	Area (ha) [(1)]	Flooding area (ha)				Flooding ratio (%)			
		2050		2100		2050		2100	
		(*)	(**)	(*)	(**)	(*)	(**)	(*)	(**)
Entire province	***331,176.29***	***0***	***5,998***	***80,436***	***149,831***	***0***	***1.81***	***24.3***	***45.3***
Soc Trang City	*7,616.21*	*0*	*112.20*	*336.30*	*699.10*	*0*	*1.47*	*4.42*	*9.18*
Thach Tri	*28,759.96*	*0*	*302.70*	*7,911.00*	*21,620.00*	*0*	*1.05*	*27.51*	*75.17*
Cu Lao Dung	*26,143.22*	*0*	*1,254.87*	*19,659.70*	*25,058.28*	*0*	*4.80*	*75.20*	*95.85*
Ke Sach	*35,301.83*	*0*	*380.50*	*3,167.00*	*8,185.00*	*0*	*1.08*	*8.97*	*23.19*
Long Phu	*26,372.12*	*0*	*30.72*	*152.10*	*774.30*	*0*	*0.12*	*0.58*	*2.94*
My Tu	*36,815.56*	*0*	*1,513.00*	*19,640.00*	*30,480.00*	*0*	*4.11*	*53.35*	*82.79*
My Xuyen	*37,095.15*	*0*	*50.92*	*1,332.00*	*11,880.00*	*0*	*0.14*	*3.59*	*32.03*
Nga Nam	*24,224.35*	*0*	*1,176.00*	*18,450.00*	*23,150.00*	*0*	*4.85*	*76.16*	*95.56*
Vinh Chau	*47,339.48*	*0*	*995.20*	*5,327.00*	*13,370.00*	*0*	*2.10*	*11.25*	*28.24*
Chau Thanh	*23,632.43*	*0*	*181.80*	*4,218.00*	*12,290.00*	*0*	*0.77*	*17.85*	*52.00*
Tran De	*37,875.98*	*0*	*0.00*	*243.20*	*2,324.00*	*0*	*0.00*	*0.64*	*6.14*

Note:

(*) : For the lowest tide

(**) : For the highest tide

([(1)]): Administrative unit, area as of April 2009 (provided by the Department of Home Affairs) ar Resolution No. 64/NQ-CP dated 23 December 2009.

According to simulation results of scenario B2, the flooding level and flooding area have increased, especially in Nga Nam district 76.16%, My Tu district 53.53%, Thach Tri district 27.51%, Cu Lao Dung 75.2% (for lowest tides). Tran De, Long Phu, Vinh Chau, Ke Sach districts and Soc Trang City are insignificantly flooded in comparison with other districts in the province.

Natural disasters and environmental events

Over the past few years, the number of storms and tropical depressions have constantly increased, causing significant material damages to the people. According to statistics, during the period 2011-2014, a number of 36 storms and 14 tropical depressions was registered. Although the number of storms and tropical depressions Affecting directly the province is not that many, abnormal weather phenomena (such as the formation of superstorms, depression areas right on the South China Sea, of local vortexes) occuring at a higher frequency accompanied by large rainfalls, floods, river/sea bank erosion, rising sea level, drought, saltwater intrusion, etc. have caused huge losses to the lives of the people (total loss estimated at around VND236,476 million).

Furthermore, from 2011 to date, the province has witnessed one gasoline-caused explosion incident, which significantly affected the assets and safely the the people as well as contributed to environmental pollution in the area.

2.2. ENVIRONMENTAL QUALITY BASELINE IN SOC TRANG SUBPROJECT AREAS

2.2.1. Status of air, noise and vibration

For the subproject ESIA, Consultant also sampled the air, noise and vibration at 20 positions in SocTrang city from 29th-30th September, 2016. The analysis results are shown in Table 2.3 and compared with the indicators stated in the following standards:

- QCVN 05:2013/BTNMT (about 1 hour): National Technical Regulation on Ambient Air Quality.
- QCVN 26:2010/BTNMT (*): National Technical Regulation on Noise – Allowable maximum limit on noise in normal area.
- QCVN 27:2010/BTNMT (*): National Technical Regulation on Noise vibration- Allowable maximum limit on acceleration for construction in normal area.

The analysis results of the air quality in the subproject area are as follows:

Table 2.3. Measurement results on air, noise and vibration

Sign	Position of sample	Measurement results					
		Dust(*)	NO_2(*)	SO_2(*)	CO	Noise (*)	Vibration
		µg/m^3	µg/m^3	µg/m^3	µg/m^3	dBA	(dB)
KK1	In Lia 1	48	60	53	1800	59	47
KK2	In Lia 2	55	56	70	1300	60	55
KK3	In Lia 3	35	37	16	1200	58	46
KK4	In Lia 4	77	88	60	1100	67	53
KK5	In Lia 5	13	83	18	1500	53	40
KK6	In Lia 6	42	71	46	1120	57	43
KK7	In Tra Men A canal area (near the direction intersecting to Maspero river)	18	51	38	960	61	51
KK8	In Tra Men A canal area (section in the middle of Tra Men A canal)	25	55	24	970	63	55
KK9	In Hi Tech canal area (section in ward 3)	28	61	86	1030	59	42

Sign	Position of sample	Measurement results					
		Dust(*)	**NO_2**(*)	**SO_2**(*)	**CO**	**Noise** (*)	**Vibration**
		µg/m^3	µg/m^3	µg/m^3	µg/m^3	dBA	(dB)
KK10	In Hi Tech canal area (section in ward 9)	39	75	34	860	59	43
KK11	In Phu Loi road	90	107	110	2100	67	60
KK12	In Le Duan road	120	114	108	2450	60	57
KK13	In Le Hong Phong road	180	103	120	2720	64	59
KK14	In the area where building ring road and bridge 2 (section in ward 4)	62	28	25	1650	55	42
KK15	In the area where building ring road and bridge 2 (section in ward 8)	81	13	45	1450	49	37
KK16	In the area where building Nguyen Van Linh bridge (section in ward 2)	54	35	97	1760	51	40
KK17	In the area where building Nguyen Van Linh bridge (section in ward 6)	24	18	77	830	43	40
KK18	In the area where building Dien Bien Phu road section 1 (ward 8)	97	148	140	2520	68	61
KK19	In the area where building Dien Bien Phu road section 2 (ward 6)	82	37	26	1090	51	42
KK20	In the area where building resettlement area (Mac Dinh Chi road, ward 4)	49	21	19	1470	58	45
QCVN 05:2013/BTNMT (1 hour)		**300**	**200**	**350**	**30.000**	**-**	**-**
QCVN 26:2010/BNTNMT		**-**	**-**	**-**	**-**	**70**	**-**
QCVN 27:2010/BNTNMT		**-**	**-**	**-**	**-**	**-**	**75**

Comments:

Based on the site survey and above results, it can be seen that the quality of air, noise, vibration in Soc Trang City subproject area is relatively good. The content of hazardous gases, dust, noise and vibration are much lower than the allowed limits. The content of TSS, vibration are mainly concentrated at road intersections where people and transportation means are gathered (KK11- on Phu Loi road; KK12 – On Le Duan road; KK13 – on Le Hong Phong road; KK18 – Dien Bien Phu road near the NH1) and are higher than that in residential areas in LIAs, resettlement sites but still within allowed limits.

2.2.2. Status of surface water quality

For the subproject ESIA, consultant also carried out sampling of the surface water at 10 locations in SocTrang city on 30th September, 2016. The analysis results are shown in Table 2.4 and compared with the standard QCVN 08-MT: 2015/BTNMT, column B1 – surface water used for irrigation or other purposes requiring similar quality.

Table 2.4. Analysis results of surface water quality

No	Symbol	Time of sampling	Measurement results													
			pH (*)	**DO**	**TSS (*)**	**COD** (*)	**BOD_5 (*)**	**$P\text{-}PO_4^{3-}$ (*)**	**$N\text{-}NH_4^+$** (*)	**$N\text{-}NO_2^-$** (*)	**$N\text{-}NO_3^-$**	**Cl^-**	**Fe**	**Surfactant**	**Grease content**	**Total Coliform**
			-	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	MPN/100 ml
1	NM1	High tide	7.3	6.5	37	28	13	0.018	0.37	0.012	0.21	132	**1.69**	0.04	0.52	$3.5x10^2$
	NM2	Low tide	7.1	6.3	31	36	16	0.02	0.39	0.016	0.25	135	**1.73**	0.05	0.63	$3.6x10^2$
2	NM3	High tide	6.3	4.4	23	65	46	**0.42**	**2.17**	0.11	0.54	81	**2.7**	**0.57**	**1.3**	**$8.1x10^3$**
	NM4	Low tide	6.4	4.6	19	83	51	**0.51**	**2.11**	0.24	0.63	73	**2.52**	**0.62**	**1.2**	**$8.6x10^3$**
3	NM5	High tide	6.1	4.7	44	67	31	**0.31**	**1.54**	0.31	0.42	93	**2.58**	**0.41**	0.8	**$7.8\ x10^3$**
	NM6	Low tide	6.9	4.2	32	71	38	**0.39**	**1.62**	0.33	0.51	91	**2.63**	**0.5**	0.9	**$7.9x10^3$**
4	NM7	High tide	7.1	**3.9**	24	33	21	**0.7**	**2.77**	0.18	0.35	101	**2.8**	**0.66**	**1.4**	$7.3x10^3$
	NM8	Low tide	7.6	4.2	22	59	33	**0.77**	**2.63**	0.23	0.49	115	**2.9**	**0.72**	**1.6**	**$7.6x10^3$**
5	NM9	High tide	7.1	7.1	59	26	10	0.009	0.12	0.013	0.17	144	1.12	0.01	0.7	$2.4x10^2$
	NM10	Low tide	6.9	6.5	42	29	13	0.013	0.18	0.027	0.24	145	1.2	0.03	0.8	$2.9x10^2$
6	NM11	High tide	7.3	6.5	57	24	11	0.023	0.13	0.011	0.17	152	1.01	0.07	0.14	$2.9x10^2$
	NM12	Low tide	6.8	5.8	49	22	13	0.027	0.17	0.011	0.21	157	1.1	0.02	0.11	$3.1x10^2$
7	NM13	High tide	7.6	7.3	75	17	9	0.009	0.24	0.012	0.14	215	1.31	0.12	0.23	$1.8x10^2$
	NM14	Low tide	6.5	7.1	66	19	10	0.018	0.31	0.018	0.19	201	1.33	0.23	0.21	$1.9x10^2$
8	NM15	High tide	7.3	7.1	46	34	16	0.044	0.51	0.024	0.3	144	**1.89**	0.03	0.42	$3.4x10^2$
	NM16	Low tide	7.1	6.6	44	39	19	0.047	0.55	0.031	0.35	146	1.05	0.042	0.41	$3.5x10^2$
9	NM17	High tide	7.1	6.9	51	22	12	0.037	0.34	0.034	0.37	141	1.12	0.05	0.61	$4.1x10^2$
	NM18	Low tide	6.8	6.8	47	27	15	0.042	0.42	0.037	0.39	145	1.31	0.11	0.67	$4.4x10^2$
10	NM19	High tide	7.6	6.5	24	37	21	0.061	0.71	0.04	0.41	78	**1.72**	0.21	0.8	$5.1x10^2$
	NM20	Low tide	7.2	6.1	19	40	23	0.078	0.79	0.043	0.46	81	**1.77**	0.27	0.7	$5.2x10^2$
QCVN 08-MT:2015		**Column B1**	**5,5-9**	**≥ 4**	**50**	**30**	**15**	**0,3**	**0,9**	**0,05**	**10**	**350**	**1,5**	**0,4**	**7.500**	**1**
		Column B2	**5,5-9**	**≥ 2**	**100**	**50**	**25**	**0,5**	**0,9**	**0,05**	**15**	**-**	**2**	**0,5**	**10.000**	**1**

Remarks:

NM1, NM2: Surface water in Maspero river (Section between Lia 1 and Lia 6) – at high tide and low tide (X=553012; Y=1062330).

NM3, NM4: Surface water in Tra Men A canal in Lia 2 – at high tide and low tide (X=550852; Y=1063677);

NM5, NM 6: Surface water in Tra Men A canal, section near Maspero river - at high tide and low tide (X=551003; Y=1063020).

NM7, NM8: Surface water in Hi Tech canal, section near ward 3 – at high tide and low tide (X=552905, Y=1060708)

NM9, NM10: Surface water in Dinh river, section intersecting to Hi Tech canal – at high tide and low tide (X=554269; Y=1058079)

NM11, NM12: Surface water in Maspero river, section with construction of Ring road 2 crossing the river – at high tide and low tide (X=556443; Y=1062589)

NM13, NM14: Surface water in Dinh river, section intersecting to Maspero river – at high tide and low tide (X=557243; Y=1062190)

NM15, NM16: Surface water in Maspero river, section with construction of Nguyen Van Linh bridge (ward 2) – at high tide and low tide (X=551198; Y=1062533)

NM17, NM18: Surface water in Maspero river, section with construction of Nguyen Van Linh bridge (ward 6) – at high tide and low tide (X=551230; Y=1062492)

NM19, NM20: Surface water in Nhan Luc canal, section near 5A area, Mac Dinh Chi, ward 4 – at high tide and low tide (X=553963; Y=1061609)

Comments:

According to the analyses, the quality of surface water compared against the national technical regulation QCVN08-MT:2015/BTNMT (column B1) shows that:

- pH values at all measurement locations at both spring tide and neap tide are within the allowed limit of the National technical regulation (5.5 - 8.5);
- DO values at all measurement locations satisfy the allowed limit, except the DO value at NM7 (surface water in Hi Tech canal at neap tide) which is 3.9 (mg/l) and hence, failing to meet the allowed standard (DO≥4);
- At all measurement locations in canals (Tra Men A canal (NM3, NM4, NM5, NM6), Hi Tech canal (NM7, NM8); Nhan Luc canal (NM19, NM20), at both spring tide and neap tide, BOD5 values measured exceed from 1.07 to 3.4 times the allowed limit; COD values exceed from 1.1 to 2.8 times the allowed limit. At sampling locations on the main rivers of Soc Trang City (Maspero river, Dinh river), BOD5, COD values all meet the allowed limit, except at NM15, NM16 (Maspero river, the area projected for Nguyen Van Linh bridge construction) where BOD5 values are 16-19 mg/l, or 1.3 times higher than the allowed limit.
- The ammonium content measured at Tra Men A and Hi Tech canals ranges from 1.54 to 2.77 mg/l, or 1.71-3.4 times higher than the allowed limit. The ammonium content measured at Maspero river, Dinh river and Nhan Luc canal all meet with the allowed limit.
- The phosphate content measured at Tra Men A canal and Hi Tech canal was 1.03 to 2.6 times higher than the allowed limit. The corresponding content in other locations are satisfactory with the required standard.

- The chloride content of all samples ranges from 73 to 215 mg/l, satisfying with the required standard (350 mg/l);
- The content of heavy metals (Pb, As) is lower than allowed limit in all samples. The zinc content (Zn) also meets with the standards in all monitoring locations. Notably, the iron content (Fe) obtained in many samples has exceeded the allowed limit (from 1.3 to 2 times higher) as shown in the table above.
- Surfactant content is from 1.03 to 1.8 times higher than the allowed limit; total grease and oil is from 1.2 to 1.6 time higher than the allowed limit, particularly in Tra Men A canal, Hi Tech canal; at other monitoring locations, the values are much lower than the allowed limit.
- The Coliform indices of samples obtained in Tra Men A canal and Hi Tech canal are 1.2 times higher than the allowed limit; while the indices at other monitoring locations are all within the allowed limit.

The results show that the canals in the project area are suffering from organic and microbiological contamination. A quick on-site assessment suggest that the main reason might be the stagnant water on Tra Men A and Hi Tech canals that are untreated domestic waste water or sub-standard treated domestic waste water (through septic tank/semi-septic tank).

On the other hand, according to the Report on "Environmental planning of Soc Trang province until 2010 and outlook to 2020", surface water quality monitoring at 30/4 canal (Hi Tech canal), Tam Thuoc canal, Xang canal, Maspero River have produced the following results:

Table 2.5. Analysis results of surface water quality in Soc Trang province (2002 - 2006)

Time	Code	Results							
		pH	**Turbidity (mg/l)**	**DO (mg/l)**	**BOD_5 (mg/l)**	**COD (mg/l)**	**TSS (mg/l)**	**NO_3^- (mg/l)**	**Fe (mg/l)**
2002	M1	7.46	230	**1.31**	**9.0**	-	-	KPHT	**1.74**
	M2	7.17	47	**2.16**	**10.0**	-	-	0.40	0.69
	M3	7.15	21	**2.20**	**12.0**	-	-	0.40	0.37
	M4	7.09	46	**2.18**	**9.0**	-	-	0.40	0.51
2003	M1	8.0	389	**3.1**	**-**	**21.3**	-	KPH	0.89
	M2	8.0	315	5.5	**-**	35.2	-	0.10	**1.31**
	M3	8.0	365	**1.2**	**-**	**16.8**	-	0.3	**2.04**
	M4	8.0	282	**2.2**	**-**	37.5	-	0.21	**2.06**
2004	M1	7.18	19.5	4.1	**5.0**	30.5	-	1.20	-
	M2	7.18	79.1	**1.47**	**7.0**	31.1	-	3.50	-
	M3	7.30	26.1	**1.47**	**12.0**	**11.3**	-	2.60	-
	M4	7.26	55.7	**2.99**	**8.0**	43.3	-	1.60	-
2005	M1	**3.53**	16.6	4.84	**14.0**	**17.5**	**21.0**	0.6	1.08
	M2	**3.10**	47.5	**3.04**	20.0	25.0	61.0	1.0	1.03
	M3	**5.46**	53.8	**2.7**	62.0	157.0	78.0	KPHT	1.37
	M4	**2.72**	52.3	**3.64**	**12.0**	**15.0**	66.0	0.9	1.12
2006	M1	6.08	22	4.93	26.0	32.0	**23.0**	0.4	0.5
	M2	6	1.7	**3.08**	26.0	32.0	74.0	KPHT	**2.03**
	M3	6.46	80	**3.02**	**60.0**	75.0	273.0	KPHT	**2.01**
	M4	5.89	110	**3.07**	24.0	30.0	71.0	1.0	**2.35**

Time	Code	Results							
		pH	**Turbidity (mg/l)**	**DO (mg/l)**	**BOD_5 (mg/l)**	**COD (mg/l)**	**TSS (mg/l)**	**NO_3^- (mg/l)**	**Fe (mg/l)**
QCVN 08:2015/BTNM, column B1		**5.5 ÷ 8.5**	**-**	**≥ 4**	**15**	**30**	**50**	**10**	**1.5**

Source: "Environmental Planning of Soc Trang province until 2010 and outlook to 2020"

Remarks:

+ M1: Surface water in 30/4 canal (Hi Tech canal);

+ M2: Surface water in Maspero river;

+ M3: Surface water in Tam Thuoc canal;

+ M4: Water surface in Xang canal;

+ KPHT: Non-detected;

+ (-): NA.

The above data prove that the majority of parameters on organic substances (DO, BOD_5, COD) in the surface water of Soc Trang City are above the allowed limit. The indicators and NO_3-N, Fe, TSS indicators also have the tendency to increase, suggesting that the surface water in the canals across the city has been seriously contaminated by organic substances generated from domestic and industrial waste water (sub-standard waste water from seafood processing discharged into Tam Thuoc canal – M3).

2.2.3. Status of groundwater

The ESIA consultant carried out groundwater sampling on 30th September, 2016. The analysis results of underground water quality are as follows based on a comparison with the standards provided in QCVN 09-MT:2015/BTNMT:

Table 2.6. Results of underground water analysis

No	Parameter	Unit	NN1	NN2	NN3	NN4	NN5	QCVN 09-MT:2015/BTNMT
1	pH	-	7.8	8.1	7.9	7.1	7.5	**5.5 ÷ 8.5**
2	Hardness	mg/l	158	121	66	101	145	**500**
3	TSS	mg/l	542	476	304	318	402	**1500**
4	COD	mg/l	1	2	1	0	0	**4**
5	Amonium	mg/l	**1.44**	**1.91**	0.45	**1.42**	0.41	**1**
6	Chloride	mg/l	206	166	58	33	87	**250**
7	Nitrite (NO_2^-)	mg/l	0.01	0.02	0.01	0.01	0.04	**1**
8	Nitrite (NO_3^-)	mg/l	0.23	0.28	0.12	0.13	0.14	**15**
9	Sunfate	mg/l	145	129	145	140	119	**400**
10	Cyanide	mg/l	KPHT	KPHT	KPHT	KPHT	KPHT	**0.01**
11	Arsenic (As)	mg/l	0.015	0.024	0.011	0.009	0.017	**0.05**
12	Cadmium (Cd)	mg/l	0.0016	0.0008	0.0009	0.0012	0.0009	**0.005**
13	Lead	mg/l	0.0011	0.0015	0.0037	0.0021	0.0012	**0.01**
14	Copper	mg/l	0.009	0.012	0.014	0.006	0.013	**1**
15	Zinc	mg/l	0.017	0.031	0.008	0.016	0.024	**3**
16	Manganese	mg/l	0.25	0.12	0.21	0,013	0.017	**0.5**

No	Parameter	Unit	NN1	NN2	NN3	NN4	NN5	QCVN 09-MT:2015/BTNMT
17	Chromium (VI)	mg/l	KPHT	KPHT	KPHT	KPHT	KPHT	**0.05**
18	Iron (Fe)	mg/l	**14.5**	**12**	**17**	0.37	0.7	**5**
19	E - coli	MPN/100ml	KPHT	KPHT	KPHT	KPHT	KPHT	**KPHT**
20	Coliform	MPN/100ml	2	**3**	1	1	3	**3**

Remark: *"KPHT" - Not found*

NN1: Water from household drilled well Lia 4, ward 2 (X=550675; Y=1062686)

NN2: Water from household drilled well at Lia 5, ward 2 (X=551327; Y=1061878)

NN3: Water from household drilled well near Tra Men A canal, ward 6 (X=550965; Y=1063862)

NN4: Water from household drilled well near Hi Tech canal, ward 9 (X=553320; Y=1059850)

NN5: Water from household drilled/artificial wells near resettlement area, Mac Dinh Chi, ward 4 (X=554182; Y=1061209)

Comments:

The above results show that the pH value in underground water at sampling locations ranges around 7.1-8.1. The underground water has neutral or poor pH value but overall, it is within the allowed limit set in QCVN 09-MT:2015/BTNMT. However, the ammonium content at 3 out of 5 samples is from 1.42 to 1.91 times higher than the allowed limit. Notably, the Fe content is also relatively high, exceeding 2.4-3.4 times the allowed limit. The Coliform content at NN2 has reached the limit (3 MPN/100ml) and its appearance in all samples indicate a risk of microbiological contamination in underground water in Soc Trang City. Most importantly, one of the key causes of microbiological contamination in underground water is the widespread and unsupervised well-drilling activities, posing risks of contamination from soil surface to underground water.

2.2.4. Status of soil quality

The Consultant carried out the sampling of soil on 30th September, 2016. The analysis results presented in Table 2.7 below show that the indicators of the soil samples taken in the subproject area meet the standards provided for in QCVN 03-MT:2015/BTNMT - National technical regulation on the allowable limits of heavy metals in the soils.

Table 2.7. Soil analysis results

No.	Parameter	Unit						QCVN 03:2015/BTNMT	
			Đ1	Đ2	Đ3	Đ4	Đ5	Agricultural land	Residential land
1	Arsenic (As)	mg/kg	0.12	0.07	0.09	0.02	0.06	**15**	**15**
2	Cadmium (Cd)	mg/kg	0.17	0.19	0.17	0.06	0.09	**1.5**	**2**
3	Lead (Pb)	mg/kg	7.7	8.6	7.2	6.2	6.4	**70**	**70**
4	Crom (Cr)	mg/kg	8.4	10.2	8.8	7.2	9.1	**150**	**200**
5	Copper (Cu)	mg/kg	0.36	0.22	0.05	0.03	0.05	**100**	**100**
6	Zinc (Zn)	mg/kg	71	80.4	70.6	64.2	66.7	**200**	**200**
7	Plant protection substances	µg/kg	$<10^{-2}$	$<10^{-2}$	$<10^{-2}$	$<10^{-2}$	$<10^{-2}$	-	-
8	Coliform	MPN/100ml	$1{,}1x10^{3}$	$2{,}1x10^{2}$	$1{,}0x10^{3}$	$1{,}9x10^{2}$	$1{,}3x10^{2}$	-	-

Remarks:

Đ1: Soil at construction area of Ring road bridge 2 (X=556426; Y=1062454)

Đ2: Soil at construction area of Ring road 2 (X=556537; Y=1063269)

Đ3: Soil at construction area of Nguyen Van Linh Bridge (X=551211; Y=1062585)

Đ4: Soil at construction area of Dien Bien Phu road at the section 2 in ward 8 (X=555656; Y=1062586)

Đ5: Soil at construction area of resettlement area 5A, Mac Dinh Chi in ward 4 (X=554407; Y=1061291)

Comments:

The analysis results reveal that the content of metals (Cu, Zn) and heavy metals (As, Cd, Pb, Cr) is much lower than the allowed limit. Residues of plant protection substances in soil samples are also negligible and nearly undetected. This prove that, at present, there is no sign yet of pollution or heavy metal accumulation in the soil in the project area.

2.2.5. Sediment quality

The Consultant carried out the sampling of sediment on 30th September, 2016. The analysis results presented in Table 2.8 below show that the indicators of the sediment samples taken in the subproject area meet the standards provided for in QCVN 43:2012/BTNMT: National Technical regulations on sediment quality.

Table 2.8. Sediment analysis results

Parameter	Asen (As)	Cadimi (Cd)	Lead (Pb)	Crom (Cr)	Copper (Cu)	Zinc (Zn)	Mercury (Hg)	Coliform
Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	MPN/100ml
TT1	$<10^{-2}$	0.02	3.9	7.5	0.12	54.9	$<10^{-3}$	$2.7x10^{2}$
TT2	0.03	0.12	5.9	6.4	0.19	58.1	$<10^{-3}$	**$3.8x10^{3}$**
TT3	0.04	0.14	6.3	8.1	0.22	67.9	$<10^{-3}$	**$4.1x10^{3}$**
TT4	0.01	0.04	4.7	7.1	0.09	81.8	$<10^{-3}$	**$2.6x10^{3}$**
TT5	$<10^{-2}$	0.01	4.4	7.2	0.23	66.2	$<10^{-3}$	$1.7x10^{2}$
TT6	$<10^{-2}$	0.05	2.3	5.2	0.08	60.2	$<10^{-3}$	$1.2x10^{2}$
TT7	$<10^{-2}$	0.03	5.4	6.9	0.33	54	$<10^{-3}$	$1.1x10^{2}$
TT8	$<10^{-2}$	0.07	7.8	4.9	0.2	72.2	$<10^{-3}$	$1.9x10^{2}$
TT9	$<10^{-2}$	0.02	5,9	3.8	0.15	67,4	$<10^{-3}$	$0.9x10^{2}$
TT10	0.06	0.24	2.7	8.8	1.23	83.3	$<10^{-3}$	$4.6x10^{2}$
QCVN 43:2013/BTNMT	**17**	**3.5**	**91.3**	**90**	**197**	**315**	**0.5**	**-**
QCVN 07:2009/BTNMT Ctc (mg/l)	**2**	**5**	**15**	**5**	**-**	**250**	**0.2**	**-**

Remarks:

TT1: Sediment of Maspero river (section between Lia 1 and Lia 6), same sampling location as NM1-NM2 (553012 1062330)

TT2: Sediment of Tra Men A canal in Lia 2, same sampling location as NM3-NM4 (X=550852; 1063677)

TT3: Sediment of Tra Men A canal, section near Maspero river, same sampling location as NM5-NM6 (X=551003; Y=1063020)

TT4: Sediment of Hi Tech canal, section at ward 3, same sampling location as NM7-NM8 (X=552905: Y=1060708)

TT5: Sediment of Dinh river, section intersecting to Hi Tech canal, same sampling location as NM9-NM10 (X=554269; Y=1058079)

TT6: Sediment of Maspero river, section of construction of Ring road bridge 2 crossing the river, same sampling location as NM11-NM12 (X=556443; Y=1062589)

TT7: Sediment of Dinh river, section intersecting to Maspero river, same sampling location as NM13-NM14 (X=557243; Y=1062190)

TT8: Sediment of Maspero river, section of construction of Nguyen Van Linh bridge (ward 2), same sampling location as NM15-NM16 (X=551198: Y=1062533)

TT9: Sediment of Maspero river, section of construction of Nguyen Van Linh Bridge (ward 6), same sampling location as NM17-NM18 (X=551230; Y=1062492)

TT10: Sediment of Nhan Luc canal, near 5A, Mac Dinh Chi, ward 4, same sampling position as NM19-NM20 (X=553963; Y=1061609).

Comments:

According to the analysis results, the sediments from the canal dredging work in Tra Men and Hi Tech canals 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. This could rather 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 Soc Trang Waste Treatment facility.

2.2.6. Aquatic environment quality

The Consultant carried out the sampling of aquatic environment on 30th September, 2016. Aquatic fauna and flora samples were taken in Maspero river and Dinh river at the subproject areas. The sampling locations and analysis results presented in Appendix.

Structure of species composition:

The monitoring of phytoplankton in the project area has recorded 62 species belonging to 5 families. Of the highest prevalence is Euglenophyta with 28 species representing 45.9%; followed by Bacillariophyta with 11 species, representing 18.0%. Of the lowest presence is Charophyta with 2 branches (3.3%). Cyanophyta, Chlorophyta and Euglenophytta are relatively diverse and rich, ranging from 9 to 28 species, accounting for 14.8 – 45.9% respectively

The species structure is formed by the typical freshwater species; in addition, there are some marine-originated species which are found extensively (Coscinodiscus, Climacosphenia, Biddulphia).

Table 2.9. Structure of phytoplankton in the province

No.	Branch	Number of species	Ratio (%)
1	Cyanophyta	9	14.8%
2	Bacillariophyta	11	18.0%
3	Chlorophyta	11	18.0%

4	Charophyta	2	3.3%
5	Euglenophyta	28	45.9%
6	Dinophyta	0	0
Total		**61**	**100**

Structure of species volume

The number of phytoplankton recorded averages at 30 species/location, ranging from 11 to 37 species/location. There is a clear fluctuation in the number of phytoplankton from one sampling location to another. Samples collected from more populated areas have a higher number of species than other areas that are affected by human activities such as: domestic water discharge, waste water from seafood processing, domestic waste, etc.

Distribution and dominant species

The density of plankton plant cells varies across sampling locations, ranging from 10^2 to 10^3 cell/l. This is due to the over-development of toxic Cyanophyta: Oscillatoria perornata, Planktothrix sp, Merismopedia minima. These are filamentous algae which can rapidly grow in number under favorable conditions and are capable of releasing toxins into the aquatic environment, affecting other aquatic animals (fish, shrimps) and even humans.

2.3. SOCIO-ECONOMIC CONDITIONS

2.3.1. Socio-economic conditions in SocTrang city

2.3.1.1. Economic conditions

As acity in the Southwest in **MKR**[7], Soc Trang economic development is mainly based on marine an coastal resources. GDP Growth rate per capita of the city has regularlyincreased over the past three years. The city's GDP per capita is significantly higher than ten one ofSoc Trangprovince. Details are shown below:

Table 2.10. Growth rate and comparison betwen GDP per capita of Soc Trang city and Soc Trang province

Year	Growth rate (%)	GDP/per capita of the city/year(mil)[8]	GDP/per capita of the province[9]
2015	16.5	69	30.6
2014	15.54	61	29.1
2013	15.3	56	26.0

Source:*Socio-economic report of Soc Trang city and province in 2013, 2014 and 2015*

The Urban Upgrading Project shall be an important factor for promoting and fastening the economic restructuration and development, contributing to enhancement ofthe living quality of people in Soc Trang city, especially households in Low income areas (LIA) in the project area.

2.3.1.2. Socio-cultural conditions

Population

7Decision No. 939/QĐ-TTg, approving the overall plan on socio-economic development of the mekong river delta from 2012-2020, p12
8Present value
9Present value

Growth rate in recent years is stable ranging arround 0.9% per year. Population of the city in 2015 is 137.899 people.

Natural population growth rate of SocTrang city in recent years (2010-2015) has tended to decrease from 0.95% (2010) to 0.59% (2014) and 0.63% (Initialstatistic in 2015). However, urban population growth rate in the province in 2010-2015 has varied, average rate is relatively high, about 8.48%/year. This is because of the upgrading from suburban communes to wards. In addition, from 2007, SocTrang city was upgraded to a city from town, attracting labors from other localities in and beyond the province to live and work.

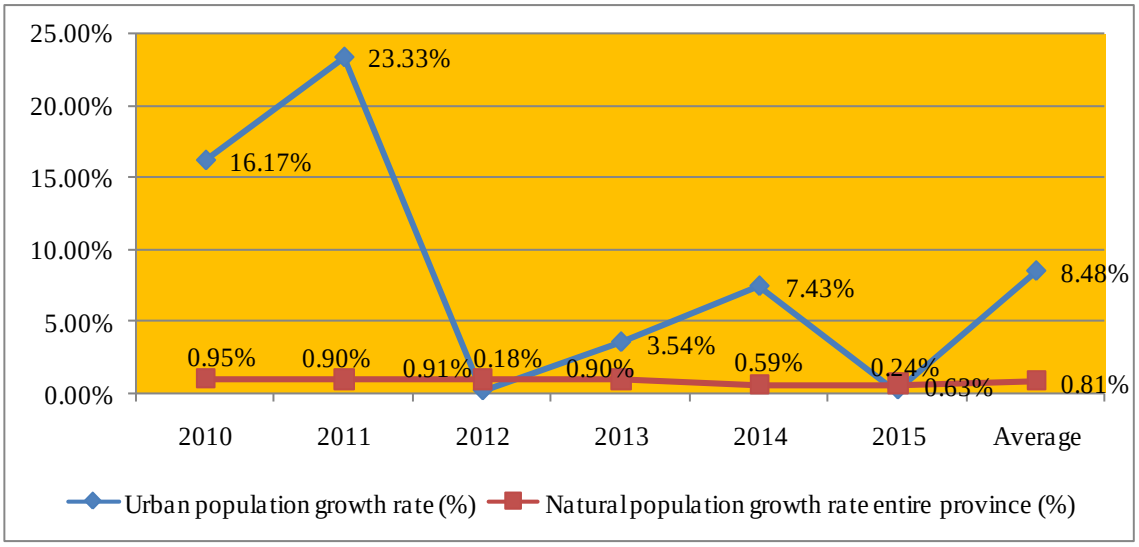


Figure 2.8: Urban population growth rate in SocTrangTrang city

***Source**: Statistical Yearbook of SocTrang province in 2015*

In general, over the past few years, population of SocTrang city tends to be concentrated in the central wards due to the trends of urbanization. With the situation, apart from advantages of attracting skilled human resources, SocTrang city, and central areas are under pressure regardinginfrastructure (houses, transport, transportation, etc.) in comparison with other areas.

Ethnic people:

There are three ethnic minority groups(Kinh, Chinese, Khmer) living harmoniously and integratedliving in the city. According to the Statistical Yearbook in 2014, Kinh dominates the population of the city with 88,030 people (make up 63.98%); followed by Khmer people with 31,953 persons (account for 23.22%) and Hoa people with 17.475 persons (make up 12.70%). The city is characterized by many pagodas, temples, cultural relics with specific ethnic features, especially Ok-Om-Bok festival including Ghe Ngo boat race which is selected as among 15 typical festivals of Vietnam. Thus, these monuments has been attracting tourists in Mekong River Delta.

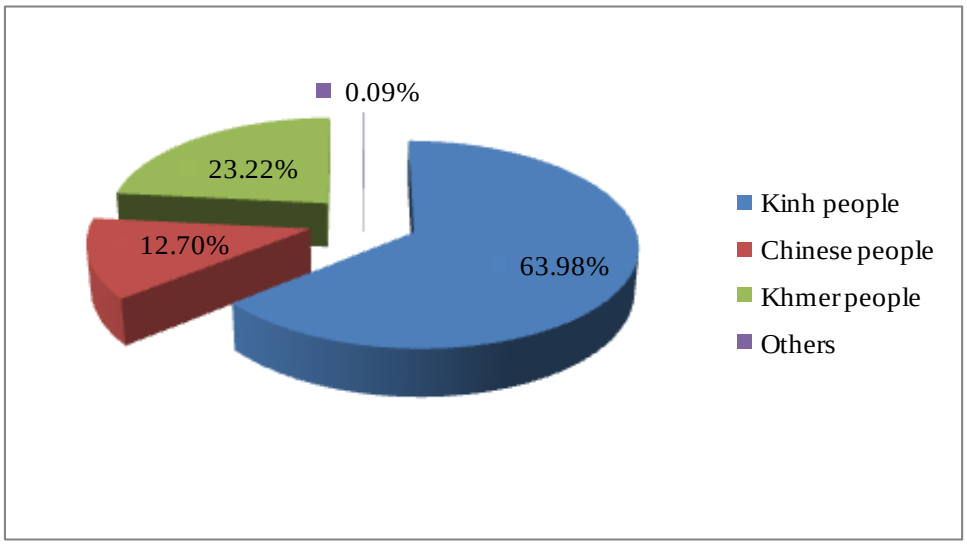


Figure 2.9: Structure of ethnic peoples in SocTrang city in 2014

***Source**: Statistical Yearbook of SocTrang province in 2015*

Labor structure:

Labor structure tends to decrease in agricultural sector and increase in non-agricultural sector, especially trade-service with about 60.2%, according to the labor status and working status of SocTrang city in 2014 - 2015

- Working-age labor: 94,712 people, in which: Male 56,827 persons; Female: 37,885 person.
- Number of labors in economic zones:
    - Industry and construction: 12,214 persons;
    - Trade and service: 31,916 persons;
    - Agriculture and fisheries: 8,881 persons.
- The number of working age labors having job is relatively high: 58,380 people, making up 56.7%:
    - Male 36,540 persons.
    - Female 21,840 persons.
- Labor export: 45 persons (in 2014-2015)

In general, economic sector are clearly divided and distributed; labors in trade-service mainly work in the city center where infrastructures are mainly completed. Labors in industry – construction mainly focus in wards, communes, near city center; labors in agriculture – fisheries are distributed in coastal communes. This constitutes favorable conditions for SocTrang city to develop and distribute residents and labors in typical zones. However, pressure on infrastructures development from resident (houses, residential system, schools, markets etc.) and social safeguards policies, security and social orders contribute to the challenges for city in the coming time.

Gender

Gender mentioned in the report includes division of labor in family, in public activities and decision making.

- Division of labor:

  - 67.2% said that women mainly are housewife. However, other jobs as cleaning, taking care of children are equally taken by both genders.
  - For activities which bring high incomes for households, 60.7% females get involved in small trading and services (hair washing, beauty care, etc); 69.7% males mainly are hired workers (hanging worker, mason, etc). These analysis shows that job opportunities and adaptive capacity with career changes are major challenges for women in the region. In case of resettlement, women are the persons who are more vulnerable than man, especially single women headed with dependents disadratage (09 PAHs).

- Participation in public activities and meetings:

  - Survey on participation in public activities in the city shows the differences between the males and females: Males are more frequently parting in these activities than women do. 38.9% respondents said that males are major participators in public and local meetings while 16.1% females do. Results from survey on participating in local and public meeting and local activities for males and females are 47.0% và 43.0% respectively.

- Decision maker in family:

  - Family, survey shows that both male and female discuss together to make decisions in family. For shopping andtaking care of children, the rate is 48.5% and 62.3% respectively for each gender. Male will make decisionon career change, borrowing capital for family trade and name of ownership for land, house and other assets.

Poverty

SocTrang city has 10 Wards and 60 clusters with population in 2015 is 137,899 person. In which, 88,228 Kinh people, 17,515 Chinese people, 32,026 Khmer people. Results recorded poverty rates of Soc Trang city with a low, only 5.97% (Table 6)

The near poverty rate also warns a risk of increasing poor rate, particular in Khmer community. The poverty rate in Khmer community is 10.5%. This is a vulnerable group with low education, low income as indicated.

2.3.2. Socio-economic data of affected households

Size of a household

Number of members in affected households is in average 4.53 persons/households; normally 4 person/household; the highest number of member in a family is 12 while the lowest is 1 person/household. (In this study, number of members in a family is those who named together in the family's Resident Registration Book

Information about average size of household will help to estimate the number of affected extended households to be separated when resettlement. With average size of 4.53 persons/household and common size of 4 person/households, the number of additional land lots for households who are eligible to separate is very few and definitely within the control of the locality.

Education background

Education background of directly affected households is not high. The percentage of illiterate in affected households is 5.2%, mainly are the elderly; 24.4% members in the households finish primary curricula; the vast majority of members in these households finish the

secondary and high school curricula (60.8%); 8.5% achieve university and higher school level. Information about the education level is among bases orienting the supports for changing careers of working-age labors. With the qualification at secondary and high school level, shareholders have jointly made discussion about suitable and stable jobs for laborsin compliance with the general development strategy of the locality.

The survey showed that the education background of male is higherthan female. This is demonstrated via (i) the higher ratio of illiteracy and primary among female group, (ii) the lower ratio of the rest levels among those. Tables below show the information of education by gender, in general and each ward.

Table 2.11. Education background information by gender

Level of education		N	% with education	% with total
Illiteracy	Male	36	40.4	2.1
	Female	53	59.6	3.1
Primary	Male	195	44.7	11.3
	Female	241	55.3	13.9
Secondary	Male	292	51.5	16.9
	Female	275	48.5	15.9
High school	Male	243	50.2	14.1
	Female	241	49.8	13.9
High educatued (university and higher level)	Male	82	56.6	4.8
	Female	63	43.4	3.7
Total		1721		100.0

Source: *Survey data SA of SocTrang city. 2016*

Information about the education level is essential to identify the supports for changing careers of working-age labors. With the qualification at secondary and high school level, shareholders have jointly made discussion about suitable and stable jobs for labors in compliance with the general development strategy of the locality.

Career and job

Livelihood and jobs of the community directly affected by the project are not stable, in which 59% working-age labor are employed while 41% are unemployed or temporarily employed. It is worth noting that 30% of family head are temporarily unemployed or unemployed. This shows that the vulnerability of the community and the needs to implement development projects which target livelihood of seriously affected households.

34.3% members in affected households are students – making the highest percentage. Workers/Staffs in private companies with long-term contract are the main and stable income sources for these households (21% over total number of members in households). A very small number are state officers and retired and harvestable income (8%). 8.2% members in AHs run small-scale business in markets and sidewalks such as trading in vegetables, “hoa qua dam” (fruits mixed with milk and coconut water), milk tea, grilled potato, bread, etc). Agricultural sector makes up small part with about 0.5% farmers. This results show that the percentage of dependents in families are very high with about 53.7%, including persons who don’t generate income (such as household wife), the elderly (have no pension), children and students. This also limits the capacity of savings of households. (Refer to the appendices for further information).

During review and analysis, the consultant realizes that: with such typical occupation,

resettlement in new area may cause difficulties at the beginning for traders, especially those selling near or at their house. The group shall encounter into difficulties in changing business environment, finding new customers. Therefore, farmers should be paid attention, although the percentage and the possibility of displacement of the group is not high. HH could continue their livelihood, excepting for an adaption period at the beginning because of change of moving/travelling. In addition, average distance between 2-3 km from the former location to new resettlement area shall cause no significant impacts for households to access to education, transport and medical services.

Poverty , income and expenditure of PAHs

About 40% of households have salary as main income source. In additional, up to 48% of households have income from other sources as service, supports from policies and leasing house/land. With other income sources, households are likely to increase their yearly accumulative amount and will lead to better their living conditions.

The survey shows that average income of AHs is about 128 million VND/year. However, the common income level is about 72 million/year/household, much lower than the average level. (Refer to average value, median and mode in the appendices for further information).

Average expenditure per year is about 64 million VND/year, the most common expenditure is about 80 million VND/year, higher than average level.

With such income and expenditure, households are able to save about 60 million dong/year. However, it is worth noting that almost all households have no savings and are in short of finance with average 8 million dong/household (Refer to average value, median and mode in the appendices for further information).

Current status of sanitation, community health and medical service

According to the survey, households are using tap water and rainwater for eating, drinking and other domestic activities. Currently, about 15% of remaining households use rainwater for eating and drinking and about 12% use rainwater for bathing because of "*money saving*" and "*habit*".

Almost all households are aware of the importance of hygienic toilets and can build toilets with septic tanks (72.7%). 26.8% of remaining households use 1 compartment toilet and most of them have plan to upgrade to 2-compartments toilet.

Thanks to high awareness of people, infectious and environment related diseases such as malaria, cholera tends to decrease. Common diseases in the locality include flu, respiration disease (60%) and some chronic diseases such as diabetes and blood pressure (36%).

People can conveniently access to medical service units (2 km to ward medical service unit; 4 km to hospital of the city). Private clinics and convenient drug stores contribute to increase the access of the community to medical services.

Current status of house use of affected households

PAHs live in permanent house. All affected temporary architechture are for cultivation and harvesting crops. Survey showed that 43% PAHs live in Independent house (one-storey) with wooden pillars, pre-cast concrete pillars, brick pillars or prefabricated steel frame houses; 52% is in the independent houses with Reinforced Concrete pillars frame; 4% is one-storey houses or 2-4 storey house and 1% is Terrace house.

Situation and use of loan

40% of households have at least 1 loan from banks. Average value of loan is not exploited in this survey. About 60% borrow loan for studying purposes. Currently, in affected household

community about 54% households have education-related loan.

Land Tenure

The rates of HH have LURC or have papers of demonstration for possessions among PAHs are quite high, approximately 66%.

The project affects 908 households. In terms of the ownership status of affected land, the majority of PAPs have formal legal rights to the affected land (i.e. they own a LURC). The number of HH with LURCs is 599 out of 908 the total HH, accounting for 65.8%. The number of affected HH without LURCs but having a claim on the affected land is 242, accounting for 26.7%. The number of land parcels with no recognizable legal right or claim to the land is 49 plots with 7.5%.

The Table below summarized the socio-economic situation in each project component based on the SES conducted.

Table 2.12. Socio economic Situation of HH in Each Component

Component	Socio-economic situation of the population
Component 1 LIAs 1, 2, 3, 4, 5, 6	*Poverty:* - According to the survey on poor households of the city in 2015, the poverty rate is very low with only 5.97%. However, the SA survey data shows (see below) that the poverty of income rate is very high (accounting for 54-67% of the total HHs). - The evaluation is based on multidimensional poverty standard applied in 2016 - 2020 (urban poverty level is under 900.000 VND / month / person). Poverty of income rate in LIAs remains high, accounting for 54-67% of the total HH. The highest rate is found in LIA2 (67.3%), followed by LIA 4 (66.2%) and LIA 6 (62.1%). *Sanitation conditions:* - The vast majority of households in the LIAs has no access to drainage and waste collection. Survey shows that only 45.3% households of the total survey samples have access to these services. Other HH, are directly discharging waste water, garbages into rivers /streams/canals (25.5 %), releasing into a ponds/gardens (21.8%) and other forms. *Income:* - Income of households in the LIAs are from various sources (Agriculture, cattle-breeding, hire workers; salary as state officers; trade/services; Social assistance; Land/house rental). The main income sources arehired labor, trade accounts for a high proportion (43.6% and 41.2%). However, tehse are unstable sources because of theirseasonal characteristics. The stable revenues is from state salary employment (workers and employees) with only 39.8%. *Land Use Right Certificate (LURC):* - The percentage of affected households with LURC in theLIAs is quite high, according to 70%; In LIA 4, 90% households have LURC. The remaining rate includes eligible households but not granted or poor households who cannot afford to register the certificate. In addition, in LIA 6, the percentage of households with LURC is only 40% while 40% are eligible households but not yet granted and the remaining 20% are not ineligible to to get LURC. - No immigrants are found in the LIAs. *Housing conditions:* - In the area there are no temporary houses, 86.1% have one-floor permanent house, the rest is storey houses or two to four storey houses.

Component	Socio-economic situation of the population
	Poor sanitation conditions, high poverty rate and unstable livelihoods remain the main socioeconomic features in LIAs.
Component 2 Canals	Similar to LIAs, the poverty rate as reported by the City People's Committee is much lower than the data of SA survey, namely as: - *Poverty according to each investment:* - The poverty rate in Hi Tech and Tra Men A is 21.5% and 17.8% respectively. *Sanitation conditions:* - The survey shows that 76.4% households have access to the drainage and waste collection and treatment services, the rest: discharges into canals/creeks (12.8%), release to ponds/garden (7.5%) and other forms. *Income sources:* - Income of households living along the canals are unstable, the main sources are hired labor (39.9%), followed by small-scale trade (sewing, small business, nail.) which are mainly operated by the family headed women (27.8%) and state officers (22.1%), and the rest works in other fields. *Land Use Right Certificate (LURC):* - The percentage of households with LURC in Hi Tech, Tra Men A canal is 60% and 30% respectively; 20% households in Hi Tech canal area are eligible but have not registered, while the percentage is 40% in Tra Men A canal area. The number of ineligible households because of canal encroachment in two areas accounts for 20% and 30%, respectively. *Housing conditions:* - Similar to LIAs, in rehabilitation area of Tra Men A and Hi Tech canal, there are no temporary houses but temporary structures as warehouse, camps, etc. The percentage of one-storey permanent house makes up 73.2%, the rest is one-storey houses or two to four storey houses. *Important number of encroachers lacking security of tenure and unstable sources of income are the main socioeconomic features along canals.*
Component 2 Roads	According to the survey: *Poverty rate according each region:* - The poverty rate in Dien Bien Phu road – section 1 and section 2 is about 28.4% and 26.1% respectively, following Nguyen Van Linh bridge with 19.1%, Ring Road 2 with 11.4%. *Sanitation conditions:* - The households in the area enjoy better sanitation conditions than for other components; thanks to the position which is easy to access to sanitation network. The surveys reveals that 96.1% of households have access to sewage, while the rest have no access most of them are poor and want to save money for basic needs (food, health etc.). *Income sources:* - The main income sources are from hired jobs (45.5%), trade and services (42.5%), state salary employees and officers with 31.4 %%, the rest works in other fields. HH often have 2 sources of income. *Land Use Right Certificate (LURC):* - 60-70% households have the land use righ certificate, 20-30% households are eligible be issued but they haven't registered yet; particularly in the area of Dien Bien Phu section 1, 20% of households have not been certified because of encroachment along the canal located along the road.

Component	Socio-economic situation of the population
	Housing conditions: - There is no temporary house, 71.1% one-storey permanent house, the rest is one-storey houses or two to four storey houses in the area. *Good sanitation conditions, better security of tenure and more stable jobs are the main socioeconomic features along the project roads.*

2.4. INFRASTRUCTURE CONDITIONS

2.4.1. Transport system

Soc Trang City is located on the national key road such as National Highway 1A, National Highway 60 that connects Soc Trang City with the Mekong River Delta provinces. There are also the provincial roads 938, 933, 934 passing through the city connecting with Tran De, My Tu and Long Phu districts. In addition, the canal system of the city connects to the main waterway of the region which is Hau River that brings to Soc Trang many opportunities of economic development and commodities trade through the river port service center. Tran De port (Tran De district) and Dai Ngai Port (Long Phu district) have created the development triangle of Soc Trang Province, in which Soc Trang City is the key urban center.

a. Road transport:

External transport:

The National Highway 1A passes through the city center with total length of about 8.3 km, the road bed is 12m wide, 10.5 m wide road surface is covered by the asphalt concrete layer. This road connects Soc Trang with Can Tho city, Ho Chi Minh City and the South Western provinces. The segment running through the urban center has 35 m wide cross-section. The road quality is good.

National Highway 60: The segment passing through the city is 5.7 km long (Ton Duc Thang, Luong Dinh Cua roads, its alignment of 24m), the 3.2 km bypass NH 60 was asphalted, linking Soc Trang city with Dai Ngai port (Long Phu district) and Cu Lao Dung ecological tourism area. The segment running through the urban center has a cross-section of 28 - 30m. The road quality is good.

Provincial Road 934 (Soc Trang - My Xuyen): The segment running through the city with 2.8km length, 9 - 12 m wide road surface, and connecting Soc Trang city with Tran De port (Vinh Chau district) is upgraded to grade IV asphalt concrete road for the plain area. The segment running through the urban center has 30m cross-section (Le Hong Phong road). The road quality is good.

Provincial road 933 (Soc Trang – Long Phu): the segment running through the city with 6.8km length, 7 - 8m wide road surface, connecting Soc Trang city with Long Phu district is asphalted. The segment passing through the city has cross-section of 30m (Pham Hung road). The road quality is good.

Internal transport:

There are 80 routes with total length of 110km, in which there are 70 urban roads with total length of 64.50km; 51 sub-urban roads with total length of 123km; 5 bridges and 145 concrete lanes.

Mac Dinh Chi road connects the residential area in Ward 4 to Tran Hung Dao road (National Highway 1A), the road surface is 20-22m wide with the total length of 2.1 km. The road quality is good.

Phu Loi road where the city's state agencies are located, has the surface of 27-29 m width, the

length of 1.8 km. The road quality is good.

Hung Vuong road where the city's state agencies are located, has the surface of 24-26 m width, the length of 1.94 km. The road quality is good.

Mac Dinh Chi-Tran Hung Dao route connecting the residential areas in ward 2, ward 3 with National Highway 1A has a road surface of 22-24 m width, total length of 4.8 km. The road quality is good.

Ly Thuong Kiet road running along Maspero river, where Boat Race Festival of Khmer people takes place in the Mekong Delta River annually on 13th ,14th, 15th Lunar October. The road cross section width is 6-7 m and the road length is 7.47 km. The road is in good condition.

Some urban routes have been deteriorated, the asphalted surface has been damaged that seriously affects on the travel of the local people.

b. Waterway, transport facilities:

There are Maspero river, Dinh river (Saintard), Kinh Xang that meet the standards of the grade V inland waterway, in which Dinh river is the external relation water way connecting the City with Hau river that can be integrated into waterway and maritime system of the Mekong River Delta region.

The port and its service area has the scale of more than 100 hectares in Ward 8, which are along Saintard river near Tan Thanh bridge, in the northeast of the city.

There are 3 major bridges (247 bridge, 30/4 bridge and Khanh Hung bridge); 2 bus stations (the south station is located at the Tran Hung Dao - Phu Loi intersection, Tra Men station is located on the National Highway 1A); 2 seaports in Ward 8 and Ward 4 in the city. There are also small parking lots in the downtown area.

Current traffic situation in the alleys as per the public opinions:

According to the survey results, the current internal traffic system or roads and lanes directly leading to the households are asphalted or concreted: asphalt roads account for 27.5%; concrete ones accounts for 31.7% and stones/gravel/brick lanes account for 25.2%. However, about 15.5% of the roads are soil lanes/alleys, which means that there are only space, and have not been upgraded.

In general, according to assessment of the community, the vast majority of interviewed households said that there are frequent floods in the roads connecting to their houses (45.1.6%) and narrow roads (31.8%). These households mostly live in LIAs. Moreover, only 21.8% of the interviewed households stated that the current roads/alleys system is still in good operating condition.

2.4.2. Water supply system

The current water source for the water supply plants in the city is underground water. There are the follow water supply plants in the city:

- Undergroundwater Plant No.1: is located on Nguyen Chi Thanh road, has a capacity of 14.000 m3/day & night, current maximum capacity of 12.000 m3/day & night, 10 drilling wells at the depth of 110m and 170m and the well capacity q = 100 - 120 m3/h.
- Undergroundwater Plant No.2: is located on Phu Loi road, constructed and put into operation in 1999. Its capacity is 8.000 m3/day & night, 3 drilling wells, of which there are 01 hotwater well with 480m depth and its capacity of q = 120 m3/h and 2

wells with the depth of 150 – 170m and itscapacity of q = 100 - 150 m3/h.

- Dinh river underground water supply plant with capacity of 2.000 m3/day & night was constructed and put into opearation in October 2005.
- An Nghiep industrial zone water supply plant with a capacity of Q= 12.000m3/day & night is under operation (only serving the industrial zone).

Water supply pipeline network of the city includes 53.770 m long pipes with diameter 100 - 400, 1.317 m long pipes with diameter 300, 1.231 m long pipes with dimeter 250, 5.260 m long pipes with diameter 200, 13.316 m long pipes with diameter 150, 32.614 m long pipes with diameter 100

Total water supply capacity of the above plants in the city is 34.000 m^3/day which is enough for domestic and manufacture purpose of the city's people with total consumption volume of 150 l/day.

Current water supply situation to the households as per the public assessment:

These are the findings from the investigation on the households' used water sources in the questionnaire sample as follows: 89.1% of the households use the clean water with the water meters installed in each household, 15.8% of the households use the rainwater; the remaining ones use the water from the drilled wells, excavated wells or the water from the ponds/lakes/rivers/canals.

According to criteria based assessment method mentioned in the below chart, there are 79.8% opinions confirming their current clean and clear water source which is supplied by the city's water supply company; only 16.0% opinions assuming that their water supply is pure, but badly smelly from sulfate alum; 1.6% people complaining about the opaque/unclear and smelly/colored water which is probably because of the long used and polluted water pipes in the residential areas when the construction of some infrastructures took place in the residential areas.

2.4.3. Drainage and wastewater treatment

There is a sewer pipe network in the city centercollecting the wastewater discharged at the outlets. There are separate drainage system in the new urban areas and industrial zones. There is a general drainage system in the suburban areas. The city's drainage basins include as follows:

- Basin 1: its boundary is set by the National Highway 1A, Nguyen Chi Thanh and Le Duan roads (this basin is located in the old urban town). The rain water of this basin is discharged into Maspero river.
- Basin 2: its boundary is set by the National Highway 1A, Nguyen Chi Thanh road and National Highway 60 toward the North. The rain water of this basin is discharged into Maspero and 30/4 canal.
- Basin 3: its boundary is set by National Highway 1A, Nguyen Chi Thanh road, National Highway 60 toward the West. The rain water of this basin is discharged into Soc Trang, Soc Do, Tam Thuoc and Tam Soc canals.
- Basin 4: its boundary is set by National Highway 60, Le Duan road and the planned road toward the Southwest. The rain water in this basin is discharged into Bac Ky canal, Dinh river.
- Basin 5: its boundary is set by National Highway 60, Le Duan road and the planned road toward the East. The rain water in this basin is discharged into Maspero and Dinh rivers.

In the suburban areas, the water drainage is mainly discharged into rivers and canals. In the urban areas, the wastewater is collected via the sewage collection pipelines connecting to the treatment plants.

The drainage source system of Soc Trang city includesthe river and canal network which establishes the quite adequate drainage source. Besides the network of Maspero river and Kinh Xang canal, there is also the primary canals network with the bottom elevation of -5.0 to -1.0 m and the width of 20 – 40 m, the secondary canals network with the bottom elevation of -2.0 m to – 0.5 m and the average width of 6-15 m, the tertiary canals network with the bottom elevation of -0.5 to 0 m and the width of 2-2.5 m.

Drainage sewer pipeline system: The rain water and wastewater are currently collected into one common sewer pipes with the length of 7.2 km and 160 manholes and through 10 lift stations located along the roads in the area discharged to the city's wastewater treatment plants with a treatment capacity of 13.180 m3/day & night. The treated wastewater volume of the city accounts for 36.19%. Now the collecting sewer pipelines are only concentrated in the urban area of the wards 1, 2, 6, 4, 8. The wastewater of the other wards is discharged directly into the city's canals resulting in environmental pollution and affecting the lives of the local residents.

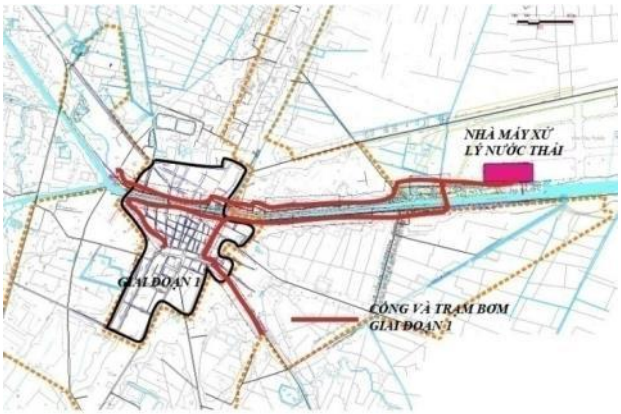


Figure 2.10: Sewer pipes and the pumping station of Kfw's Drainage project – Phase 1

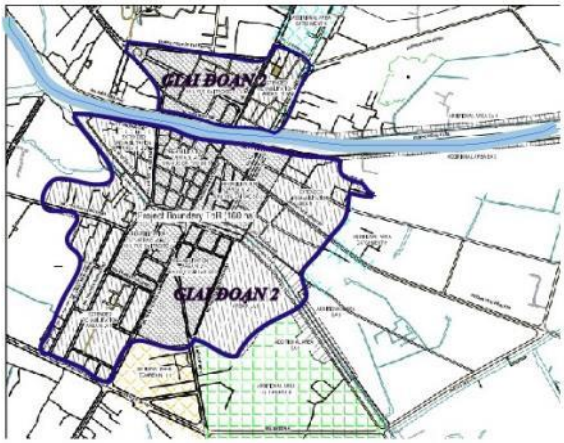


Figure 2.11: Coverage Area of Kfw's Drainage project – Phase 2

<u>Assessment on Current Drainage Situation:</u>

Tra Men, Hi Tech and Tam Thuoc canals in the city are covered by rubbish and hyacinths. There are illegal resettlements on the both banks of these canals, particually Hi Tech canall which contriburte to limited drainage capacity during rainy season. Furthermore, the domestic wastes in the canals is the potential source of diseases such as dermatology, respiratory disease, bacteria, cholera, etc which create the adverse effects to the health, the lives of the local residents there. Therefore, the need for dredging and rehabilitating the canals is critical for Soc Trang urban development as well as the living condition enhancement of the residents living along the canals.

The wastewater collectingsewer pipeline system of KfW's Project – Stage 1 has addressed the drainage in the urban core centre area including wards 1,2,4 and ward 8, which covers an area of 320 ha. However, it has not solved ulimately the drainage for the entire city. The wastewater treatment plant in phase 1 has a capacity of 13.180 m 3/day & night. Phase 2 of the KfW project will meet the drainage demand for wards 1,2,3,4,5 serving an area of 970 ha with the increased capacity of 24.000 m3/day & night. When Phase 2 of the project is put into

operation, it will contribute to thorough collection and treatment of the wastewater for the city and improvement of the environment and urban landscape.

Current drainage situationof the households in the project area:

The survey results show that: 48.8% of the interviewed households discharge their domestic wastewater into the common drainage system of the region, 25.5% of the interviewed households discharge their domestic wastewater directly into the rivers/ponds/canals, 22.3 % households let the wastewater be self-absorbed into land and about 1.7% households discharge their wastewater into the interior fields through their self-excavated drainage ditches.

The findings from the survey on the wastewater drainage system of the households show that there are 25.5% of the households in the project area discharging the wastewater directly into rivers/ponds/canals. This is one of the causes creating the water resource pollution, which make the impacts on living environment of the households and trigger the outbreak of epidemic diseases.

2.4.4. Current flood situation

Soc Trang city has relatively flat terrain with the main slope from the Northwest to the Southeast. The average ground elevation is + 1.5m, the highest level is + 1.6m to + 2.0m (the alluvium area has the width of approximately 150-500m running from the North to the South along the National Highway 60); the lowest elevation is from +0.7m to 1.0m (fields, ponds and lakes).

Soc Trang city has a dense canals network with the flow density of 1.1km/ km2, of which the main canals include Maspero river with the width of 40-60 m and the length of 7 km; Santard canal (Dinh river) with the width of 60 - 80m and the length of 17km; the branch/feeder canals include 9 routes with the width of 8-20m; the rest is the sublateral network with the width of 2–10m. The canals in Soc Trang City are affected by the tidal regime which is 2 times of up and down in a day. The tidal level in the City fluctuates from 0.4 to 1.4 m.

The average rainfall in Soc Trang city is about 2,100-2,200 mm. The rainfall is not distributed evenly during the months but in 2 typical seasons: rainy season and dry season. The rainy season lasts from May to November, but the most heavy rainy season is focused in August, September and October. There are currently usually floods, local floods with the flooding depth of 0.3m – 0.4m in Phu Loi main road connecting the National Highway 1A and Tran Hung Dao road, Tran Binh Trong road connecting to Phu Loi road of the city.

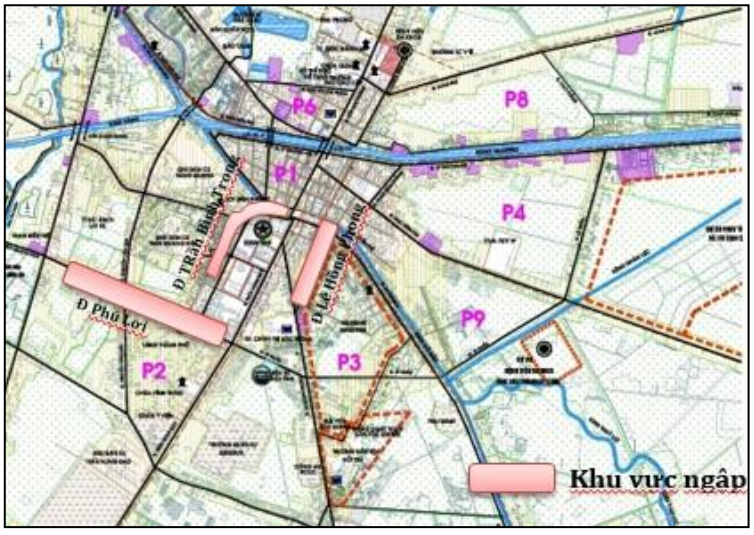


Figure 2.12: Location of flooding points

The city has been experiencing floods and inundations because of small dimension of the drainage sewer pipes and ditches. Some of those have been degraded, thus those do not meet the drainage capacity in the rainy season which create effects on the daily lives of the local people. To address this situation, it requires rehabilitation of some drainage systems on the main roads where the floods often occur in the rainy season such as Phu Loi and Tran Binh Trong roads.

2.4.5. Solid waste collection and treatment

The waste in the city is collected by The Urban Works One Member Co. Ltd of Soc Trang province who is the dedicated agency in charge of collecting around 90 tons/day and transferring to 5 ha Soc Vo disposal site in Nam Ky Khoi Nghia road, ward 7 .

Soc Trang city is currently constructing the 27 ha central waste treatment plant with a capacity of 160 tons/day in the west of the National Highway 1, about 8 km far from Soc Trang city in the Southwest (at the interchange of Phu My - My Tu, Dai Tam and Thanh Phu communes, My Xuyen district) and The test and inspection took place by the end of June 2016.. After acceptance of the plant, there are 3 months for commissioning before official operation.

Cemetery: There is no general cemetery area for the entire city, but there are the individual cemeteries in each commune or each ethnic community. The largest cemetery in the city belongs to Chinese residents, which is located along Luong Dinh Cua road with an area of approximately 50 ha. In the expanding area, each village and town has 1 - 2 cemeteries with the area of 0.5 - 2 ha scattered in the fields; There is one project on construction of people's cemetery with a size of 20ha in the provincial road 938 in the west of the city.

Current situation of the waste collection and treatment in the households:

According to the social survey data in 5/2016, 77.5% of the households, equivalent to 724/934 HHs have accessed to the waste collection service, while about 18.8% of the households, equivalent to 176/934 households have not a change to access to the waste collection service. These households live far away from the center, in the narrow alleys where the waste collection service has not reached to and some poor households have not used the service in order to save the living cost.

Based on the survey questionnaires and group discussions on the treatment manners of the solid wastes in the community which have not collected via the service, the findings are as follows: 34.7% HHs excavate holes/landfill in their gardens; (ii) 46.6% HHs burn and landfill the wastes; 9.7% HHs and 7.4 % HHs throw the waste into the rivers, ponds and randomly discharge the wastes. This is one of various actions causing the environmental pollution that must be eliminated in the community through communication on awareness enhancement.

2.4.6. Power Supply System

Power source: The power supply for Soc Trang city and the neighboring districts is provided by two 220/110KV Tra Noc and Bac Lieu 2 substations, via two Tra Noc - Soc and Bac Lieu – Soc Trang 110KV power transmission lines. There are 2 transformers with total capacity of 103 MVA (40MVA + 63MVA) in Soc Trang 110/22KV intermediate substation in No.70 National Highway 1A. 22KV power grid line includes 9 outgoing feeders starting from 110/22KV intermediate substation. All feeders have the loop-circuits linked together to form a closed loop for open operation and also linked as the closed loop among the 110/22KV intermediate substations of Soc Trang - Dai Ngai – Tran De.

Lighting system: The city has 131.03km medium-voltage power line, 129.05 km olow voltage power line, 358 substations with the capacity of 60,052.5 KVA. By the end of 2015, there were 98% HHs accessing to the power supply. The power consumption accounted for

50% of the whole provincial power volume. Urban lighting is now arranged in 91/91 main roads, and 175/225 alleys.

Current situation of power supply and consumption of the households:

In order to find out the current situation of the power consumption in the project area, the survey team has investigated the power sources that the citizens are consuming. The results show that 93.0% interviewed HHs consume the national power supply with the individual electrical meter and only 0.4% households have no access to the electricity, they mostly are so poor that can't afford the electrical charge.

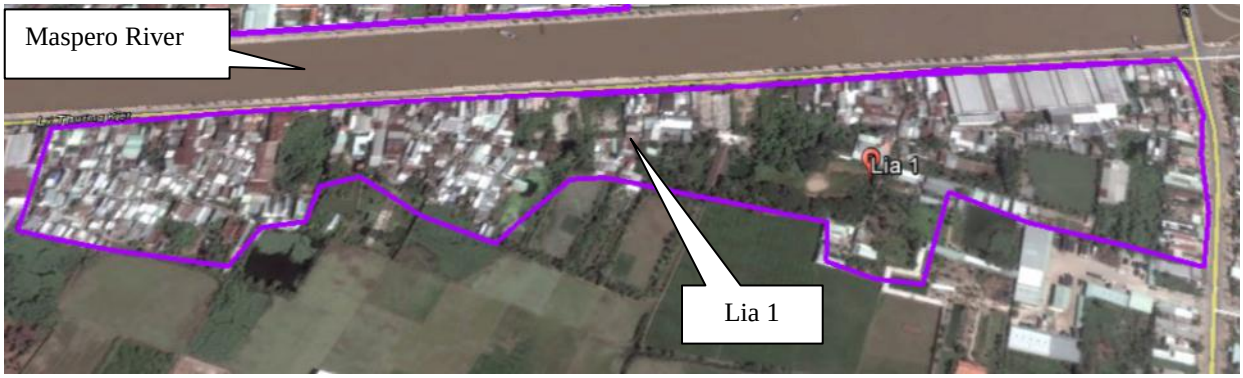
2.5. SPECIFIC ENVIRONMENTAL AND SOCIAL CONDITIONS IN SUBPROJECT AREAS

The section below gives more specific description on the environmental and social conditions in the surrounding areas of the subproject investments as specified in Table 1.2.

2.5.1. Component 1: Low Income Areas (LIAs)

- **LIA 1:**

LIA 1 of ward 4 is bounded by Lý Thường Kiệt Street, running along side of Maspero river to Lê Duẩn street, covering 29.0 hectares of residential land and in between agricultue and garden land. The population is 3,321 people including 1,023 Khmer people. The densely population is living along Lý Thường Kiệt street. Houses in LIA are typically temporary and degraded structures (see Figure 2.13 below).



Dirt alley in Lia 1

Drainage in Lia 1

Power and lighting system

Figure 2.13: Map of LIA 1 and typical alleys and houses in the LIA 1.

The concrete alley routes in LIA are degraded. Some of small alleys are made of soil. The present width of the alleys is 1.5m-3m. The current alleys elevation is lower than the Ly Thuong Kiet road surface level along Maspero River. When the tides increase twice per day, there are floods in some small alleys, which make effects on the living condition of the local

citizens.

There are no wastewater and storm water drainage system in 1.5m-2.5m wide small alleys. The domestic wastewater is discharged directly into canals in the area. Some alleys of 2.5 to 3.5 m wide have some forms of drainage however they are much degraded and insufficiently function. The power supply system including electrical poles and lamps in the small alleys is downgraded which affects to the social security and order in the alleys.

The investment in LIA 1 includes widening the alleys, installation of drainage and lighting system. After being upgraded, the domestic wastewater and storm water will be collected into drainage pipes and discharged to the canals in the areas. Once the wastewater treatment plant funded by KfW is completed, the drainage of LIA 1 will be connected with this plant receptor and wastewater will be treated properly at the WWTP.

The vehicle transportation of construction materials and waste will be conducted via the following route:

Lý Thường Kiệt Street →Lê Duẩn Street → Trần Hưng Đạo Street → National Way 1A → Provincial road 939 → Soc Trang Waste Treatment Facility.

There are no sensitive PCRs in LIA 1.

- **LIA 2:**

LIA 2 of ward 6 covers an area of 52 hectares, mainly agriculture land. LIA 2 is bounded by Hùng Vương street to Trần Quốc Toản Street and to Tra Men A Canal. The LIA population is 3,436 people of whom 1,100 are Khmer. People living densely along Huynh Phan Ho and Tran Quoc Toan street. Houses in the LIA have temporary structure.

Trần Quốc Toản Street is currently degraded road with 4 m wide. The street long side sewage is broken, causing impact to the drainage capacity. Hung Phan Ho road with the cross section width of 3.5m is getting worse too, which is dangerous to the travelers and the system. There are no drainage systems in small alleys in LIA. The main drainage channel in LIA 2 is Tra Men A canal which is seriously downgraded, silted and polluted by domestic waste being discharged directly into.

The investment in LIA 2 includes widening the alleys, installation of drainage and lighting system. After being upgraded, the domestic wastewater and storm water will be collected into drainage pipes and discharged to the canals in the areas.

The vehicle transportation of construction materials and waste will be conducted via the following route:

Huỳnh Phan Hộ and Trần Quốc Toản Street →Hùng Vương Street → National Way 1A → Provincial road 939 → Soc Trang Waste Treatment Facility;

PCRs in LIA2 are unknown, but a chance finds procedure is included in the ESMF and contracting document for this investment.

Trà Men A runs through LIA 2

Huỳnh Phan Hộ Road

Figure 2.14: Map of LIA 2 and typical alleys and houses in the LIA 2

- **LIA 3:**

LIA 3 has the area of 10.5ha, is located in Ward 3 from Le Duan road to Duong Minh Quang road (see Figure 2.15 below). The present cross section' width of the alleys in this area is 1.7m – 3 m. These concrete roads and the drainage system are downgraded. The drainages are often open ditches, causing environmental pollution and dangers to the transport there. The main drainage of the area is along Trần Hưng Đạo Street, Lê Duẩn Street and Dương Minh Quang Street and it discharges wastewater into the ponds and fields in the area. Power and lighting system are degraded which affect to the social security and order in the alleys.

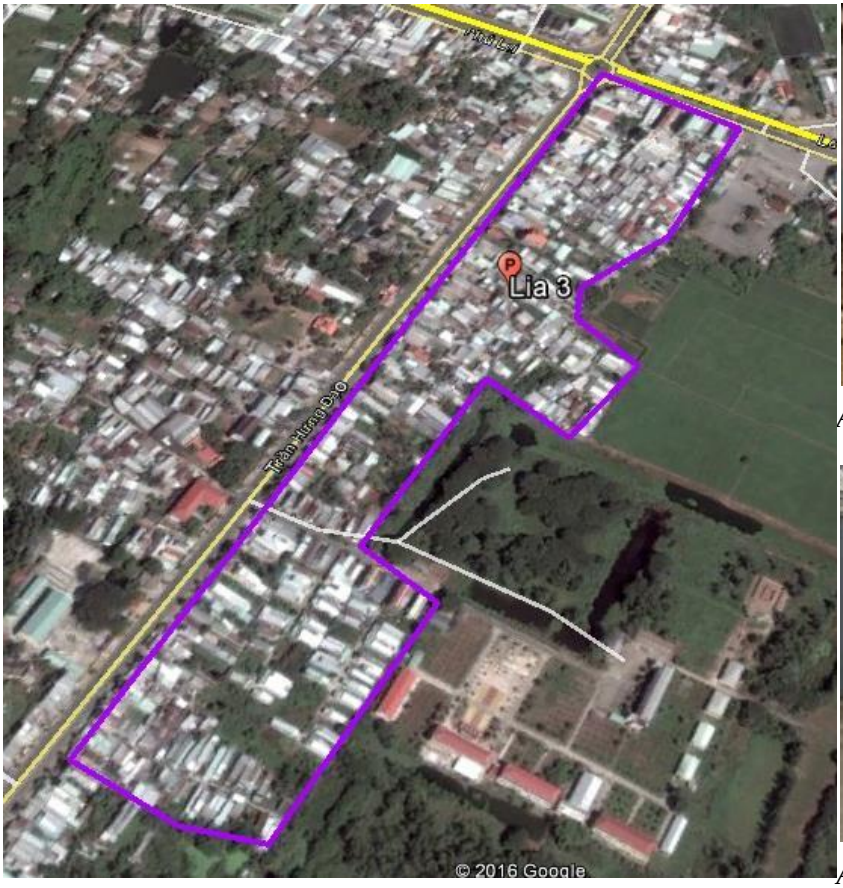
Population in LIA 3 is high and houses are often temporarily structured.

The investment in LIA3 includes widening the alleys, installation of drainage and lighting system. After being upgraded, the domestic wastewater and storm water will be collected into drainage pipes and discharged to the canals in the areas.

The vehicle transportation of construction materials and waste will be conducted via the following route:

Lê Duẩn Street → Trần Hưng Đạo Street → National Way 1A → Provincial road 939 → Soc Trang Waste Treatment Facility;

There are no sensitive PCRs in LIA3.



Alley and close drainage pipe

Alley and open drainage ditch

Figure 2.15: Map of LIA 3 and typical alleys and houses in the LIA 3

- **LIA 4:**

LIA 4 has the area of 6.8ha, is located in Ward 2, from NH 1A to Kinh Xang bridge, Khanh Hung bridge (see Figure 2.16 below). The current average cross section's width of the alleys there is 2.5m-4m. The elevation of the alleys surface in the LIA is usually 20cm lower than the elevation of NH 1A surface, thus the area is usually flooded. Currently, alleys have no sewage systems thus wastewater is being discharged directly to the canals or penetrated downward. The power system in the alleys including electrical poles, lamps is degraded which affects to the social security and order as well as the living condition of the people in the alleys

Population density in LIA 4 is a medium. Houses have temporary structures.

The investment in LIA 4 includes widening the alleys, installation of drainage and lighting system. After being upgraded, the domestic wastewater and storm water will be collected into drainage pipes and discharged to the canals in the areas. Once the wastewater treatment plant funded by KfW is completed, the drainage of LIA 4 will be connected with this plant receptor and wastewater will be treated properly at the WWTP.

The vehicle transportation of construction materials and waste will be conducted via the following route:

Hùng Vương Street→ National way 1A → Provincial road 939 → Soc Trang Waste Treatment Facility;

There are no sensitive PCRs in LIA 4.

Flooded alley

Degraded alley without sewage pipe

Figure 2.16: Map of LIA 4 and typical alleys and houses in the LIA 4

- **LIA 5:**

LIA 5 has the area of 14.7ha, is located in Ward 2, from Truong Cong Dinh to Phu Loi roads (see Figure 2.17). Alleys in LIA 5 are made of soil and earth materials with the cross section width of 2m-3m. The drainage system in the alleys is not good, which creates localized floods in the residential areas during rainy season. Domestic wastewater and storm water drain directly into the canals in the area. Some downgraded canals in this LIA do not meet the drainage requirement during rainy season in this LIA. The power system in the alleys including electrical poles, lamps is downgraded which affects to the social security and order in the alleys.

Population of LIA 5 is 5,375 people of which 963 are Khmer. The population density is at medium. Houses in LIA5 are temporary houses.

The investment in LIA5 includes widening the alleys, installation of drainage and lighting system. After being upgraded, the domestic wastewater and storm water will be collected into drainage pipes and discharged to the canals in the areas.

The vehicle transportation of construction materials and waste will be conducted via the following route:

Truong Cong Dinh/ Tran Binh Trong Street → Phu Loi Road → National Way 1A → Provincial road 939 → Soc Trang Waste Treatment Facility;

There is Huong Son pagoda located in the area and at a distance of 20m from the construction site.

Earth/Dirt alley

Degraded concrete alley

Figure 2.17: Map of LIA 5 and typical alleys and houses in the LIA 5

- **LIA 6:**

LIA 6 has the area of 19 ha of mainly agriculture land and gardens, situated in Ward 8, from Cau Den road to Kinh Xang road along Maspero river (see Figure 2.18). Alleys are mostly degraded. Some alleys are made of soil and rock, which are dangerous for travelling. Some drainage systems around Cau Den road are seriously worse, which create localized floods during the rainy season and affect to the living of the people. Domestic wastewater and storm water drain directly into the canals in the area. The power system in the alleys including electrical poles, lamps is downgraded which affects to the social security and order in the alleys.

Population of LIA 6 is 1,712 people of which 57 are Khmer. The population density is at medium. Houses in LIA6 are temporary houses.

The investment in LIA6 includes widening the alleys, installation of drainage and lighting system. After being upgraded, the domestic wastewater and storm water will be collected into drainage pipes and discharged to the canals in the areas.

The vehicle transportation of construction materials and waste will be conducted via the following route:

Dien Bien Phu/ Cau Den Street → Le Duan Street →Tran Hung Dao→ National Way 1A → Provincial road 939 → Soc Trang Waste Treatment Facility;

There is no sensitive PCR receptor in LIA6.

Wastewater discharge

Soil/ macadam alley

Degraded concrete alley

Figure 2.18: Map of LIA 6 and typical alleys and houses in the LIA 6

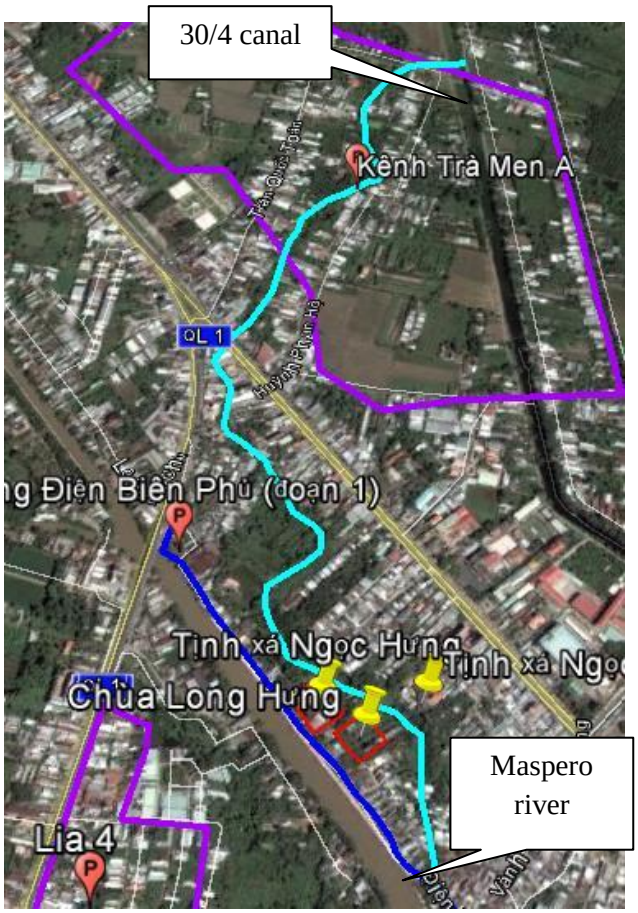
2.5.2. Component 2: Priority and Secondary Infrastructure

- **Tra Men A Canal**

Tra Men A Canal is built in Ward 6, Soc Trang city. Its total length is around 2.64km, its width is 6-8m, starting from Km 0+000 in Maspero river and the end point of canal connected with 30/4 canal (see Figure 2.19).

Tra Men A canal is polluted with elevated organic substances. In dry seasons it becomes dark and badly smelly. The reason of such pollution is the domestic wastes discharged by the households. At the same time, due to the encroachment, irregular dredging, the canal surface is full of wild grasses, reeds, water hyacinth which limit the drainage capacity of Tra Men A canal, creating the floods in rainy seasons. In addition, people encroachment and the fact that the canal have not been dredged regularly also contribute to the environmental pollution, bad sanitation and poor drainage capacity.

Investment for Trà Men A includes dredging for the entire route and embankment for the section from Km0+0.00 to Km1+076 & from Km1+295 to Km2+000, installation of drainage box coupling with road from Km1+076 to Km1+295m and installation of drainage and lighting system along the two sides of the canal. Storm water will be collected and discharged to the Tra Men canal.



Canal bed is covered with grass and bushes

Black water and bad odor

Figure 2.19: Map of Tra Men A canal and its status

- **Hi Tech Canal**

Hi Tech canal is blocked at one end, with 3.2km long and 10 – 14 m wide, running through ward 3 and ward 9. It starts from Km0+00 at intersection of Lê Duẩn Street and 30/4 Road and ends at Km3+054.39 connected with Dinh river (on the west side of Dinh River and at about 400 m far from Cay Diep bridge).

Hi Tech canal is polluted with elevated organic substances. In dry seasons it becomes dark and badly smelly. The reason of such pollution is the domestic wastes discharged by the households. The polluted canal is a potential source of water borne diseases, affecting living conditions of people along the canal.

The investment for Hi Tech Canal include of dredging 3.2 km canal and embankment with soil revetment structure. Operational roads with lighting system along sides the canal of 2 m wide will be constructed.

- Construction of soft embankment (2 stepped steep sandbag revetment with geotextile filter) with slope of 1:0.27. First step: vertical riser 2.7m. Grass is planted between sand bags. Second step: vertical riser 0.8 m, horizontal distance of 0.47 m with grass planted for green appearance; and inner canal width is 12m, and length of 3.2 km.

- Construction of operational roads along side of the embankment with 2 m wide, total length of both sides is 6.4 km;

- Provision of lighting systems for operational roads

Canal bed is covered with grass and bushes

Black water and bad odor

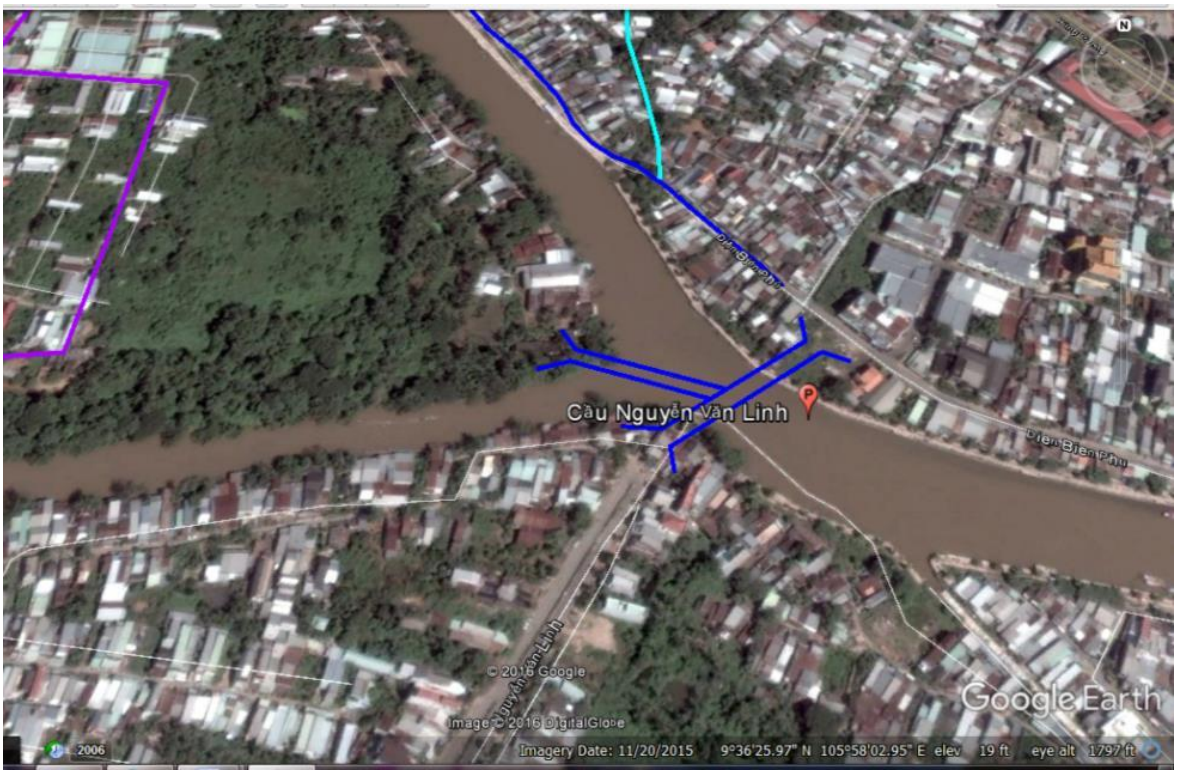
Figure 2.20: Map of HiTech canal and its status

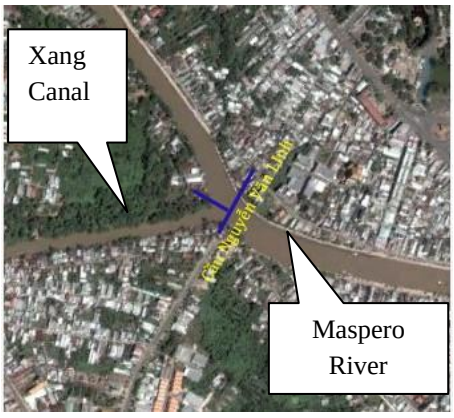
- **Area around Nguyễn Văn Linh Road:**

The Nguyễn Văn Linh bridge will be constructed within the area of Ward 2 and Ward 6, starting from Nguyen Van Linh road at a distance of 77 m south of Maspero river and with branches to Dien Bien Phu Street in Ward 6 (in junction with Hung Vuong street) and mango gardens in Ward 2.

The Maspero in this site intercepts with Xanh canal with 60 m wide. The water quality is relatively good. People are living at high density at the two ends of the bridge. Waterway traffic is not high.

Apart from the Y-shaped bridge, the investment includes approach roads of 14 m wide, 0.552 km long and 2 sidewalks of 5 m wide (see Figure 2.21).





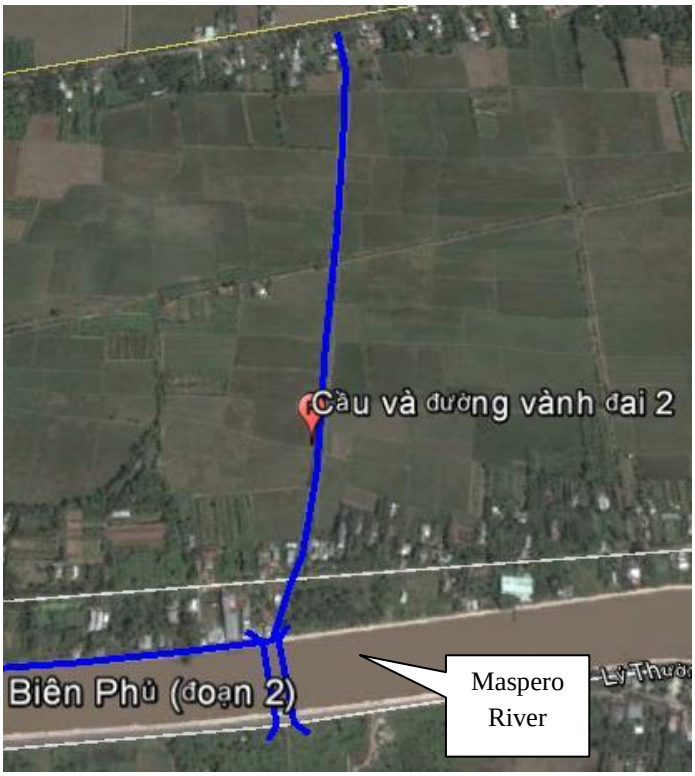
Location of bridge *Area of Nguyen Van Linh proposed bridge*

Figure 2.21: Locations of the proposed Nguyen Van Linh bridge

- **Area around bridge and ring road 2:**

Bridge and Ring Road 2 are constructed in Ward 4 and 8, Soc Trang city. The starting point is Km 0+000 in the junction of Ly Thuong Kiet road and Ring road 2 and around 2.5km far from Le Duan junction (with Ly Thuong Kiet road) in the East. The ending point is Km 1+300 in Pham Hung road and around 2.5km far from Le Duan junction (with Pham Hung road) in the East – North.

Maspero river in this area has the width of 60m, the river water quality is quite good, the waterway traffic there is not so high, there are a few households living scattered at both ends of the bridge.



Area of Ring road No.2

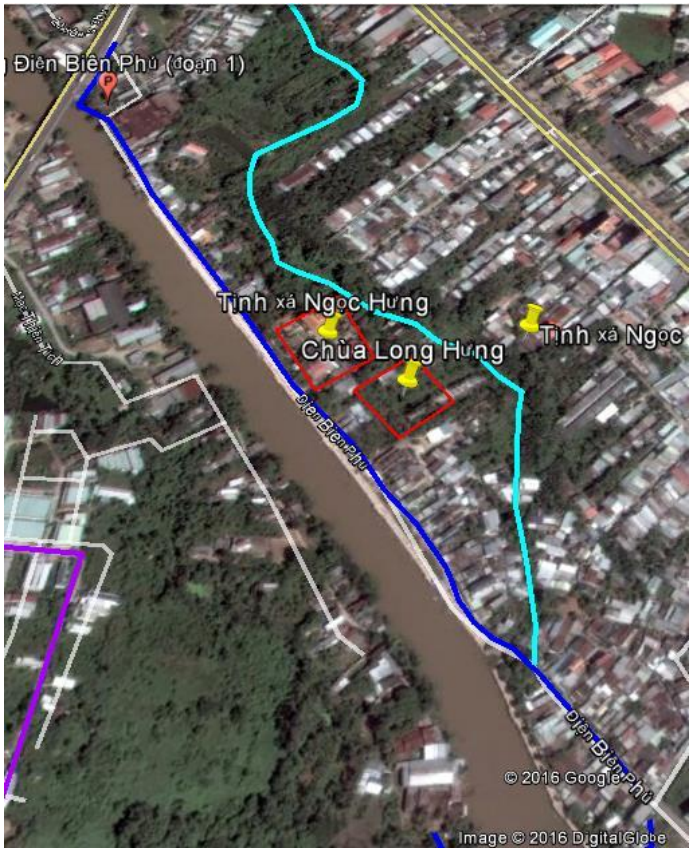
Location of the bridge No2 over Maspero River

Figure 2.22: Locations of the proposed bridge and ring road No.2

- **Area in the vicinity of Dien Bien Phu road - section 1**

Dien Bien Phu road – segment 1 (approx. 1 km long) starting from Nguyen Van Linh bridge to NH1A is constructed in Ward 6, Soc Trang city. The starting point Km0+00 is in the road next to Kinh Xang bridge, NH1A and approx. 90m far from the Kinh Xang bridge center in the North. The ending point is Km1+00 in Dien Bien Phu road in junction with the planned constructed Nguyen Van Linh bridge.

Currently the road is from 5-7 m width and heavily degraded, causing dangers to people traveling on the road. People are living at a quite high density from 10-50 m to the construction site. The sensitive PCR receptors are Long Hưng pagoda (a distance of 5m) ; Ngọc Hưng pagoda (25m) and Ngọc Phước pagoda (5m).

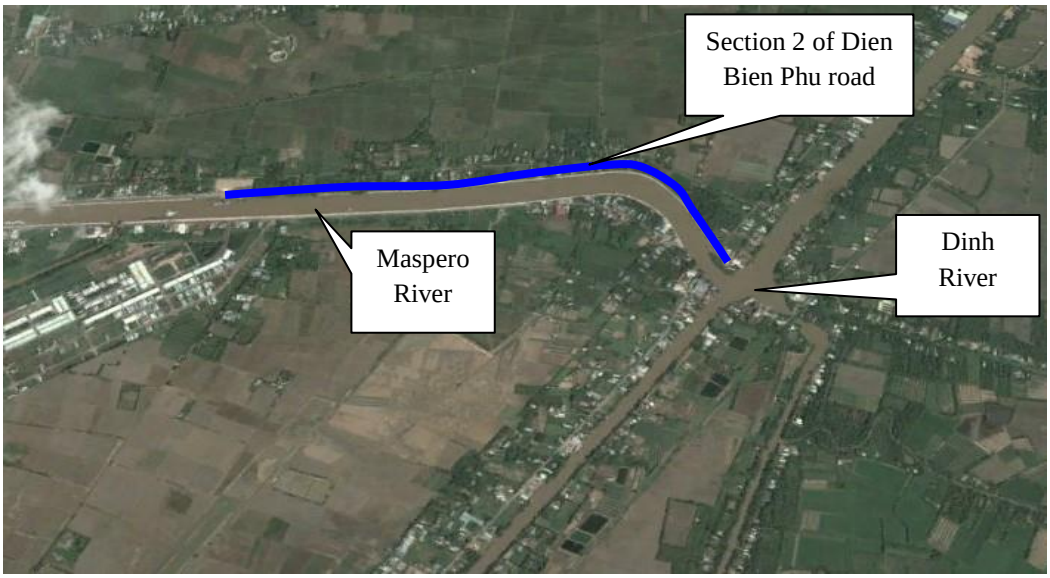


Section 1 of Điện Biên Phủ road

Section 1 of Điện Biên Phủ road

Figure 2.23: Locations of Dien Bien Phu road – section 1

Dien Bien Phu section 2 is in ward 8, currently a dirt road and badly degraded, causing impact to people's mobility. There are only few households living scatteredly with 100 - 500m far from the construction site.



Location of Dien Bien Phu road - section 2

Figure 2.24: Section 2 of Điện Biên Phủ road

- **Installation of drainage system at ward 2**

During rainy season, ward 2 is often flooded, especially along Phú Lợi and Trần Bình Trọng road the level of flood can be up to 20 to 35 cm. The reason of flood is due to the old drainage system was under capacity and degraded. People live about 10-50 m far from the construction site. (see Figure 2.25)

The project will provide new drainage pipes and manholes along Phu Loi and Tran Binh Trong road to enable the drainage capacity during rainy season.

Localized floods on Trần Bình Trọng road *Localized floods on Phu Loi road*

Figure 2.25: Localized floods along Phu Loi and Tran Binh Trong road

2.5.3. Component 3: Resettlement Site

The resettlement site is at 5A, Mạc Đĩnh Chi Street in ward 4 (see Figurexx). This is the city resettlement site for the some development projects of the city. The SUUP will expand 1 ha on the available land to accommodate for the relocated families in the project.

The investment includes roads, drainage system, drinking water supply and lighting system within the 1 ha of the site.

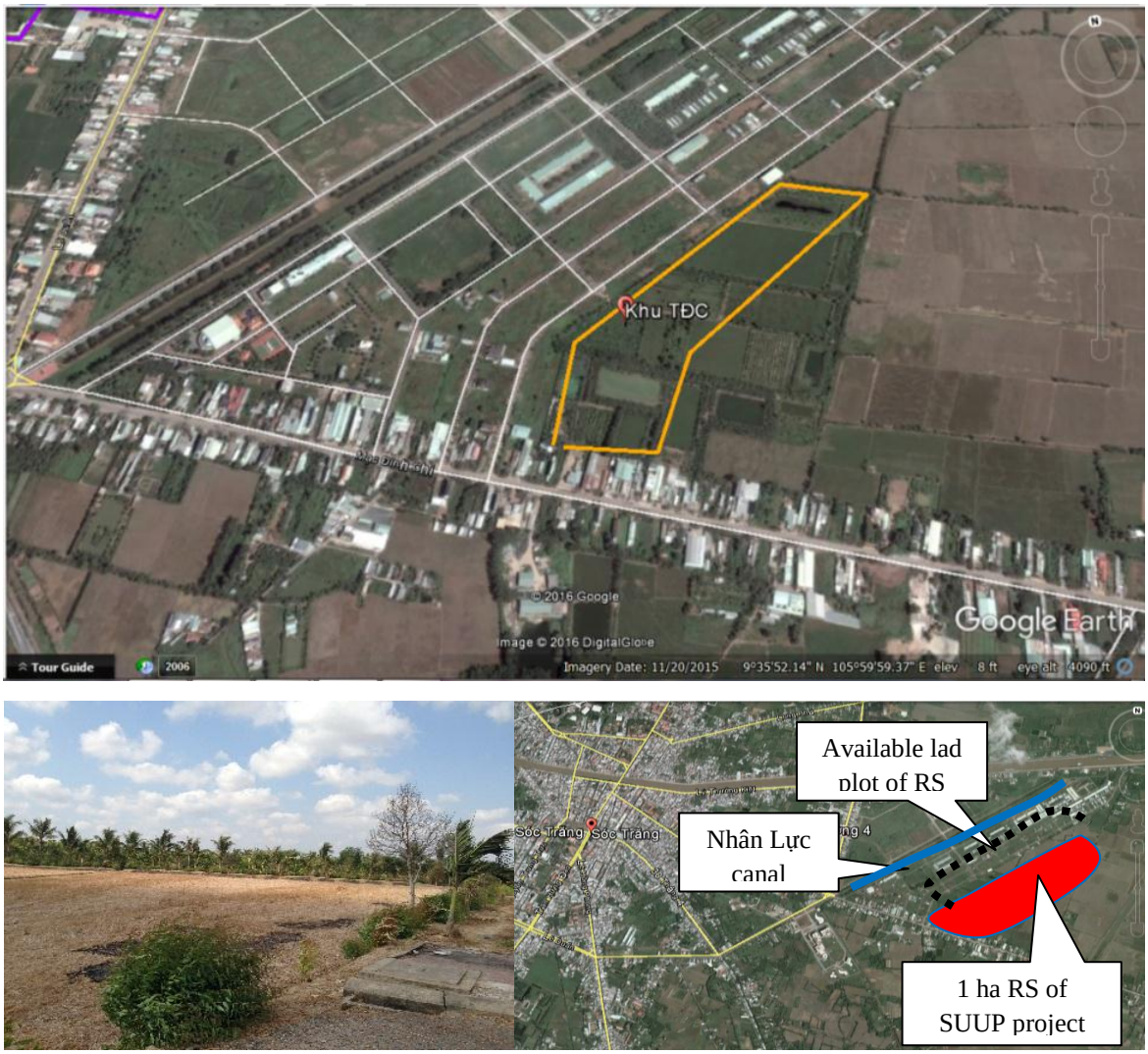


Figure 2.26: The Project' Resettlement Site

2.6. PHYSICAL CULTURAL RESOURCES AND SENSITIVE PLACES

Valuable landscape in Soc Trang province:

It is referred to the General Report on Soc Trang province environmental planning to 2010 and its orientation towards to 2020 by Soc Trang provincial DONRE in October 2008.

Soc Trang promotes the eco-tourism development and cultural touring which are two dominant types of tourism and will form the sustainable exploitation strategy. Now there are the following valuable landscapes:

- *Freshwater lake cultural zone:* area of 20ha, is located in Hung Vuong road, in the North of Soc Trang city's center.

- *Mahatup pagoda*: Is an ancient Khmer pagoda, located in ward 3, Soc Trang city.

There are 03 main architectural structures in the Pagoda which are the presbytery, Sala and Thach Chia ancient main worship place constructed as per Khmer traditional style. The campus of the pagoda is the home of thousands of bats. Thus this pagoda is also known as Bat Pagoda. In 1999 Mahatup pagoda has been recognized as the cultural and historical relics by the Ministry of Culture and Information.

- *Clay Pagoda* This pagoda has been constructed by the Ngo family for practicing as laypersons; there are many big clay statues with subtle textures which require skillfulness and high techniques. There is especially the 13-storey multi-gem tower, a gem-building tower and 8 special candles, which has a total weight of 1.4 tons, of which 6 candles are as heavy as 200 kg.

- *Sa Lon Pagoda:* is located in NH1A in the direction to Bac Lieu, 12 km far from Soc Trang city. Lining bricks on the pillars and walls are the bowls and plates with very special unique style.. Thus the pagoda was soon known as Chen Kieu (Stylish Bowl) pagoda.

The province has expanded more tourism activities, put Tan Long stork garden eco-tourist site and My Phuoc hillock tourist site into operation, and developed Con Noi No. 3 tourism area construction project in Song Phung commune, Long Phu district.

Valuable landscape and sensitive places in the subproject areas:

According to the field survey, 5 sensitive places are expected to be affected by the project during construction period. The lists of the sensitive places of Soc Trang city subproject are as follows:

Table 2.13. Description of the subproject's affected sensitive structures

No.	Name/image	Location	Shortest distance to the subproject site (m)	Description
I.	**Pagoda, church**			
1	Long Hung pagoda 	Rehabilitation of Dien Bien Phu road and dredging and improving Tra Men A canal in ward 6.	5	The pagoda is located in 42A Dien Bien Phu road, cluster 1 – ward 6 – Dien Bien Phu road is located in the direction toward to NH 1A, where the households are living along roads , traffic density is medium. Pagoda is about 5 to 10 m far from Tra Men A canal.
2	Ngoc Hung monastery 	Rehabilitation of Dien Bien Phu road and dredging and improving Tra Men A canal in ward 6.	25	The Monastery is located in 44A Dien Bien Phu road, cluster 1 – ward 6 – Dien Bien Phu road is located in the direction toward to NH 1A, where the households are living along roads, traffic density is medium. The Monastery is 25m-35m far from Tra Men canal.
3	Huong Son Pagoda	Upgrading and rehabilitating Lia	20	Huong Son pagoda is located in No. 99 Truong Cong Dinh road, cluster 4,

No.	Name/image	Location	Shortest distance to the subproject site (m)	Description
		5 in ward 2.		ward 2. Huong Son Pagoda becomes the events center where is the worship places for the various Buddhists. The pagoda is about 20m far from the reformed road in Lia 5 in ward 2.
4	Ngoc Phuoc monastery 	Rehabilitating Tra Men A canal, ward 6	5	The Monastery is about 5-10m far from Tra Men canal.
II.	**Public works**			
5	Bong Sen Market 	Constructing Nguyen Van Linh bridge connecting with ward 2, ward 6	250	Bong Sen Market is located in Yet Kieu road, ward 6, Soc Trang city. Bong Sen Market is known as the major market serving the shopping and trading demands of the residents in ward 6 of the city.

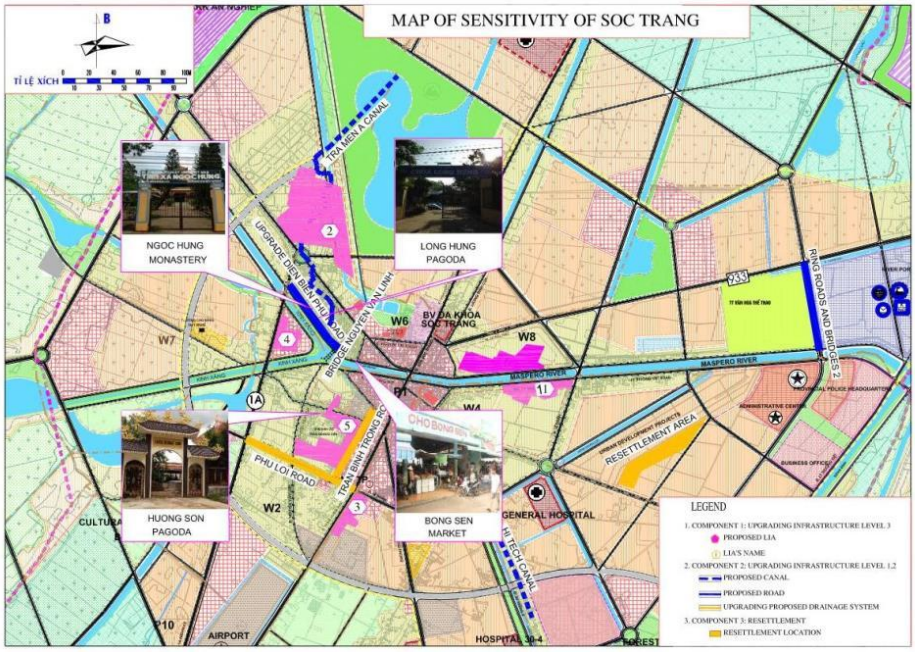


Figure 2.27: Locations of sensitive places

CHAPTER 3. ANALYSIS OF ALTERNATIVES

Scaling up Urban Upgrading Project – Soc Trang city sub-project is designed in conformity with the national and regional urban upgrading policies, the local urban development planning, and socio-economic development plan. By investing in this sub-project, Soc Trang city will achieve its targets for roads, drainage system, and lighting system that will help the city to leapfrog to class II city by 2020. The related development plans and policies are:

- The National Urban Upgrading Program for the period 2009-2020 as promulgated by the Prime Minister in Decision 758/QD-TTg
- The National Urban Development Program as detailized in the Decision 1659/QD-TTg dated November 7, 2012 by the Prime Minister
- Approval of the amendment to the Orientation of the Master Planning for the development of urban system in Viet Nam towards 2025 and with vision of 2050 as in Decision 445/QD-TTg dated on April7, 2009 by the Prime Minister
- Approval on the Proposal for Climate Change adapted Urban Development Program in Viet Nam for the period of 2013-2020, governed under Decision 2623/QD-TTg dated on 31 December 2013 by the Prime Minister.
- Approval on The Action Plan for Viet Nam Green Growth Strategy for the period 2014 – 2020 as specified in the Decision 403/QDD-Ttg dated on 20 March 2014 by the Prime Minister.
- Approval on Soc Trang provincial Socio-Economic Development Plan towards 2020 as in Decision No. 423/QĐ-TTg dated on 11 April 2012 by the Prime Minister.
- Approval on the Revised General Soc Trang city's Construction Master Plan towards 2030 with prospective of 2050 in the Decision No. 378/QĐ-UBND by Soc Trang provincial People's Committee dated on 30 December 2011.
- Approval on the revised Soc Trang provincial Transport Development Master Plan towards 2020 including for Soc Trang city in the Decision No. 1409/QDHC-CTUBND dated on 27 December 2012 by the Chairman of the PC.
- Approval on the Strategic Direction of the Drainage, Collection And Treatment of the Wastewater From The Urban Area, Industrial Clusters And Zones And Hospitals located in Soc Trang province including Soc Trang city in Decision no 783/QHĐC-CTUBND dated on 15 August 2013 by the Chairman of the provincial People's Committee.
- Approval on the revised Master Plan of the Solid Waste Management in Soc Trang province towards 2020 with vision of 2030 in Decision No. 1409/QDHC-CTUBND dated on 3 October 2014 by the Chairman of the provincial People's Committee.

As part of the impacts assessment, the analysis of alternatives is an important stage in identifying the investment's location, scope, design, and technology applicable for a particular (sub) project component in order to not only minimize negative impacts, but also maximize positive impacts. The analysis of alternatives has been conducted for each subproject component. in consultation with relevant stakeholders.

3.1. "WITHOUT PROJECT" ALTERNATIVE

If the sub-project is not implemented, Soc Trang 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

The consideration of the "with" and "without" scenario is presented in Table 3.1 for each of the Soc Trang sub-project component, highlighting the component's key investments.

Table 3.1. Alternatives analysis of the without project scenario

Investment Item	With Project	Without Project
Widening the alleys in LIAs	- Improve the commuting conditions for the people living in the LIAs. - Give access to local houses for evacuation, emergency and fire safety purposes - Transform the Low Income Areas and the city as LIAs are within the city's urban core. - Contribute to the urban upgrading goals of the city. - Increase land value - Compensate for affected households	- LIAs exist and expand as the more migrants coming to the city for work - Living conditions of residents are not improved - Difficult access for evacuation, emergency, funerals and fire safety.
Installation of sewage system in LIAs Improvement of Drainage System in Phu Loi and Tran Binh Trong roads (Ward 2)	- Improve significantly living conditions of residents - Improve sanitation and environment conditions - Improve local floodings	- Continue discharge of wastewater directly to the environment - Increase environmental pollution and local floods - Affect people's health due to the unhygienic practices
Upgrading Dien Bien Phu Road (Section 1 &2)	- Improve the commuting conditions for local people - Improve environmental and sanitation along the road as a drainage system will be installed. - Increase land value - Align with the city planning - Cost emerged due to compensation and resettlement to affected households	- Inconformal and degraded road. The current road will not meet the commuting needs of people. - The road segment along the Dien Bien Phu road continues being polluted due to the direct discharge of waste and wastewater. - No resettlement issues

Construct of Nguyen Van Linh bridge; bridge and Ring Road 2	- Complete construction for a main road of the city - Increase the connectivity of the current areas with the new extended areas of Soc Trang city master plan. - Promote the transport, socio-economic development of the people in Wards 8, 9 and the central Wards 1, 2, 3, 4. - Promote the economic exchange and development in the river port service sector in Tran De and Dai Ngai ports. - Increase land value - Improve flooding conditions	- Undone road, bridge as currently only 1 segment of the Ring road 2 completed as planning - No resettlement issues
Upgrading and embankment of Tra Men A and Hi Tech canals	- Protect canal banks and prevent erosion - Provide safety to people and their assets - Provide better drainage capacity and improve environmental pollution - Increase climate change adaptation - Better manage the canals and prevent local encroachment - Better landscape and increase green spaces - Cost to resettlement of affected households.	- At high risk of loss of life and properties due to bank erosion. - Limited drainage capacity because of people encroaching and environmental pollution. - No cost emerged for resettlement.

In general, "With project" scenario will bring more socio-economic and environmental benefits in comparison with "Without project". Although there are the negative impacts of the "With project" scenario, however, these impacts are mainly potential to occur during the construction period and disappear after completion of the civil works and shall be mitigated if the technical measures are strictly applied and the appropriate supervision is made.

3.2. "WITH PROJECT" ALTERNATIVES

In this scenario, the alternatives analysis addresses the options of widening the alleys in the LIAs and different technical designs of Tra Men A and Hi Tech canal embankments. The construction of roads (Ring Road 1 and Dien Bien Phu Road Segment 1 and 2); Bridges (Nguyen Van Linh, Ring Road 2) and the technical infrastructures of the resettlement areas of Soc Trang city subproject mostly follows the plannings, therefore no changes emerge from the current plan. The alternatives analysis is conducted considering a combination of technical, economic, environmental, and social criteria.

3.2.1. Alternatives Analysis for Investments under Component 1

Alternatives for widening the alleys in the LIAs

The proposed options for upgrading the LIAs are:

(i) Widening the alleys that are loaded with heavy traffic and have a potential for expanding into at least 4 m width. The alley's centerline would stay unchanged.

(ii) Upgrade the current alleys to concrete ones, conforming to their existing widths

(iii) A mix of option 1 and 2 in which big and heavy traffic alleys would be widened to at

least 4 m widths and small alleys would be improved following theirs current status with the width of at least 2 m.

The detailed analysis of alternatives is presented in table 3.2 below. There will be a total of 52 alleys to be upgraded in 6 LIAs. Given the advantages in term of simple operation, less social and environmental impacts and high consensus from the community (greater than 90% people voted for from the community consultation), option 3 is selected.

Table 3.2. Alternatives for Widening Alleys in LIAs

Criteria	Option 1	Option 2	Option 3 (selected)
Technical	- Sufficient road width for installation of basic infrastructures and evacuation purposes - Construction work might be delayed due to big resettlement work arrangement.	- Easy for construction and operation - Difficult for installation of basic infrastructures (sewage)	- Main alleys with sufficient width for installing basic infrastructure - Upgraded small alleys would easily be connected to the main alleys - Evacuation or emergency could be possible
Social	- Living conditions and traffic safety would be significantly improved - Daily life/ livelihoods of residents would be impacted during construction and resettlement process - Involve large compensation and resettlement - Address grievances would be needed	- Not much improve traffic and living conditions - Construction and operation would be easy - Affected and reallocated households are minimal - No upset in daily life of people	- Improve traffic and living conditions - Construction and operation would be easy - Affected and reallocated households are less than option 1 - Grievance would be expected
Environmental	- Environmental sanitation conditions would be improved. - Prevent local flooding - Better landscape and waste management - Noise, dust, vibration and waste would be expected during construction	- Environmental sanitation conditions would be improved. - Prevent local flooding - Less impact from noise, dust and vibration. - Accessibility would be difficult for emergency, fire safety, evacuation or waste collection purposes. - Landscape and environmental management would not be improved much.	- Environmental sanitation conditions would be improved. - Prevent local flooding - Better landscape and waste management - Noise, dust, vibration and waste would be expected during construction
Investment cost	- Increase value of land - Highest cost for compensation - Highest construction cost	- Compensation cost would be the lowest - Cost of construction would be the lowest. - Highest economic return - Value of land would not increase	- Value of land would increase along the main alleys. - High construction cost. - High compensation cost.

3.2.2. Alternatives analysis for Investments under Component 2

In the subproject's pre-feasibility study report (PreFS), the design consultant proposed design options are mainly based on the city development master plan and adapted to the locality's conditions. The pre-feasibility study proposed alternatives to the design of embankment of Tra Men A and Hi Tech canals, the construction scale for the Ring Road and Bridge No. 2. However, the other investment items such as Nguyen Van Linh bridge and approach road, drainage system along Phu Loi and Tran Binh Trong roads and Dien Bien Phu road (section 1 and 2) are proposed with only one design option, which fits the city development master plan.

In the case of ring road and bridge number 2, the alternatives are in term of the scale of the investment: one option for road and bridge with cross sections that double those of the other option while all other technical specifications are applied the same in both options. In option 1, the cross sections of the road and bridge as in the planning are 40 m wide and in option 2, those are 16 m wide. The latter option is capable of meeting the current needs of Soc Trang city. The former option would add up the cost, increase the resettlement and exceed the financial capacity of the city. The city decides to build the bridge and ring road No2 with 16 m wide considering as phase 1 of the investment and leaves the option for 40 m wide to be built in the future (phase 2) when the financing is possible and the local demand increases. Therefore, the designs of the bridge and road are open for the add-on of their other halves when things are ready. The subproject owner commits to strictly supervise the application of ECOPs and site-specific mitigation measures for Phase 2 investments.

As analyzed above, the alternatives analysis for component 2 is therefore only conducted on the designs of the embankment of Tra Men A and Hi Tech canals. The two canals share similarities in terms of its scale and environmental and social settings as described in Chapter 2. Therefore, the entire embanking work will be in integrity both in term of the design and construction quality. The consultants consider two design options:hard and soft embankment structures which are detailed as the following.

- Alternative 1: Reinforced concrete revetment with anchoring piles; landscaping with tree on the surface.
- Alternative 2: Soil revetment with timber piles; landscaping with green planted on the soil/sand bags.

Table 3.3. Alternatives for technical embankment designs of Tra Men A and Hi Tech canals

Criteria	Alternative 1: Hard Structure Reinforced concrete / stone revement	Alternative 2 (selected): Soft Structure Soil/ sand bags revetment
Technical	- Revetment foundation and foot protection are made of concrete adequately in front of concrete piles. Revetment slope is 1:1.5 (vertical/horizontal). Revetment is made of concrete or stone. - Construction of the concrete road for operation management and facilitation the travelling of the local people. - Structure is stable due to its resilience against the waving interchange when the boats travel and Ensure canal bank stability; - Create the beautiful landscape when the water	- Revetment foundation is made of concrete adequately placing in front of timber/melaleuca piles. Revetment slope is 1:0.27 (vertical/horizontal). Revetment is built by stacking up soil/sand bags to the design embankment height. Green appearance is created by planting grass/ plants in the sandbags. - Ensure the stability of the side slope, but resilience to the wave's effects when the boats travel is weaker; - Combination of grass and green trees

Criteria	Alternative 1: Hard Structure Reinforced concrete / stone revement	Alternative 2 (selected): Soft Structure Soil/ sand bags revetment
	level is high, but when the water level is low, the landscape creates the rigid/concrete feelings; - Control the complex construction quality; since the integral reinforcement concrete is made on the embankment; Complicated construction (steel reinforcement, form, casting). - Construction time is shorter; - Operation and maintenance is simpler, since these are the concrete structures, O & M is rather easy.	creates the beautiful and greenery landscape at both banks; - Utilization of environmental friendly materials. High aesthetic nature, low cost. - Easy control of construction quality since the used materials are the PP bags and reinforced concrete M250 layer of 15 cm thickness; Simple construction method (PP bags, casting one layer of reinforced concrete M250 layer of 15 cm thickness); - Shorter construction time; - O & M is more complicated since green species are planted on the revetment slopes.
Social	Scope of impacts is larger, create a lot of changes of the life of the affected households in the larger extent. - Tra Men A canal: number of affected HH is 200 HHs, of which 72 HHs have to move away; - Hi Tech canal: number of affected HH is 300 HHs, of which 90 HHs have to move away. - There are more challenges in construction and operation due to high compensation costs for land acquisition.	Scope of impacts is smaller, create a changes of the life of the affected households in the smaller extent. - Tra Men A canal: number of affected HH is 184 HHs, of which 56 HHs have to move away; - Hi Tech canal: number of affected HH is 221 HHs, of which 77 HHs have to move away. - O & M are carried out in easier manner.
Environmental	- There are low risks of slide at both banks since these are concretized. - Drainage capacity of the surface water is weak since the canal surface is concretized. - Excavated organic soil volumes on both banks are larger. - Environmental impact is rather high due to piles pressing process, transport of materials and construction of embankment wall and foots.	- Drainage capacity of the surface water is strong since the used materials are highly absorbent; - Low impacts during construction since the materials are ready made and friendly environmental. - Beautiful landscape - Possibility of the landslides since the side slope structure has the weaker bearing capacity than that of alternative 1.
Cost	- High construction cost, pilling depth into good quality soil is long. Construction of embankment foots depends on the tides, the construction time prolongs. - Construction cost for 1 m lembankment ength: 45,000,000VND	- Construction cost is lower. Construction cost for 1 m embankment length: 22,000,000VND

Conclusion: Alternative 1 is selected as the investment option for upgrading Tra Men A and

Hi Tech canals because the investment cost is low, the banks stability is guaranteed; beautiful landscape is made, greenery space is increased. Alternative 1 investment will also fit to the urban water river urban setting and its landscape.

3.2.3. Alternatives Analysis for Investments under Component 3

There is only 1 option regarding the resettlement site, which is already determined in the city planning. The resettlement site is located at 5A, Mac Dinh Chi Street in Ward 4. This site is new home for all relocated households resulted from land acquisitions from all development projects in Soc Trang city. An area of 1 ha within the site will be developed with roads, water supply and drainage system, power supply and lighting system and social infrastructure. Expectedly, each household will be able to own a land plot of 60-90m2. More detailed information is explained in the resettlement plan of this city subproject.

CHAPTER 4. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

Chapter 4 presents the findings of the assessment of potential environmental and social impacts (other than resettlement per se) induced by the subproject activities of (i) Tertiary infrastructure upgrading in Low Income Areas; (ii) Priority Primary and Secondary Infrastructures; (iii) Resettlement sites. Component 4, which is implementation support and capacity building does not involve any physical construction thus will not cause any environmental impacts. The method used in this chapter is based on the analysis of the baseline social and environmental information (discussed in Section 2.5), field survey and discussion and consultation with local authority and people and other stakeholders (chapter 7).

The overall impacts will be positive in terms of economic and social issues. The direct beneficiaries are communities at both local and regional levels. The positive impacts brought by the subproject will solve most difficulties that Soc Trang city is facing such as flooding, traffic congestion and environmental sanitation. Besides, the implementation of the subproject civil construction works will pose negative impacts on the local communities due to the pollution of air, soils, watershed, noise and vibration. However, these negative impacts are localized, short-term, controllable and will cease upon completion of the subproject. This chapter presents type, level and scale of impacts caused by construction activities of each subproject component.

4.1. ENVIRONMENTAL IMPACT ASSESSMENT

4.1.1. Positive impacts

The positive environmental impacts are of the following:

- Improve environment and sanitation in LIAs from alley upgrading, sewage and stormwater collection and domestic waste collection.
- Improve the air quality and reduce dust as earth alleys to be replaced by concrete alleys.
- Reduce local flooding as the drainage would be improved and alleys' base elevation would be leveled up as same as that of the main roads.
- Address the environmental pollution in the main drainage network of the city (Trà Men A, Hi-Tech canals)
- Canal embankment would help to protect canal bank and prevent from bank erosion
- Dredging the canals would improve the environment, ensure water flow and increase drainage capacity
- Eliminate the encroachment and thus prevent the direct discharge of waste and waste water into the canals
- Tree planting along the canal banks and roads will beautify the landscape and increase the city green coverage.
- Increase the connectivity by road and bridge construction, reducing the flood risks
- Improve environmental conditions in resettlement sites
- Increase climate resilience by improving drainage/ flood retention capacity, strengthening the weak soil foundation and applying the construction standards and designs adapted to climate change.

4.1.2. Negative impacts

4.1.2.1. Type and scope of impacts

Potential negative impacts are identified and screened at each project component from the preparation, construction to operation phase and categorized by the nature of the construction works. Most of the negative impacts are temporal, localized and reversible due to the medium sized construction works. The impacts can be mitigated by applying appropriate technologies and site-specific ESMP together with close supervision by the contractor and consultation with local community.

Potential environmental impacts are classified in Table 4.1

Table 4.1. Level of negative impacts of Soc Trang city subproject

Component	Physical aspects			Biological aspects		Soci aspects				Others	
	Air, noise, vibration	*Soil, water*	*Solid waste, dredged material*	*Forest, natural ecosystem*	*Fish, aquatic species*	*Land acquisition and resettlement*	*Native alethnic group*	*Physical cultural resources*	*Livelihood, community disturbance*	*Local flooding, traffic, safety*	*Off-site impacts*
Component 1: Upgrading Tertiary Infrastructure (US$ 8.674 millions)											
Upgrading infrastructure in 6 LIAs, covering 132ha and involving 9,790 people: The scope includes: (i) Upgrading 52 alleys with a total length of 11.5km; installation of 1.9km sewage pipes and alleys' lighting system; (ii) Resettlement: 612 partially affected households, 7 relocated households; Land acquisition: 14,961.6 m2 of which agricultural land area is 4,047m2; (iii) Sensitive locations: Huong Son pagoda (20m).											
Pre-construction	N	N	N	N	N	L	M	N	N	M	L
Construction	M	M	M	N	L	N	L	N	M	M	M
Operation	L	L	L	N	N	N	N	N	N	L	N
Remark	- Small-scale impacts can be addressed through ECOPs (see 6.1.1) - Impacts to PCRs and sensitive receptor - Social disturbances and traffic safety concerns - Potential flooding impacts due to poor operation and maintenance (O&M)										
Component 2: Primary and Secondary Infrastructures (US$ 26.485 million)											
Sub-component 2.1. (1) Upgrading of Tra Men A Canal (Ward 6), including: (i) Dredging and embankment of Tra Men A canal with a length of 2.64km; construction of operational road, sewers, lighting system, tree landscaping; (ii) construction of tidal gates at the outlet to Maspero River; (ii) Resettlement: 19 partly affected households; 5 relocated households; Land Acquisition: 1,063.5 m2 residential land; 2,225.0 m2 agricultural land; (iii) Sensitive locations: Long Hung pagoda (5m distance); Ngoc Hung Monastery (25m distance); Ngoc Phuoc Monastery (5m);										
Pre-construction	N	N	N	N	N	L	M	N	M	N	N
Construction	M	M	M	N	M	N	M	M	M	M	M
Operation	L	L	L	N	N	N	N	N	L	L	L
Remark	- Small and medium impacts can be addressed through ECOPs (see 6.1.1)										

Component	Physical aspects			Biological aspects		Soci aspects				Others	
	Air, noise, vibration	*Soil, water*	*Solid waste, dredged material*	*Forest, natural ecosystem*	*Fish, aquatic species*	*Land acquisition and resettlement*	*Native alethnic group*	*Physical cultural resources*	*Livelihood, community disturbance*	*Local flooding, traffic, safety*	*Off-site impacts*
	- Major impacts including community disturbance; traffic concerns, odor and management of dredged materials (total of 8,700 m3) - Impacts on PCRs due to upgrading of in Tra Men A canal - Potential generation of waste, local flooding, erosion or land subsidence due to poor O&M;										
Sub-component 2.1. (2) Upgrading of Hi Tech canal (ward 3 and 9) with the scope of (i) Dredging and embankment of Hi Tech canal with a length of 3.2km, construction of operational road, sewers, lighting system and tree landscaping. (ii) Resettlement: 19 affected households, 0 relocated households; Acquisition of 19.6 m2 residential land; 205.4 m2 agriculture land in Ward 3 and 9 respectively.											
Pre-construction	M	M	M	N	M	L	N	N	M	M	M
Construction	M	M	M	N	M	L	N	N	M	M	M
Operation	L	L	L	N	L	N	N	N	L	M	L
Remark	- Small and medium impacts can be addressed through ECOPs (see 6.1.1). - Major impacts including disturbance to residential areas along the embankment route, dredged material transportation and disposal (total volume of 13,000 m3). - Risk on erosion of the canal banks and embankment subsidence risk, house cracking; Social disturbance and traffic issue - Potential generation of waste, local flooding, erosion or land subsidence due to poor O&M;										
Sub-Component 2.2. Construction of Nguyen Van Linh bridge and access roads (Ward 2 and 6), including: (i) Construction of Nguyen Van Linh bridge with a length of 145m and a width of 14 m and access roads with a length of 155 m and a width of 14 m. (ii) Resettlement: 38 affected households in Ward 2 and 65 affected households in Ward 6; total 03 relocated households; Acquisition of 350.3 m2 residential land; 11,337.7m2 agriculture land in Ward 2 and Ward 6 respectively; Van Dien temple is 328 m2 gardening land. (iii) Sensitive locations: 20m from Van Dien temple; 200m from Bong Sen Market.										
Pre-construction	M	M	M	N	M	L	N	L	L	L	L
Construction	M	M	M	N	M	L	N	M	M	M	M
Operation	M	N	L	N	N	N	N	N	L	L	L
Remark	- Small and medium impacts can be addressed through ECOPs (see 6.1.1).										

Component	Physical aspects			Biological aspects		Soci aspects				Others	
	Air, noise, vibration	*Soil, water*	*Solid waste, dredged material*	*Forest, natural ecosystem*	*Fish, aquatic species*	*Land acquisition and resettlement*	*Native alethnic group*	*Physical cultural resources*	*Livelihood, community disturbance*	*Local flooding, traffic, safety*	*Off-site impacts*
	- Community disturbance; transportation and disposal of construction materials and waste - Disposal of dredged soils and sediment of Maspero river (2,200 m3) - Impacts on water environment and aquatic resources of Maspero river; Impact on waterway transportation on Maspero River - Local flooding due to poor operation and maintenance; Traffic safety concerns - Impacts on sensitive locations: *Van Dien temple of Cao Dai religion, Bong Sen market*										
Sub-component 2.3. Construction of bridge and ring road 2 (ward 4 and 8), with the following scope (i) Construction of ring road 2 with a length of 1.3km, a width of 20m, and a bridge with a length of 97m, a width of 14m. (ii) Resettlement: 44 affected households in Ward 8 and Ward 4; 2 displaced households; Acquisition of 2,401.2 residential land in Ward 8 and Ward 4 and of 109,310.6m2 agriculture land; and relocation of 16 graves.											
Pre-construction	M	M	M	N	M	L	N	M	L	L	L
Construction	M	M	M	N	M	L	N	N	M	M	M
Operation	M	N	L	N	N	N	N	N	L	L	L
Remark	- Small and medium impacts can be addressed through ECOPs (see 6.1.1). - Community disturbance; transportation and disposal of construction materials and waste - Potential flooding impacts due to poor O&M; Road safety concerns; - Impact on agriculture land - Relocation of 16 graves by construction Ring road No.2										
Sub-Component 2.4. (1) Upgrading of Dien Bien Phu road (section 1) - ward 6, including (i) Upgrading of Dien Bien Phu road –section 1 from Nguyen Van Linh Bridge to national way 1A with a width of 14m and a length of 1km. (ii) Resettlement: 52 affected households, 35 relocated households; Land acquisition: 9,570.5m2 residential land; Ngoc Hung pagoda is 100 m2 gardening land and 200m fence and Long Hung pagoda is 36 m2 gardening land . (iii) Sensitive locations: Residential area (within a radius of 20-500 m); Long Hung pagoda (a distance of 5m); Ngoc Hung Monastery (a distance of 5m);Maspero River.											
Pre-construction	M	M	M	N	L	M	N	M	M	M	M
Construction	M	M	M	N	L	L	N	M	M	M	M
Operation	L	L	L	N	N	N	N	N	L	M	L
Remark	- Small and medium impacts can be addressed through ECOPs (see 6.1.1).										

Component	Physical aspects			Biological aspects		Soci aspects				Others	
	Air, noise, vibration	*Soil, water*	*Solid waste, dredged material*	*Forest, natural ecosystem*	*Fish, aquatic species*	*Land acquisition and resettlement*	*Native alethnic group*	*Physical cultural resources*	*Livelihood, community disturbance*	*Local flooding, traffic, safety*	*Off-site impacts*
	- Community disturbance; demolition of structure and disposal of waste - Disruption of business activities in section 1 of Dien Bien Phu road; Potential flooding impacts due to poor O&M; road safety concerns; - Impacts on PCRs from constructing section 1 of Dien Bien Phu road: *Long Hung pagoda (at 5 m distance), Ngọc Hưng pagoda (at 25m distance)*										
Sub-component 2.4. (2) Upgrading of Dien Bien Phu road (section 2) - Ward 8, including (i) Upgrading of Dien Bien Phu road – section 2 from bridge and ring road 2 to the boat racing station with a width of 14m and a length of 1.9km. (ii) Resettlement: 89 affected households; 6 relocated households; Land acquisition 3,071.4m2 residential area and 482.4m2 agriculture land; (iii) Sensitive locations: residential area (distance of 100 - 500 m from the site), Ghe Ngo boat racing station (at a distance of 50-100m), Maspero River											
Pre-construction	M	M	M	N	L	L	L	M	M	M	M
Construction	M	M	M	N	L	L	N	M	M	M	M
Operation	L	L	L	N	N	N	N	N	L	M	L
Remark	- Small and medium impacts can be addressed through ECOPs (see 6.1.1). - Community disturbance; demolition of structure and disposal of waste - Social disturbance and traffic concern; - Potential flooding impacts due to poor O&M; - Impacts on the Festival (Ok Om Bok or Moon Fest) during construction phase of Dien Bien Phu road – section 2.										
Sub-Component 2.5. Rehabilitation of drainage system in the city center (ward 2), including (i) Upgrading of drainage system along both sides of Phu Loi road with a length of 3.23km and Tran Binh Trong road with a length of 1.81km. (ii) Land acquisition and resettlement: None**;** (iii) Sensitive locations: Residential areas along the roads with a distance from 10 - 500m											
Pre-construction	L	L	L	N	N	N	N	N	L	L	L
Construction	M	M	M	N	N	N	N	N	M	M	M
Operation	N	L	M	N	N	N	N	N	N	M	L
Remark	- Small and medium impacts can be addressed through ECOPs (see 6.1.1).										

Component	Physical aspects			Biological aspects		Soci aspects				Others	
	Air, noise, vibration	*Soil, water*	*Solid waste, dredged material*	*Forest, natural ecosystem*	*Fish, aquatic species*	*Land acquisition and resettlement*	*Native alethnic group*	*Physical cultural resources*	*Livelihood, community disturbance*	*Local flooding, traffic, safety*	*Off-site impacts*
	- Community disturbance; demolition of structure and disposal of waste - Potential flooding impacts due to poor O&M; - Road safety concerns; Impact on existing utilities along Phu Loi and Tran Binh Trong roads										
Component 3: Construction of resettlement site in 5A, Mac Dinh Chi, Ward 4 (US$ 0.299 million) (i) Construction of 1 ha resettlement site comprising of 64 land plots; provision of complete infrastructure of roads, water supply and drainage system, power supply, public lighting; (ii) Land acquisition and resettlement: 6 households affected in agricultural land with a total area of 10,023 m2 (about 1.0 hectare); (iii) Sensitive locations: residential area with a distance between 50-500m from construction location.											
Pre-construction	N	N	N	N	N	M	N	N	N	N	N
Construction	M	M	M	N	N	N	N	N	L	L	L
Operation	L	L	L	N	N	N	N	N	N	L	N
Remark	- Small and medium impacts can be addressed through ECOPs (see 6.1.1). - Community disturbance; demolition of structure and disposal of waste - Potential flooding impacts due to poor O&M; Road safety concerns										

Note:

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

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

4.1.3. Impact Assessment for Investments under Component 1

The investments under component 1 include activities on upgrading of alleys with extension, alley surface concreting, installation lighting and drainage system. Detailed assessment on the potential adverse impacts during preparation, construction and operation of investments under component 1 are descibed below.

4.1.3.1. Component 1: Potential Adverse Impacts during Preparation

Impacts during the preparation phase include: (i) UXO risk; (ii) land acquisition and resettlement

a. Safety Risks due to Unexploded Ordnance (UXO)

Vietnam underwent two wars with French and USA, and the city was bombed during the war time. The subproject construction sites have been greatly affected by human activities including extensive urban development, and UXOs have already been cleared. However, there could be UXOs remaining, which may be encountered during excavation. The consequences can be serious, causing injuries, losses of human life and assets in the subproject areas. Therefore, UXO detection and clearance must be carried out before commencement of any construction work.

b. Land acquisition and resettlement

Land acquisition, relocation and resettlement have potential to impact the affected households physical and mentally, may result in social problems and even litigation, if not undertaken successfully. Relocating to a new place may cause some disturbances and people do need time to be settled and some households may be seriously affected by a new living environment. Local people need time to integrate into new circumstances, especially creating new relationships and adapting to new jobs, if necessary.

Under component 1 of the project, there are 619 households affected by the project, of which only 07 households have to relocate to the resettlement area, the remaining households are affected partly in residential land or agricultural land or, fence, yard, garden, etc. The total permanently acquired land is 14,962 m2 (about 1.5ha), of which residential land is 7,751 m2; agriculture land is 4,047 m2, the remaining land managed by the Ward People's Committee is 3,164 m2. The detailed impacts are assessed in the **section 4.2.**

4.1.3.2. Component 1: Potential Adverse Impacts during Construction

4.1.3.2.1. Generic impacts during construction of investment under component 1

Activities in the construction phase of Component 1 include construction of roads, construction and installation of culverts, lighting system, the movement of vehicles and machineries as well as workers' activities. These activities will cause dust, gas emission, solid waste, wastewater, noise, vibration impacts at different levels depending on the size and nature of the construction works, the above-mentioned negative impacts will be assessed in details as follows:

a. Impacts from dust and emission:

a1. Dust generated from the demolition:

Under the construction of alleys, the demolition work will include breaking out of completely 7 houses of which 2 houses are in Cluster 6 in LIA 2; 2 houses in Cluster 4 of LIA 3; 2 houses in Cluster 3 of LIA 5 and 1 house of Cluster 1 of LIA 6. These structures are simple either 1 floor house with concrete roof or class 4 temporary houses. Other work items include fences, ground

and barns of 309 affected households. Most of the structures to be demolished are built with masonry, brick. Demolition of structures and adhesion of materials generates dust.

The volume of dust emissions generated from the demolition of housing and structures will be calculated by the following equation:

Applicable equation: **W = E×Q×d [1]**

In which: ***W***: The average dust emissions (kg);

E: Particulate Emission factor (kg dust/ton);

Q: Emission volume (m^3);

d: Specific weight of debris d = 1,8 ton/m^3 (according to document No. 1784/BXD-VP of the Ministry of Construction publishing the norm of construction materials).

Dust emission coefficient is determined in accordance with guidelines of environmental assessment sourcebook (World Bank, 1991) and AP 42 for Stationary Point and Area Sources (US EPA, 1995) as follows:

$$E = k \times 0{,}0016 \times (U/2{,}2)^{1,4} \div (M/2)^{1,3}, \text{ kg/ton} \quad [2]$$

In which: E - Emission coefficient (kg/ton); k - Particle structure with average value (k = 0.35 with particle size <10μm – particle structure table (k) page 13.2.4-4 AP 42 (US EPA, 1995); U - average wind speed (m/s) (selected speed is 3 m/s); M - The average moisture content of debris (%) (Selected average moisture is 11% - Table 13.2.4-1 AP 42, US EPA, 1995).

→ E_d = 0.03752 kg/ton

Based on pollution coefficient E and compliance with the subproject work progress, the loads of dispersed dust generated by demoliton is calculated and provided in Table 4.2.

Table 4.2. Forecasts of dispersed dust from demolition under component 1

Work items	Volume of demolition (m3)	Dust emission (kg)	Duration of demolition (month)	Dust load (kg/day)	Dust concentration (mg/m3)	QCVN 05:2013 (mg/m3)
LIA 1	267.8	18.09	1	0.60	**2.38**	0.3
LIA 2	86.3	5.83	1	0.19	0.38	0.3
LIA 3	406.4	27.45	1	0.92	**6.66**	0.3
LIA 4	38.3	2.59	1	0.09	0.63	0.3
LIA 5	109.5	7.40	1	0.25	**1.24**	0.3
LIA 6	82.2	5.55	1	0.19	**1.06**	0.3

Remark: *The following assumptions are made (i) a working day of **8** hours; (ii) Dispersion height h = 5m and (iii) Dry season's meteorological data are used*

In general, the dust emission amount depends on many factors such as structure materials, size of work, humidity and weather conditions in dry or wet season. The above calculated results in the dry season show the dust emission from the demolition activities exceeds acceptable limits under QCVN 05:2013/BTNMT from 1.3 – 7.6 times varying for each LIA. In LIA 3, the demolishing volume is the highest and thus, the dust emission is 22 times higher than the limit. The site

clearance will take place in 1-2 weeks. By experiences, in the wet season, dust emission is less of about 1.5 – 2 times compared with that of the dry season. Therefore, impact from dust overall is at medium level and can be mitigated.

a2. Dust emission from the backfilling and excavation activities

Construction process will include stripping of the topsoil and excavating soils for installation of water drainage system and underground technical infrastructure. Different types of machines and equipment will be used such as excavator, roller, hack, shoves that emit dust and exhaust gases.

Based on equation **[2]** the particle emission factor applied for the construction phase under component 1 is E = 0,0272kg/tons. Thus, the dust emission at each LIA is calculated and summarized in Table 4.3.

Table 4.3. Estimation of dust emission from the excavation and backfilling under component 1

Work items	Volume of excavation and backfilling (m3)	Dust emission (kg)	Duration of demolition (month)	Dust load (kg/day)	Dust concentration (mg/m3)	QCVN 05:2013 (mg/m3) *(average value in 1h)*
LIA 1	9,700	399.0	18	0.74	**2.92**	0.3
LIA 2	12,026	494.6	18	0.92	**1.81**	0.3
LIA 3	4,403	181.1	18	0.34	**2.44**	0.3
LIA 4	3,430	141.1	18	0.26	**1.93**	0.3
LIA 5	5,901	242.7	18	0.45	**2.25**	0.3
LIA 6	5,262	216.4	18	0.40	**2.3**	0.3

Remark: *The following assumptions are made (i) a working day of **8** hours; (ii) Dispersion height h = 5m and (iii) Dry season's meteorological data are used*

The emission load is ranging from 1.81mg/m^3 (in LIA2) to 2.92 mg/m^3 (LIA3) on 1hour average, exceeding the acceptable limit of 0.3 mg/m^3 for 1 hour-average (QCVN 05:2013 for ambient air quality). In all LIAs during 2-4 weeks of work, the dust emission is elevated from 6-10 times compared to the limit therefore the impact of dust due to these activities can be considered as medium or moderate. Within the immediate vicinity of the work up to a distance of 50 m, the densely population living along the alleys will be directly impacted. The area of high population footprint is often distributed towards one end of an alley cutting cross a main road, especially LIA 1 where alleys end up at at Ly Thuong Kiet road, LIA3 where alleys end up at Tran Hung Dao and Le Duan road and LIA 6 where alleys end up at Dien Bien Phu and Cau Den road.

a3. Dust and emission generated from the transportation

Dust and exhaust gases from transportation: According to the standards established by the World Health Organization (WHO) (*Assessment of Sources of Air, Water and Land Pollution –Part 1: Rapid Inventory Techniques in Environmental Pollution, WHO, 1993)*, 15-ton diesel vehicles will generate loads of dust and exhausted CO, SO_2, NO_2, and HC as follows: dust: at 1.6 g/km/vehicle; CO gas: 3.7 g/km/vehicle; SO_2: 7.43S g/km/vehicle; NO_x: 24.1 g/km/vehicle and HC: 3 g/km/vehicle (diesel of 0.05% S). The subproject will use 10-ton trucks for transporting.

The average transport distance is 10 km. The total passages of trucks and the generated dust loads in the process of transportation are calculated as follows:

Table 4.4. Number of truck passages in constructing items of Component 1

Work items	Volume of material (ton)	Transport time (months)	Number of vehicles (trip/day)	Volume of waste (ton)	Transport time (months)	Number of vehicles (trip/day)	Total vehicle (trip/day)
LIA 1	28,637	18	4	14,550	18	2	6
LIA 2	85,127	18	11	18,039	18	2	13
LIA 3	15,548	18	2	6,604	18	1	3
LIA 4	15,339	18	2	5,145	18	1	3
LIA 5	22,574	18	3	8,852	18	1	4
LIA 6	19,769	18	3	7,893	18	1	4

From the above pollution loads from dust and exhaust gases, by applying Sutton model with a wind speed of 3.0 m/s, and a distance of 10-20 m from generating sources, the concentration of pollutants created by transportation operations can be calculated as follows:

Table 4.5. Dust emission concentration from the transportation of under component 1

Work items	W (m)	Dust concentration (mg/m^3)				QCVN 05:2013/BTNMT (1h average)
		H=1,5	H=2	H=3	H=3.5	(mg/m^3)
LIA 1	10	0.42	0.38	0.28	0.23	**0,3**
	20	0.28	0.27	0.24	0.23	
LIA 2	10	0.92	0.83	0.62	0.51	
	20	0.61	0.59	0.53	0.49	
LIA 3	10	0.21	0.19	0.14	0.12	
	20	0.14	0.14	0.12	0.11	
LIA 4	10	0.21	0.19	0.14	0.12	
	20	0.14	0.14	0.12	0.11	
LIA 5	10	0.28	0.26	0.19	0.16	
	20	0.19	0.18	0.16	0.15	
LIA 6	10	0.28	0.26	0.19	0.16	
	20	0.19	0.18	0.16	0.15	

As seen from Table 4.5, concentrations of dust emitted from the transportation of materials and waste from LIA 3, 4,5 and 6 are within the allowable limit of QCVN 05:2013/BTNMT, the National Technical Regulation on ambient air quality. The concentration of dust from LIA 1 exceeds the allowable limit of about 1.26 times at a distance of 10m and at 1.5 - 2m height; further away from the source at a distance of greater than 20m and at the height of 3m and above, the concentrations reach the acceptable limit.

Similarly, concentration of dust from transportation of materials and waste of LIA 2 exceeds the allowable limit of about 1.6 - 3 times within a distance of 10-20 m from the source as shown in the table above. At a distance of greater than 30 - 50 m, the dust concentration reaches the acceptable limit.

Overall, the impact of dust due to transportation would not be substantial as vehicles (10 ton trucks) travel by as low as 2- 4 trips a day. Dust can disperse from the mobile trucks evenly along transportation routes. Thus the households, shops and objects located along the transportation routes within 10 to 20 m will slightly affect. Construction materials and waste will be routed back and forth between 15 km distance between LIAs, material suppliers and disposal site, specifically:

LIA 1→ Lý Thường Kiệt Street →Lê Duẩn Street → Trần Hưng Đạo Street

LIA 2 → Huỳnh Phan Hộ and Trần Quốc Toản Street →Hùng Vương Street

LIA 3 → Lê Duẩn Street → Trần Hưng Đạo Street

LIA 4 → Hùng Vương Street

LIA 5 → Truong Cong Dinh/ Tran Binh Trong Street → Phu Loi Road

LIA 6 → Dien Bien Phu/ Cau Den Street → Le Duan Street →Tran Hung Dao

From the above Tran Hung Dao, Hung Vuong and Phu Loi cross sections with the National Way No.1, all trucks further follow National Way 1A → Provincial road 939 → Soc Trang Waste Treatment Facility.

a4. Dust from the material gathering, unloading and loading activities:

The unloading and loading materials are mainly gravel, sand and cement. Based on document AP 42, Fifth Edition Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, the dust emission loads from the material unloading and loading activities can be calculated.

Dust emission concentration from the constructional material unloading and loading activities follow *Tran Ngoc Chan, 1999, Air pollutant and waste gas treatment (Volume 1), Ha Noi Science and Technology Publishing House.*

Table 4.6 presents the 1 hour average dust concentration in 1 hour (mg/m3) considering base concentration of air pollutants in the baseline environment. This emission concentration is used to identify the level of impact to the surrounding environment due to the material gathering, unloading and loading processes.

Table 4.6. Dust emission concentration due to loading and unloading construction materials under component 1

Work items	W (m)	Dust concentration (mg/m^3)				QCVN 05:2013/BTNMT (The average in 1h)
		H=1.5	H=3	H=6	H=9	(mg/m^3)
LIA 1	10	1.25	0.67	0.39	0.29	**0.3**
	50	0.20	0.15	0.12	0.12	
LIA 2	10	1.55	0.83	0.46	0.28	
	50	0.22	0.16	0.13	0.12	
LIA 3	10	0.72	0.41	0.25	0.20	
	50	0.15	0.13	0.11	0.11	
LIA 4	10	0.71	0.41	0.25	0.20	

Work items	W (m)	Dust concentration (mg/m^3)				QCVN 05:2013/BTNMT (The average in 1h)
		H=1.5	H=3	H=6	H=9	(mg/m^3)
	50	0.15	0.13	0.11	0.11	
LIA 5	10	1.00	0.55	0.33	0.25	
	50	0.18	0.14	0.12	0.11	
LIA 6	10	0.89	0.50	0.30	0.23	
	50	0.17	0.13	0.12	0.11	

The results show that dust concentration during the material unloading and loading processes under component 1 in the area that is 10 m away from the site and at the height level of 1.5 - 3 m exceeds allowable limits as according to **QCVN 05:2013/BTNMT** from 1.3 - 5.0 times in 6 LIAs At a distance greater than 50 m, the dust concentration meets the acceptable limit. However, due to the construction time lasts long (on average of 18 months) and the "successive construction method" applied thus the level of dust emission impact from the loading/unloading of materials is at LOW and can be mitigated.

a5. Exhaust gas emission due to activities of transportation means

Transportation activities by 10-ton trucks for construction materials or disposal of construction waste in the construction phase under component 1 that will result in the exhaust of gas pollutants such as particles, NO2, SO2, CO, VOC, affecting the ambient air quality.

Pollutant load depends on the numbers of trucks travel and types of engine fuel that used. At current time, typical fuel used for transportation means is Diesel Oil (DO) with sulphur content smaller than 0.25% so the concentration of SO_2, NO_2 in the exhaust gases significantly limited. Moreover, emission source is the mobile source so the waste gas concentration is not focused, but, it will be dispersed on whole road line.

At current time, there is no standard value for emission source that generated by all those means. Thus, the fast assessment method of WHO that used to evaluate all impacts.

Table 4.7. Emission coefficient of all air pollutant substance from truck

No	Type of car	Unit (U)	SO2 kg/U	NOx kg/U	CO kg/U	VOC kg/U
1	Petrol-run lorry (> 3,5 tons)	1000 km	4,50*S	4,50	70	7
		Fuel ton	20*S	20	300	30
2	Oil-run lorry DO (< 3,5 tons)	1000 km	1,16*S	0.70	1	0,15
		Fuel ton	20*S	12	18	2,60
3	Oil-run lorry DO (3,5 - 16 tons)	1000 km	4,29*S	11,80	6	2,60
		Fuel ton	20*S	55	28	12
4	Oil-run lorry DO (>16 tons)	1000 km	7,26*S	18,20	7,30	5,80
		Fuel ton	20*S	50	20	16

Remark: S is the concentration of sulfur in diesel (S = 0,25%)

Specifications for diesel oil-run vehicles: Weight load is from 3.5 to 16 tons, average speed is 10km/h, at the average distance of 1km, the pollutant load generated from a (01) vehicle is as follows: Dust: 0.90 g/km; SO2: 4.29*S g/km; NOx: 11.80 g/km; CO: 6.00 g/km; VOC: 2.60 g/km.

The transportation means as well as machines, equipment for construction work use mainly Diesel Oil (DO) so these vehicles will emit exhaust gas as products and byproducts of a combustion process such as NOx, SO2, CO. This exhaust is mobile and it will directly affect on people on the transportation routes and workers and people in the project surroundings. Based on assumption of using 10 ton truck to transport backfilling and excavation materials and the truck would consume 0.4 liters of oil/car.km (1 liter of DO weights 0.832 kg) and other transportation details, the emission loads are calculated and presented in table 4.8.

Table 4.8. Exhaust emission from vehicles for transporting backfilling and excavation materials for Component 1

Work items	Expected duration (month)	Number of trip (trip/day)	Distance (km)	Fuel consumption (kg/day)	SO_2 emission load (mg/m.s)	NO_2 emission load (mg/m.s)	CO emission load (mg/m.s)
LIA 1	18	2	15	9.98	0.00012	0.00022	0.00021
LIA 2	18	2	15	9.98	0.00012	0.00022	0.00021
LIA 3	18	1	15	4.99	0.00006	0.00011	0.00011
LIA 4	18	1	15	4.99	0.00006	0.00011	0.00011
LIA 5	18	1	15	4.99	0.00006	0.00011	0.00011
LIA 6	18	1	15	4.99	0.00006	0.00011	0.00011

From the above pollution loads from exhaust gases, by applying Sutton model with a wind speed of 3.0 m/s, and a distance of 5-20 m from generating sources. The concentration of exhaust gases generated from transport activities meets QCVN 05:2013/BTNMT - National technical regulation on ambient air quality. Thus, level of impact is low.

a6. Exhaust emitted from the operation of constructional machines and equipment

The amount of all construction machines and fuel demand are presented in the following Table 4.9 *(Source: WHO, 1993)*.

Table 4.9. DO fuel demand for construction machines and equipments

Equipment, machines	Quantity						Fuel norm/ca (diesel liter)
	LIA 1	LIA 2	LIA 3	LIA 4	LIA 5	LIA 6	
Vibration roller 25T	1	1					40.32
Grader 110 CV	1	1	2	1	1	1	38.88
Excavator ≤ 0,8 m^3	1	1	1		1	1	64.8
Steel wheel compactor 8,5T	1	1	1	-	-	-	24
Bulldozer ≤110 CV		1	1	-	-	-	54.6
Car 15 T (tank transport)	1	1	1	2	2	2	31
Asphalt truck 7 T	1	1	-	-	-	-	25.5
Water truck 5 m^3	1	2	1	1	-	-	22.5

Equipment, machines	Quantity						Fuel norm/ca (diesel liter)
	LIA 1	LIA 2	LIA 3	LIA 4	LIA 5	LIA 6	
Total DO oil quantity used (liter/hour)	*30.88*	*40.51*	*34.33*	*15.42*	*20.71*	*20.71*	
The largest DO oil volume used (kg/h) (D_{DO}=0,85kg/liter)	*26.25*	*34.43*	*29.18*	*13.11*	*17.6*	*17.6*	

Based on the frequency of the machine activities, the constructional area and a working day of 8 hours, the emission load and emission concentration from Diesel oil combustion process are calculated as follows:

Table 4.10. Emission coefficient and emission load due to DO combustion engines under component 1

	Waste gas	Pollutant load coefficient (g/kg DO)	Work items					
			LIA 1	LIA 2	LIA 3	LIA 4	LIA 5	LIA 6
Load (g/s)	SO_2	20*S	0.0046	0.006	0.0051	0.0023	0.0031	0.0031
	NO_2	2.84	0.0026	0.0034	0.0029	0.0013	0.0017	0.0017
	CO	0.71	0.0006	0.0008	0.0007	0.0003	0.0004	0.0004
	Coal-dust	0.28	0.0003	0.0003	0.0003	0.0001	0.0002	0.0002
	VOC	0.035	0.00003	0.00004	0.00004	0.00002	0.00002	0.00002

In which: S is the sulphur content in fuel (0,25%).

From the above pollution loads from exhaust gases, by applying Sutton model with a wind speed of 3.0 m/s, and a distance of 5-10 m from generating sources. The concentration of exhaust gases generated from construction machines and equipments meets QCVN 05:2013/BTNMT - National technical regulation on ambient air quality. Thus, level of impact is low.

b. Impact due to noise, vibration:

b1. Impact due to noise:

The noise generated in the constructional phase under component 1 comes mainly from the 3 sources: (i) from the construction demolition, (ii) from the vehicle transportation of construction waste and (iii) from the operation of constructional machines and equipment.

In this phase, the community health may be affected by the noise that generated from the demolition activities and site clearance. Noise from these activities is within 82 - 90 dBA. When constructs the road, drainage culvert, ... in all LIAs areas that will use all machines such as excavators, bulldozers, lorries (10 – 15 ton), loaders, concrete mixers, standby electrical generator,… In general, for the constructional scope and nature for all works that belongs to HP 1, the noise level generated from all machine about 77 - 93 dBA (*Source:Mackernize 1985*).

Based on the generated noise result, it can be see that within a radius of 30 m (day time) and 120m (night time), the noise pollution of each machine exceeds permitted level (55dBA and 70dBA respectively). If aggregated noise from all machineries, the radius of impact extends further to 50 m (day time) and 180 m (night time).

In general, households in 6 LIAs areas of Soc Trang subproject are not located right next to the alleys. The average closest distance is from 30 - 50 m except in LIA 1 and LIA 3, the nearest distance is of 10-20 m. And thus, the households would be relatively sensitive to the noise pollution. However, the construction and upgrading work of LIA do not happen all at once at all alleys therefoe the noise impact can be assessed as being from LOW to MEDIUM.

b2. Impact due to vibration:

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. Operation of construction equipment causes ground vibrations which spread through the ground and diminish in strength with distance. Buildings founded on the soil in the vicinity of the construction site respond to these vibrations, with varying results ranging from no perceptible effects at the lowest levels, low rumbling sounds and feelable vibrations at moderate levels and slight damage at the highest levels.

Vibration during construction phase therefore needs to be quantitatively assessed in order to detect any significant impact. Various types of equipment under a variety of construction activities cause vibration such as pile-drivers, car, roller, loader, compactor under drilling and demolition proccesses.

General comment:

As mentioned in the impact assessment of noise pollution, the scope of all technical infrastructure works in all LIAs is small, all alleys disperse and the constructional work is simple (2-4 m width concrete road) and thus the construction machines and equipments deployed are at small capacity. The level of impact from vibration could be assessed as being LOW and can be compromised.

At night, if the construction activities take place in these areas, the noise level will exceed the allowable limit within a radius of 180-200 m. During the daytime, these areas will be affected by the noise within a radius of 30-50 m. Especially for Huong Son pagoda which is about 20m away from the construction area in LIA 5, the noise will affect the religious activities in the pagoda and to the Buddhists who come in on the first and fifteenth day of every month according to the lunar calendar. Therefore, the contractor should carry out measures to minimize the impacts caused by noise, dust in the vicinity of the pagoda area. In general, as assessed in the aforesaid parts, the impact level of the dust is LOW and of the noise is from LOW to MEDIUM.

Table 4.11 lists number of areas affected by dust, exhaust gas, noise and vibration during construction of the works under component 1:

Table 4.11 Areas affected by dust, exhaust gas, noise and vibration under component 1

No.	Affected entities	Item	The shortest distance to the construction area
1	Residential area of group 4 - ward 4	Construction of roads in LIA 1	Close to the construction route
2	Residential area of group 6 - ward 6	Construction of roads in LIA 2	30 m
3	Residential area of group 4 - ward 3	Construction of roads in LIA 3	Close to the construction route
4	Residential area of	Construction of roads in LIA 4	30 m

No.	Affected entities	Item	The shortest distance to the construction area
	group 5 - ward 2		
5	Residential area of group 3 - ward 2	Construction of roads in LIA 5	30 m
6	Huong Son pagoda - ward 2	Construction of roads in LIA 5	20 m
7	Residential area of group 1 - ward 8	Construction of roads in LIA 6	Close to the construction route

c. Impacts on water environment:

During the construction phase of the work items under component 1, there are three main sources of impact on the aquatic environment, including: (1) Rainwater runoff at construction site; (2) Wastewater of construction workers; (3) construction wastewater.

c1. Rainwater runoff at the construction site:

Rainwater is considered clean if it is not exposed to pollution sources such as wastewater, exhaust gas, contaminated soil/dredged material, etc. During the construction process, the rainwater runoff on construction sites will drag soil, sand, waste discharged by construction workers, debris,... and become a source of pollution to surface water, soil, groundwater.

Total storm water generated from the subproject area during the site preparation is estimated by the following equation:

$$Q = \varphi \times q \times S \qquad \textbf{[3]}$$

In which:

S : Total stormwater drainage area (m^2).

φ : The flow coefficient of the type of cover surfaces (area of land, covered mostly = 0.2, the area is covered mostly macadam (no binders) = 0.4, the mostly covered area asphalt, concrete, then = 0.6).

q : rain intensity (l/s.ha), q = 166.7 x i

- 166.7 : conversion factor for q in volume metric
- q: rain intensity = 166,7 x i, with i the highest water level of the area in the highest rainny month (according to Hoàng Huệ – 1996) which is September with 504 mm (according to Soc Trang Environment Report 2015). Number of rainy day in September is 25 and for 3 hours each day, thus i equals i = 0.112 mm/minute → q = 18.671 (l/s.ha).

Table 4.12. Flow of rainwater runoff during construction in LIAs

Work items	Stormwater drainage area (m^2)	Flow coefficient	Rainwater runoff flow rate (l/s)
LIA 1	6325	0.6	7.09
LIA 2	12644	0.6	14.16

Work items	Stormwater drainage area (m^2)	Flow coefficient	Rainwater runoff flow rate (l/s)
LIA 3	3434	0.6	3.85
LIA 4	3388	0.6	3.79
LIA 5	4986	0.6	5.58
LIA 6	4366.5	0.6	4.89

Due to the construction site spread through alleys in each LIA from one to the other, construction site is confined and small, the amount of stormwater runoff from construction sites is not significant. Stormwater runoff will flow into the canal / river in the project area, but due to the concentration of pollutants in stormwater is low (Table 4.12) along with the control measures for emissions sources arise during this period. Therefore, there is no significant impact to surface water in the surrounding area. However, to minimize the impact, the contractor will have to appropriately allocate the gathering areas for machines, materials and solid waste in order to avoid leakage of pollutants.

c2. Wastewater discharged by construction workers:

Wastewater flow which is generated from daily activities of construction workers and calculated according to the average water supply standard for each construction worker under TCXD 33:2006 - Water supply standard and design is 45 lit/person/day, the amount of wastewater generated is equal to 100% of the supplied water amount). The total amount of wastewater in each construction area is calculated for each subproject component as follows:

Table 4.13. Amount of wastewater generated in the construction under component 1

Work items	Number of workers (people)	Construction duration (months)	Amount of domestic wastewater (m3/day)
LIA 1	50	18	2.25
LIA 2	50	18	2.25
LIA 3	30	18	1.35
LIA 4	30	18	1.35
LIA 5	30	18	1.35
LIA 6	30	18	1.35

Domestic wastewater contains many suspended solids, organic matters, nutrients and microorganisms. Wastewater composition includes suspended solids, oil, grease, high concentrations of organic matters, precipitated substances, insoluble organic matters (through the indicators of BOD5, COD), nutrients (nitrogen, phosphorus) and microorganisms. Based on the pollutant emission factors specified by the World Health Organization for developing countries, the load of pollutants in domestic wastewater for construction of component 1 is calculated as in Table 4.14:

Table 4.14. Domestic Wastewater Quality

Pollutants	Concentration	QCVN 14:2008/BTNMT (Column B)
pH	5 – 9	5 - 9
BOD_5	450 – 540	50
TSS	700 – 1450	100
Nitrate (NO_3^-)	50 – 100	50
Total coliform	$10^6 – 10^9$	5.000

Source: Hoang Hue, 2000

The data mentioned above shows that most wastewater parameters do not meet QCVN 14:2008/BTNMT – National technical regulation on wastewater quality. Although the effluent flow is not high, this wastewater will locally pollute the construction sectors, especially in worker's camps if no appropriate treatment measures are applied.

However, the construction is successively performed so the number of worker is not many. In addition, the contractors prioritize local man powers so the generating at source will be minimized and level of impact is low.

d. Impacts from solid waste

Solid waste generated in the construction phase of component 1 includes 3 main types as follows: (1) Construction solid waste (debris); (2) Domestic solid waste; (3) hazardous solid waste. The generated volume is assessed as follows:

Waste from construction activities of component 1 are generated mainly from the demolition of existing buildings and excavated soil/rock on the alleys. The amount of construction solid waste is calculated and shown in the following Table 4.15:

Table 4.15. Solid Waste Generated from Construction under Component 1

Work items	Construction solid waste (ton)	Domestic solid waste (kg/day)
LIA 1	11,360	25
LIA 2	13,642	25
LIA 3	5,669	15
LIA 4	3,915	15
LIA 5	6,8145	15
LIA 6	6,049	15

In addition, during construction period, a small amount of debris is generated such as lime, mortar, pieces of steel and iron, soil and stone, cement package, etc.

The volume of domestic solid waste generated during construction in each LIA is small, which is about 15-25 kg/day. This is the main source of pollution due to the decomposition of organic matters that creates bad odor, leachate and pathogenic microorganisms. If this source is not collected reasonably, it will cause environmental pollution. However, the LIAs are not centralized but distributed within the wards of the subproject, on the other hand, with the successive construction method, there will be a much smaller amount of domestic solid waste generated daily compared to the calculations above. Therefore, the impact level is assessed as being LOW.

The constructional solid waste volume generated in the constructional process for all items in one LIAs area at small level → mean (average, normal) in comparison with all other urban infrastructure construction works. In general, impact of the constructional solid waste in the constructional phase under compoenet1 is LOW as the construction work in all LIAs spread over a course of 18 months from one site to the next following a "successive construction method" so the daily constructional solid waste volume will be much smaller than one that calculated above. Beside that, under the soil quality analysis result in the subproject areas and the 5 year environment report of the city, heavy metals in soils/ sediments are much lower than permitted level (as mentioned in Chapter 2). As the excavated soil at all existing alleys in all LIAs are mixed with rock, pebble and garbage it can not be utilized for agricultural purpose, but, it can be used to backfill or level the ground floor (if households/units have the demand) or it can be contracted out with URENCO for disposal or treatment.

d3. Hazardous solid waste:

Hazardous wastes generated from subproject implementation would include waste grease and oil, oily rags, and empty oil/grease containers. The existence of grease from maintenance and repair of transportation and construction means in the subproject areas is inevitable. The amount of waste grease and oil generated during construction depends on the following factors:

- The amount of transportation and construction means in the construction site;
- The amount of oil discharged from transportation and construction means;
- Scheduled changes of oil and maintenance of machinery and equipment.

Without appropriate management, these types of construction waste would have negative impacts on the soil, water, and air environment; residual grease and oil in containers can penetrate into the ground, causing soil pollution. The impact level is assessed to be medium.

e. Impacts on traffic and infrastructure from the transport

The project construction will increase the number of vehicles, especially trucks carrying raw materials (4 trips), and waste (2 trips) for Component 1. This increase will affect the traffic situation of the region because Tran Hung Dao, Phu Loi, Le Duan, Dien Bien Phu, Ly Thuong Kiet, NH 1A, route are among the main roads in Soc Trang city.

Besides, the increase in the number of heavy truck on the roads also increases the risk of:

- Traffic accidents to passengers;
- Dust, noise from vehicle affects the health of inhabitants along the street and traffic participants.
- Roads are downgraded, creating pot-holes and are more likely to cause accidents on the road, especially at night.

The impact on traffic will be limited if project owners and contractors have a reasonable construction plan, coordinate with local governments in regulating traffic and having legal and economic sanction in transportation.

d. Health and Safety Risk to the Community

Population density in LIA 3, LIA 5, LIA 6 are the highest among LIAs. In other LIAs, population is mainly concentrated along main alleys. Therefore, risks of impacts on community's

health and safety in LIA 3, LIA 5, LIA 6 are considered the highest. Risks include:

(i) Risks of accidents caused to the residents by travelling/transportation using vehicles during construction must also be taken into account of by the construction contractors. Transportation activities using trucks need to have support of traffic regulator upon passing through residential areas. Since there are many households leaving along the roads within immediate proximity to the construction areas, the likelihood of the safety risk to the community is high. This impact is assessed as moderate.

(ii) Various and operations would generate domestic wastewater and wastes giving rise to large populations of flies and mosquitoes, and possibly forming epidemic nests of diarrhea, dengue fever, and malaria. Workers coming during the construction process, etc. will result in dirty pools and pits, polluting water sources and the air, giving rise to large populations of flies and mosquitoes, and possibly forming epidemic nests of diarrhea, dengue fever, and malaria. Such impacts could only be mitigated or minimized with good prevention, treatment and sanitation measures. Concentration of workers in the area may result in increased contraction of HIV/AIDS and other sexually transmitted diseases, especially through prostitution, posing risks to the local community. However, as the work is at a small scale with 20 - 30 workers to work at the construction site, and construction would not last long, this impact is low and controllable.

e. Impacts from risks and incidents

Labor accidents

In general, traffic accidents may happen at any stage during the construction of the subproject for which the causes include:

- Environmental pollution may cause fatigue, dizziness or fainting for workers during their work.
- The installation, construction and transport of materials with a lack of focus can cause labor accidents, traffic accidents, etc.
- Accidents due to negligence in work, lack of labor protection, or due to lack of awareness of strictly complying with the labor safety rules for construction workers.

Given the nature and scale of the construction activities under the component, this risk is assessed as moderate. The Subproject Owner will pay attention to the application of safety measures for workers.

Fire, explosion and leakage of fuel

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

- The temporary fuel and material warehouse (gas, DO oil, FO oil, welding gas, etc.) are the source of fire and explosion. The occurrence of such incidents can cause serious damage to people, society, economy and the environment.
- Temporary power supply system for machines and equipment during construction can cause problems of shortcircuit, fire, explosion, electric shock, etc leading to economic and labor accidents for workers.

- The subproject owner will implement the fire prevention and strictly comply with measures to prevent leakage, fire or explosion. The fire prevention shall be done regularly to minimize the possibility of incidents and the levels of impact.

4.1.3.2.2. Site-specific impacts due to construction of investments under component 1

The investments under component 1 are of small scale, and most of the impacts during construction are generic, could be mitigated via application of generic mitigation measures. There are however, certain site-specific (i) local flooding during construction; (ii) social disturbance and traffic safety; (iii) impacts to sensitive receptors; (iv) impacts to agriculture lands. These are discussed below:

a. Local flooding

There will be semi-diurnal tidal impacts to LIAs that are adjacent to the canal and river as in LIA 1 and LIA 6 which are close to Maspero River, LIA 2 by the Tra Men A canal and LIA 4 in a close proximity to Xang canal. Without the construction, people in LIAs during the wet season are already experienced local floods due to lack of drainage and the tidal effects combining with rain. The construction of alleys would hinder water flow thus can worsen the local floods. This impact will be over upon completion of the drainage system. The construction and upgrading of alleys are to be carried out in consecutive manner including many small packages scattered within the LIA, and in a relative short period (07-10 days for one alley). The impact is assessed as temporary and controllable if proper management mitigation measures are put into place.

b. Social disturbances and local traffic obstruction

Although the construction activities are of small scale, only require manual work, it is to be implemented in a very limited space i.e. small, narrow alley (1.5-3.5m) within a relatively large population, especially in LIA3 and LIA5. Therefore, subproject activities will cause social disturbance and traffic issues in a number of ways: (i) storage of materials and construction work could cause some damage to the existing alleys and limit traffic access for people (iii) dust impact to local households and goods/foodstuff in some food stands (iv) unwanted accidents can happen (v) social conflict between the construction workers and local people. The impacts are likely to occur to some extent, but it will be short term and would cease by end of construction. The impact is assessed as temporary and at moderate level.

d. Impacts on Physical Cultural Resources (PCR)

Impacts on the Huong Son pagoda (20m from the construction site in LIA5):

Upgrading the alleys in a close proximity to the pagoda would have some potential adverse impacts on the pagoda due to: (i) hindrance to access to the pagoda; (ii) increased dust, exhaust gases, noise, vibration, solid waste, and wastewater due to construction activities; (iii) traffic congestion and accident risk and community safety due to construction and transportation; (iv) interference with pagoda religious events especially those organized on the 1st and 15th day of the lunar month due to construction activities.

The impact is assessed as low, short-term, and localized as there will be only one alley to be upgraded nearby the pagoda.

Vibration Impact on Huong Son Pagoda (20 m distance from the construction site)

Huong Son pagoda is 20 m from the construction site of the alley in LIA 5. The construction work will involve in some soil excavation for installing a drainage system along the alley and surfacing a concrete asphalt layer for a 3 m wide alley. The scope of work is small and requires mainly manual labors. Only small machineries will be mobilized, causing small vibration impacts to Huong Son Pagoda and the nearby structures. Vibration impact level is identified by distance from the works to the sources of pollution. Specifically, within a radius of 5 m, vibration could cause risk (i) structural subsidence, crack; (ii) infrastructure collapse. Beyond this 5 m distance, potential impacts are just restricted to vibration with irregular frequency. The risk of collapse to the pagoda is therefore excluded given the 20 m distance from the site.

e. Impacts on agriculture land

Within the LIAs area, there is about 4,000 m^2 classified as agriculture land, which is potentially affected during construction. However the land is actually scattered between houses, becoming local gardens. The impact to the land is insignificant because there are no agriculture production activities on this land.

4.1.3.3. Component 1: Potential Adverse Impacts during Operation

a. Risk of local flooding due to poor operation and maintenance

The operation and maintenance of newly installed drainage systems along the alleys if not well maintained could potentially affect the drainage capacity, especially on rainy days, causing local flooding to some parts of LIAs. However, the impact can be low if proper O&M practices are adopted.

b. Risk of traffic accidents

In the first few months of new alleys operation, motorbike riders often excitedly drive faster than normal and could result in self injuries and/or causing accidents to local people. The impact is likely to occur to some extent and is assessed short term and can be minimized with the adoption of road safety practices and the introduction of awareness raising activities with the local communities.

4.1.4. Impacts Assessment for Investments under Component 2

The investments under component 2 includes: (i) dredging and embankment of Tra Men A Canal of 2.6 km and HiTech canal of 3.2 km; (ii) construction of Nguyen Van Linh Y shaped bridge over the Maspero River, with of concrete structure, 11m wide and 145 m long; (iii) construction Ring Road No.2 (14 m wide, 1.3 km long) and 01 bridge on the road (14 m wide, 97 m long; (iv) upgrading of Dien Bien Phu Road, 2.8 km long, 6 m wide for section 1 and 15 m wide for section 2; (v) installation of drainage system along Phu Loi and Tran Binh Trong road.

Detailed assessment on the potential adverse impacts during preparation, construction and operation of investments under component 2 are described below.

4.1.4.1. Component 2: Potential adverse impacts during Preparation

Impacts during the preparation phase of component 2 investments include: (i) UXO risk; (ii) land acquisition and resettlement

a. UXO risk

Because city was bombed during the war period, UXO removal is important so as to avoid any potential threat to works and safety for local people and workers. For the investments under this component, UXO needs to be carefully considered and removed before construction activities can commence. The impacts of UXO in the project area represent significant negative impacts if mitigation measures are not applied, with high risk to human health, life, and also infrastructure. UXO removal must be completed before starting civil works.

b. Land acquisition and resettlement

For Component 2, there are 283 households affected by the project, of which only 67 households have to move to the resettlement area, the remaining households are only affected partially in residential land or agriculture land, fence, yard, or garden. The total permanently acquired land is 140,792 m2 (about 14 ha), of which the residential land area is 16,476 m2, agricultural land is 123,525 m2 and the remaining land managed by the Ward People's Committee is 791 m2.

c. Impacts on PCRs

Especially, in Component 2, there are 3 affected PCRs on land, including: Van Dien religious facility (affected by construction of Nguyen Van Linh bridge – subcomponent 2.2) is 328 m2 gardening land; Ngoc Hung pagoda is 100 m2 gardening land and 200m fence and Long Hung pagoda is 36 m2 gardening land (affected by upgrading of Dien Bien Phu, section 1 – subcomponent 2.4). The activities of the project will not affect the tangible culture, historical monuments or religious symbols in the pagodas. The results of consultation with head of pagodas show that the project is supported by all representatives of pagodas.

d. Graves Relocation.

Construction of the Ring road No.2 will requires relocation of 16 graves. To the Vietnamese, the grave is a religious and spiritual matter, which should be respected carefully. Household and individual graves are considered PCRs, and the Bank's OP/BP 4.11 applies for this subproject. However, consultation with the households affected by grave relocation reveals that people are still willing to move the graves to another location to give land for construction if the subproject owner supports sufficiently to ensure the grave relocation. The level of the impact caused by this activity is only small.

The implementation of investment under component 2 will require the land acquisition and resettlement which would cause potential adverse social impacts. The detailed impacts are assessed in the **section 4.2.**

4.1.4.2. Component 2: Potential Adverse Impacts during Construction

4.1.4.2.1. Generic impacts during construction of investment under component 2

a. Impacts from dust and emission

The main activities taking place in this phase is the construction and upgrade Tra Men A and Hi Tech canal, roads, curb, sidewalk; lighting system, green trees (Ring Road 2, Dien Bien Phu road, section 1 and 2), construction of 2 bridges crossing over Maspero River which are Nguyen Van Linh and Ring Road 2 bridge, sewer rehabilitation on Phu Loi and Tran Binh Trong road. The scale of items is evaluated at the medium level. The construction process generates dust and exhaust gases with substantial volume, the pollution sources include:

a1. Dust generated from the demolition:

Applying equation [1] and [2] to calculate the amount of dust generated from the demolition of construction site for works under component 2, in which the particle emission factor is E = 0.03752 kg/ton. The calculation results of dust generated from the demolition activities under component 2 is presented in Table 4.16.

Table 4.16. Forecasts of dispersed dust from demolition under component 2

Work items	Volume of demolition (m3)	Dust emission (kg)	Duration of demolition (month)	Dust load (kg/day)	Dust concentration (mg/m3)	QCVN 05:2013 (mg/m3)
Tra Men canal	3,570	241.1	6	1.34	**0.63**	**0.3**
Hi Tech canal	3,980	268.8	2	4.48	**1.25**	**0.3**
Nguyen Van Linh bridge	525	35.4	1	1.18	**3.4**	**0.3**
Bridge and ring road No.2	351	23.7	2	0.40	0.19	**0.3**
Dien Bien Phu road_1	25	1.7	1	0.06	0.05	**0.3**
Dien Bien Phu road_2	21	1.4	1	0.05	0.03	**0.3**
Rehabilitation of drainage system	0	0	0	0	0	**0.3**

Remark: *The following assumptions are made (i) a working day of **8** hours; (ii) Dispersion height h = 10 m and (iii) Dry season's meteorological data are used*

Calculation results show that: for the items 2.4, 2.5, 2.6, 2.6 (RR2, Dien Bien Phu Road - section 1 and section 2) and the two drainage culvert line upgrading items on Phu Loi and Tran Binh Trong roads, the observed generated dust contents are lower or not significantly higher than allowable levels of QCVN 05:2013/BTNMT. These items have already basic structures and upgrading work is mostly based on existing conditions, so demolition is not significant. On the other hand, generated dust contents are about 11.3 times higher than allowable level for item 2.3 - Construction of Nguyen Van Linh Bridge; about 4.2 times for Hi Tech item; and about 2.1 times for Tra Men A item.

Generally speaking, dust generated by demolition activities will deposit down quickly and exist in a short period of time. Dust contents within allowable limits are estimated to be about 20 - 40m away from demolition location. Although generated dust contents are high, their existence is only 2 - 4 weeks at each demolition location. Therefore, this impact only occur locally in a short period of time and can be mitigated and so considered to be at medium level.

Volume of generated dust depends on many factors, such as used materials, work scale, humidity and weather conditions, and especially the season (dry season or rainy season. In rainy season, thanks to increased rainfall, the ability to settle down suspended dustin the air will be better, helping limit the amount of generated dust. Dust contents will be about 1.5 - 2 times lower compared with dry season, for each construction location of Component 2.

a2. Dust emission from the backfilling and excavation activities

Based on equation **[2]** the particle emission factor applied for the construction phase under component 2 is E = 0,0272kg/tons. The dust emission under component 2 is calculated and summarized in Table 4.17.

Table 4.17. Estimation of dust emission from the excavation and backfilling under component 2

Work items	Volume of excavation and backfilling (m3)	Dust emission (kg)	Duration of demolition (month)	Dust load (kg/day)	Dust concentration (mg/m3)	QCVN 05:2013 (mg/m3) *(average value in 1h)*
Tra Men canal	73,598	3,027.1	24	4.2	**1.99**	0.3
Hi Tech canal	110,397	4,540.6	24	6.3	**1.76**	0.3
Nguyen Van Linh bridge	318	13.1	24	0.0	**0.1**	0.3
Bridge and ring road No.2	59,338	2,440.6	24	3.4	**1.63**	0.3
Dien Bien Phu road_1	23,336	959.8	24	4.0	**2.81**	0.3
Dien Bien Phu road_2	30,337	1,247.8	18	2.3	**1.59**	0.3
Rehabilitation of drainage system	16,504	678.8	12	1.9	**2.6**	0.3

Remark: *The following assumptions are made (i) a working day of **8** hours; (ii) Dispersion height h = 10m and (iii) Dry season's meteorological data are used*

The calculation results showed that the dust concentration generated from the excavation and backfilling exceeds the allowable limits of QCVN 05: 2013/BTNMT at approximately 5.3 - 9.4 times, depending on each construction site but it settles quickly and exists in a short time. The dust level is at acceptable limit at a distance of 40 - 60m away from the earthwork area. The dust generation takes place in a long time (about 4 to 6 weeks in each construction location), the roads will be constructed by the "successive construction method". Thus, the degree of impact is at MEDIUM level and can be compromised.

a3. Dust emission generated from the transportation

Dust and exhaust gases from transportation: According to the standards established by the World Health Organization (WHO) (*Assessment of Sources of Air, Water and Land Pollution –Part 1: Rapid Inventory Techniques in Environmental Pollution, WHO, 1993)*, 15-ton diesel vehicles will generate loads of dust and exhausted CO, SO_2, NO_2, and HC as follows: dust: at 1.6 g/km/vehicle; CO gas: 3.7 g/km/vehicle; SO_2: 7.43S g/km/vehicle; NO_x: 24.1 g/km/vehicle and HC: 3 g/km/vehicle (diesel of 0.05% S). The subproject will use 15-ton trucks for transporting under component 2. The average transport distance is 15 km. The total passages of trucks and the generated dust loads in the process of transportation are calculated as follows:

Table 4.18. Dust emission from the vehicle transportation of excavated materials under component 2

Work items	Volume of materials (ton)	Transportation duration (month)	Number of trips (trip/day)	Volume of excavated and backfilling materials (ton)	Transportation duration (month)	Number of trips (trip/day)	Total number of vehicles (trip/day)
Tra Men canal	15,679	24	2	73,598	24	7	9
Hi Tech canal	20,481	24	2	110,397	24	11	13
Nguyen Van Linh bridge	200,578	24	19	318	24	1	20
Bridge and ring road No.2	12,284	24	2	59,338	24	6	8
Dien Bien Phu road_1	4,911	24	2	23,336	24	6	8
Dien Bien Phu road_2	9,330	18	2	30,337	18	4	6
Rehabilitation of drainage system	4,208	12	1	70,055	12	4	5

From the above pollution loads from dust and exhaust gases, by applying Sutton model with a wind speed of 3.0 m/s, and a distance of 10-120 m from generating sources, the concentration of pollutants created by transportation operations can be calculated as follows:

Table 4.19. Dust emission concentration from vehicle transportation of backfilling and excavation materials under component 2

Item	**W (m)**	**Dust concentration (mg/m^3)**				**QCVN 05:2013/BTNMT (The average in 1h)**
		H=1,5	**H=2**	**H=3**	**H=3.5**	**(mg/m^3)**
Tra Men canal	10	0.64	0.57	0.43	0.35	**0,3**
	20	0.42	0.41	0.36	0.34	
	50	0.23	0.22	0.22	0.22	
Hi Tech canal	10	0.92	0.83	0.61	0.51	
	20	0.61	0.59	0.52	0.49	
	60	0.29	0.28	0.28	0.28	
Nguyen Van Linh bridge	10	1.42	1.28	0.95	0.78	
	20	0.94	0.90	0.81	0.75	
	100	0.31	0.30	0.30	0.30	
	120	0.27	0.27	0.27	0.26	
Bridge and ring road 2	10	0.57	0.51	0.38	0.25	
	20	0.38	0.36	0.32	0.28	
	50	0.20	0.20	0.19	0.18	
Dien Bien Phu road_1	10	0.42	0.38	0.28	0.19	
	20	0.28	0.27	0.24	0.21	
Dien Bien Phu road_2	10	0.35	0.32	0.24	0.16	
	20	0.23	0.23	0.20	0.17	
Rehabilitation of drainage system	10	0.34	0.34	0.34	0.34	
	20	0.30	0.30	0.30	0.30	

For upgrading and embankment of Tra Men A and Hi Tech canal: The dust concentration generated from the transportation of materials and excavated soil exceeds the allowable limit of

about 2-3 times at a distance of 10 m; and 1.4 - 2 times at the distance of 20m; and reaches the standard at the distance of 50 m for Tra Men A canal and 60 m for Hi Tech canal (compared with QCVN 05:2013/BTNMT - National Technical Regulation on ambient air quality);

For the construction of the bridge item (Nguyen Van Linh bridge, ring road 2): the concentration of dust exceeds the allowable limits from 2.3 - 3.1 times at the distance of 20 m; the dust concentration nearly reaches the allowable limits at the distance of 100 m and reaches the allowable limits at the distance of over 120 m for Nguyen Van Linh bridge and 50 m for ring road 2;

For upgrading of road and rehabilitation of sewer line item (ring road 2, Dien Bien Phu, etc), the dust concentration reaches allowable limits at the distance of 20m for Dien Bien Phu road, section 1 & 2 and sewer lines on Phu Loi and Tran Binh Trong road; reaches the allowable limits at the distance of 50m for the ring road 2.

Generally, due to the long construction time of each project area in component 2 (the average is 18 - 24 months), the area is ventilated and using successive construction method, the flow of daily transport vehicles is low (the average of about 8 trips/day), the level of impact due to dust generated from the transport of materials and excavated soil of component 2 is at MEDIMUM level and can be reduced.

Beside, dust can disperse from the mobile trucks evenly along transportation routes. Thus the households, shops and objects located along the transportation routes within 10 to 50 m will slightly affect. Construction materials and waste will be routed back and forth between 15 km distance between subcomponents, material suppliers and disposal site, specifically:

Tra Men A canal → Hung Vuong street

HiTech canal → 30/4 road → PR 934 → NH 1A

Nguyen Van Linh bridge → Nguyen Van Linh Street → Trần Hưng Đạo Street

Bridge and Ring road No.2 → Dien Bien Phu →Le Duan → Tran Hung Dao street

Dien Bien Phu road → Le Duan → Tran Hung Dao street

Phu Loi, Tran Binh Trong roads → NH 1A.

From the above Tran Hung Dao, Hung Vuong and Phu Loi cross sections with the National Way No.1, all trucks further follow National Way 1A → Provincial road 939 → Soc Trang Waste Treatment Facility.

a4. Dust generated from gathering and loading/unloading of materials:

Materials are mainly rubble, sand and cement, similar to the evaluation method for Component 1. Based on documents AP 42, Fifth Edition Compilation of Air pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, we have load of dust generated from the loading and unloading of materials as follows:

The dust concentration generated from the loading and unloading of construction materials according to the method of *Tran Ngoc Chan, 1999, air pollution and exhaust treatment* (volume 1), *Hanoi Science and Engineering Publishing House* is calculated and presented as follows:

Table 4.20. Dust concentration generated from the loading and unloading of construction materials in component 2

Work items	W (m)	Dust concentration (mg/m^3)				QCVN 05:2013/BTNMT (The average in 1h)
		H=1,5	H=5	H=10	H=23	(mg/m^3)
Tra Men canal	10	0.77	0.30	0.20	0.14	0.3
	50	0.16	0.12	0.11	0.10	
Hi Tech canal	10	0.97	0.36	0.23	0.16	
	50	0.17	0.12	0.11	0.11	
Nguyen Van Linh bridge	10	1.92	0.65	0.37	0.22	
	50	0.25	0.15	0.12	0.11	
Bridge and ring road 2	10	3.10	1.00	0.55	0.30	
	50	0.35	0.18	0.14	0.12	
Dien Bien Phu road_1	10	3.30	1.06	0.58	0.31	
	50	0.37	0.18	0.14	0.12	
Dien Bien Phu road_2	10	2.80	0.91	0.51	0.28	
	50	0.33	0.17	0.13	0.12	
Rehabilitate drainage system	10	0.55	0.24	0.17	0.13	
	50	0.14	0.11	0.11	0.10	

The calculation results showed that the concentration of dust generated from the process of loading and unloading of construction materials in component 2 at 10 m distance and at the height of 1.5 - 5 m exceeds 1.6 - 11.0 times of the allowable limits compared to **QCVN 05:2013/BTNMT** depending on each project area; at the distance of over 50 m, the dust concentrations reaches the allowable standard.

However, due to the long construction time in each project site of component 2 (the average is 18 - 24 months), the construction area is an open space, using successive construction method ", this work is not continuous so the level of impact due to dust generataed from the process of loading and unloading of construction materials of component 2 is medium and may be reduced.

a5. Exhaust gas emission due to the activities of transportation means:

Similar to the assessment method for Component 1, on the basic of all calculation data that applied for all items that belongs to component: Based on assumption of using 15 ton truck to transport backfilling and excavation materials and the truck would consume 0.4 liters of oil/car.km (1 liter of DO weights 0.832 kg) and other transportation details, the emission loads are calculated and presented in Table 4.21.

Table 4.21. Volume of consumables due to the transportation of excavated soil of component 2

Work items	Construction time (month)	Number of transport vehicles (trip/day)	Transport distance (km)	Consumables (kg/day)	Load of SO_2 generated (mg/m.s)	Load of NO_2 generated (mg/m.s)	Load of CO generated (mg/m.s)
Tra Men canal	24	7	15	34.9	0.0004	0.0008	0.0008
Hi Tech canal	24	11	15	54.9	0.0006	0.0012	0.0012

Work items	Construction time (month)	Number of transport vehicles (trip/day)	Transport distance (km)	Consumables (kg/day)	Load of SO_2 generated (mg/m.s)	Load of NO_2 generated (mg/m.s)	Load of CO generated (mg/m.s)
Nguyen Van Linh bridge	24	1	15	5.0	0.0001	0.0001	0.0001
Bridge and ring road No.2	24	6	15	30.0	0.0003	0.0007	0.0006
Dien Bien Phu road_1	24	7	15	34.9	0.0004	0.0008	0.0008
Dien Bien Phu road_2	18	4	15	20.0	0.0002	0.0004	0.0004
Rehabilitation of drainage system	12	13	15	64.9	0.0008	0.0014	0.0014

From the above pollution loads from exhaust gases, by applying Sutton model with a wind speed of 3.0 m/s, and a distance of 5-20 m from generating sources. The concentration of exhaust gases generated from transport activities meets QCVN 05:2013/BTNMT - National technical regulation on ambient air quality. Thus, level of impact is low.

a6. Exhaust emitted from the operation of machinery and construction equipment

Based on the frequency of the machine activities, the constructional area and a working day of 8 hours, the emission load and emission concentration from Diesel oil combustion process are calculated as follows:

Table 4.22. Emission coefficient and emission load due to DO combustion engines under component 2

	Exhaust gas	Pollutant load coefficient (g/kg DO)	Tra Men canal	Hi Tech canal	Nguyen Van Linh bridge	bridge and ring road 2	Dien Bien Phu road_1	Dien Bien Phu road_2	Installation of drainage system
Load (g/s)	**SO_2**	20*S	0.005	0.007	0.007	0.008	0.011	0.010	0.009
	NO_2	2.84	0.003	0.004	0.004	0.005	0.006	0.006	0.005
	CO	0.71	0.001	0.001	0.001	0.001	0.002	0.001	0.001
	Dust	0.28	0.0003	0.0004	0.0004	0.0005	0.0006	0.0006	0.0005
	VOC	0.035	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

In which: S is the concentration of sulfur in the fuel (0,25%).

Similar to applying Sutton model with a wind speed of 3.0 m/s, and a distance of 5-10 m from generating sources. The concentration of exhaust gases generated from construction machines and equipments meets QCVN 05:2013/BTNMT - National technical regulation on ambient air quality. Thus, level of impact is low.

b. Impacts due to noise and vibration:

b1. Impacts due to noise:

In this phase, the community health may be affected by the noise that generated from the demolition activities and site clearance. Noise from these activities is within 82 - 90 dBA; Beside, the construction of work items under component 2 will use the machines like excavator,

bulldozer, truck/lorry (15 ton), excavator, concrete mixer, backup generator, etc. In general, for the scale and nature of the construction works of component 2, the noise level generated by machines is from about 77-102 dBA *(Source: Mackernize 1985).*

The estimated noise level under those sources is calculated by following equation by *Pham Ngoc Dang 2003. Air environment. Science and technics publishing house 2003*:

$$L_i = L_p - \Delta L_d - \Delta L_c (dBA) \quad \textbf{[4]}$$

In which: L_i – Noise level at site with a distance d (m) from the source; L_p – Noise level measured at source (from a distance of 1.5m); ΔL_d – Noise level as a fuction of distance d and at frequency i;

$$\Delta L_d = 20 \lg \left[\left(\frac{r_1}{r_2} \right)^{1+a} \right] \quad \textbf{[5]}$$

In which: r_1- Distance to the noise source corresponding to L_p (m); r_2- Distance corresponding to the noise L_i(m); a- Specific absorption coefficient of noise with the land surface topography (a = 0.1); ΔL_c- Decrement Noise level through the obstacle. The construction area with all buildings and obstacle brick wall, thus, ΔL_c = 1,2;

Noise level by the distance of machines in this period is calculated as in the Table 4.23 below:

Table 4.23. Noise level by the distance of machine of component 2

Item	Construction machine	Distance to the noise source (m)								
		15	**30**	**60**	**100**	**120**	**150**	**180**	**200**	**250**
Tra Men canal	**Combined noise levell**	**94**	**88**	**82**	**78**	**76**	**74**	**72**	**71**	**69**
	Excavator 0,8m^3	85	79	73	69	67	65	63	62	60
	Bulldozer ≤ 140CV	83	77	71	67	65	63	61	60	58
	Lorry 15T	94	88	82	78	76	74	72	71	69
Hi Tech canal	**Combined noise levell**	**93**	**87**	**81**	**77**	**75**	**73**	**71**	**70**	**68**
	Excavator 0,8m^3	85	79	73	69	67	65	63	62	60
	Bulldozer ≤ 140CV	80	74	68	64	62	60	58	57	55
	Lorry 15T	93	87	81	77	75	73	71	70	68
Nguyen Van Linh bridge	**Combined noise levell**	**93**	**87**	**81**	**77**	**75**	**73**	**71**	**70**	**68**
	Excavator 0,8m^3	85	79	73	69	67	65	63	62	60
	Bulldozer ≤ 140CV	83	77	71	67	65	63	61	60	58
	Lorry 15T	93	87	81	77	75	73	71	70	68
bridge and ring road No.2	**Combined noise levell**	**93**	**87**	**81**	**77**	**75**	**73**	**71**	**70**	**68**
	Excavator 0,8m^3	85	79	73	69	67	65	63	62	60
	Bulldozer ≤ 140CV	80	74	68	64	62	60	58	57	55
	Lorry 15T	93	87	81	77	75	73	71	70	68
Dien Bien Phu road_section 1	**Combined noise levell**	**93**	**87**	**81**	**77**	**75**	**73**	**71**	**70**	**68**
	Excavator 0,8m^3	85	79	73	69	67	65	63	62	60

Item	Construction machine	Distance to the noise source (m)								
		15	**30**	**60**	**100**	**120**	**150**	**180**	**200**	**250**
	Bulldozer ≤ 140CV	80	74	68	64	62	60	58	57	55
	Lorry 15T	93	87	81	77	75	73	71	70	68
Dien Bien Phu road_section 2	**Combined noise levell**	**93**	**87**	**81**	**77**	**75**	**73**	**71**	**70**	**68**
	Excavator 0,8m^3	85	79	73	69	67	65	63	62	60
	Bulldozer ≤ 140CV	83	77	71	67	65	63	61	60	58
	Lorry 15T	93	87	81	77	75	73	71	70	68
Rehabilitate drainage system	**Combined noise levell**	**90**	**84**	**78**	**74**	**72**	**70**	**68**	**67**	**65**
	Excavator 0,8m^3	82	76	70	66	64	62	60	59	57
	Bulldozer ≤ 140CV	80	74	68	64	62	60	58	57	55
	Lorry 15T	90	84	78	74	72	70	68	67	65
QCVN 26:2010/BTNMT (from 6h-21h) – Normal area		**70**								

The results show that:

- The noise of the vehicles operating within distance of more than 15 m (daytime) and more than 120m (night) is within the allowable limits of QCVN 26:2010/BTNMT - National Technical Regulations on noise (70dBA for normal areas from 6 - 21h, 55dBA for normal area from 21h - 6h)
- The resonant noise of the vehicles operating within the distance of more than 50m (daytime) and more than 150m (night) is within the allowable limit of QCVN 26:2010/BTNMT - National Technical Regulation on noise (70dBA for normal areas from 6 - 21h, 55dBA for normal area from 21h - 6h).

In general, all households in all work construction areas of component2 with the nearest distance of 20-50m (exclude the ring road 2 and bridge construction area with the sparse residential density and with the nearest distance of 50 - 1000 m), on other hand, all construction activities in all items, normally, not at the same time and the construction area plan is clear, disperse under the longitidunal direction under all road lines or two river banks (for the bridge construction item: Nguyen Van Linh and Belt bridge 2), the construction time prolongs (average from 18 – 24 months) so the impact from the noise that evaluated at medium level.

b2. Impact due to vibration:

As the result, the vibration in the constructional phase should be evaluated for quantitative aspect, if any significant impact ability. All those activities include the pile-driver, destroy and drill or excavation that near to all sensitive structures, operation of all types of heavy lorry, roller, loader, compactor,… not only effect the constructional area, but also effect the surrounding areas.

The constructional activities may cause the impact, vibration of groud surface at the different levels that depend on all constructional method and equipments, however, the vibration strength will decrease under the propagation distance. All architecture works, residential area near the project area will be impacted by the vibration level during the construction process for project.

The vibration level classified into all classes as following : from none- organoleptic effect at the lowest level, the low roaring sound and organoleptic vibratiion at all medium class and little damage at the highest level.

Refer the vibration level of means, machine, equipment in the report: *Transit Noise And Vibration Impact Assessment, FTA, 2006*, that the vibration level of all means, machine, equipment that presented in the following table:

Table 4.24.Vibration level under the distane of means, machine and equipment

No.	Equipment	Vibration level of all sources D(m) (dB)											
		7,5	10	12,5	15	17,5	20	22,5	25	27,5	30	32,5	35
1	Lorry	86	82	79	77	75	73	72	70	69	68	67	66
2	Bulldozer/earthmover	87	83	80	78	76	74	73	71	70	69	68	67
3	Excavator	94	90	87	85	83	81	80	78	77	76	75	74
QCVN 27:2010/BTNMT, (6h-21h) - Common area		**75dB**											

From the results above, the following comments could be given:

- At the distance of 7.5 - 17.5m from the vibration source, the vibration levels of all vehicles are outside the allowable limits of QCVN 27:2010/BTNMT - normal area from 6 - 21h.
- At the distance of 20m - 32,5m from the vibration source, the vibration level of excavator is beyond the allowable limit of QCVN 27:2010/BTNMT - normal area from 6 - 21h. The vibration level of the remaining vehicles is within the allowable limit.
- With the above vibration level, the vibration impacts on people around the construction site only take place within a radius of less than 35m from the source of vibration. Outside the 35m radius, the vibration impacts on local people are negligible.

General comment:

If the construction is conducted at night in these areas, the noise level also exceeds the allowable limit within the radius of 150 m. During daytime, these areas will be affected by the noise within the radius of 30-50 meters. Especially, for sensitive spots such as Long Hung Pagoda, Ngoc Hung, Ngoc Phuoc vihara, Buddhist mindfulness area are adjacent to the construction site of upgrading Tra Men A canal and about 20 meters away from the construction site for upgrading Dien Bien Phu road, so the noise will affect the religious activities of the pagoda and Buddhist especially on full moon day and the first day of every month; Bong Sen market will be affected at the market time when increasing density of vehicles transporting materials, waste,..The stage of Ghe Ngo Boat Racing will be affected if the construction is carried out on festival season in November every year. Therefore, the contractor will have to carry out measures to minimize the impact by noise, dust on the temple area, markets, Ghe Ngo festival area. In general, as evaluated above, the impact level of the dust is LOW and of noise is LOW → MEDIMUM.

Below is the areas possibly affected by dust, exhaust gas, noise and vibration during construction of the works of component 2:

Table 4.25. Special entities affected by dust, exhaust gas and noise under component 2

Affected entities	Item	The shortest distance to the construction site
Residential area along Tra Men A canal – ward 4	Upgrade Tra Men A canal	Close to construction route; some canal sections is about 30 m far away
Long Hung pagoda, Ngoc Hung and Ngoc Phuoc pagoda, Long Hưng, etc	Upgrade Tra Men A canal	Close to construction route; 10 m far away
Residential area along Hi Tech canal – ward 3 and 9	Upgrade Hi Tech canal	Close to construction route; some canal sections is about 30 m far away
Residential area at two ends of the bridge in ward 3 and 6.	Construct Nguyen Van Linh bridge	30 m
Bong Sen market – ward 6	Construct Nguyen Van Linh bridge; Upgrade Dien Bien Phu road – section 1	About 200m far away from the construction site; but located on the main material transport route;
Some households (5-7 households) at the end of the bride in ward 8	Construct bridge and ring road 2	50 - 500 m
Residential area along Dien Bien Phu road in ward 6	Upgrade Dien Bien Phu road, section 1	20 - 50 m
Long Hung pagoda, Ngoc Hung, Ngoc Phuoc pagoda, etc.	Upgrade Dien Bien Phu road, section 1	20 m
Residential area long Dien Bien Phu road in ward 8	Upgrade Dien Bien Phu road, section 2	20 m
Stage of the Ghe Ngo racing	Upgrade Dien Bien Phu road, section 2	30 m
Residential area along Phu Loi and Tran Binh Trong road	Rehabilitate drainage route in the center of ward 2	Close to construction route

c. Impacts on water environment:

c1. Rainwater runoff at the construction site:

Total rainfall from the project area during construction is estimated by the formula [3]. The calculated rainfall during the construction phase of the component 2 is shown in Table 4.26 below:

Table 4.26. Rainwater runoff in the project areas of component 2

Work items	Rainwater drainage area (m^2)	Flow coefficient	Rainwater runoff flow rate (l/s)
Tra Men canal	26,400	0.2	5.28
Hi Tech canal	44,800	0.2	8.96
Nguyen Van Linh bridge	4,340	0.40	1.74

Work items	Rainwater drainage area (m^2)	Flow coefficient	Rainwater runoff flow rate (l/s)
Bridge and ring road 2	26,000	0.2	5.20
Dien Bien Phu road_1	21,000	0.40	8.40
Dien Bien Phu road_2	18,200	0.4	7.28
Rehabilitate drainage system	9,072	0.2	1.81

Generally, the rainwater runoff in each construction area is small because the work items are located in many areas and along the upgraded road routes. The rainwater runoff will flow into canals/rivers in the project area, however, the concentration of pollutants in rainwater is small (Table xxx) and along with the control of wastewater sources arisen during this period, therefore, there is no significant impacts on surface water environment in the surrounding area.

c2.Wastewater discharged by construction workers:

Domestic wastewater flow generated by daily activities of construction workers is calculated according to the average water supply norm per worker under TCXD 33:2006 - Water supply standard and design as 45lit/person/day , the amount of wastewater generated is equal to 100% of the supplied water amount). Total amount of waste water expected to be produced in individual construction areas of each component of the project is estimated as follows:

Table 4.27. Wastewater flow produced in the construction period of component 2

Work items	Number of workers (people)	Construction duration (month)	Amount of domestic wastewater (m3/day)
Tra Men canal	50	24	2.3
Hi Tech canal	50	24	2.3
Nguyen Van Linh bridge	50	24	2.3
Bridge and ring road 2	100	24	4.5
Dien Bien Phu road_1	30	8	1.4
Dien Bien Phu road_2	50	18	2.3
Rehabilitate drainage system	30	12	1.4

In general, the quality of domestic waste water discharged by construction workers after being treated by septic tank still remains some indicators exceeding the allowable limits, in which BOD (2-4 times), TSS (1.6 times). Although the volume is not large (1.4 – 4.5 m3/day at each construction area of component 2), if there is no appropriate measures to handle, the quality of wastewater discharged by workers in this period will be a local source of pollution for the construction area, especially in the camp area. This impact is considered MEDIUM and can be compromised.

d. Impacts from solid waste:

d1. Solid waste (debris) from construction activities:

Waste from construction activities of component 2 mainly come from the demolition of existing structures and excavated soil/rock on the construction areas. Amount of construction solid waste is calculated and shown in Table 4.28 below:

Table 4.28. Volume of solid waste during the construction of component 1

Work items	Volume of demolition (ton)	Volume of excavated soil (ton)	Total (ton)
Tra Men canal	6426	51,213.2	110,397.2
Hi Tech canal	7164	76,819.1	165,595.1
Nguyen Van Linh bridge	0	222.5	476.7
Bridge and ring road 2	631.26	86,358.2	89,006.6
Dien Bien Phu road_1	45.216	22,731.5	27,503.9
Dien Bien Phu road_2	38.16	37,350.9	45,505.0
Rehabilitate drainage system	0	13,236.5	24,756.4
Total		**61,085.3**	**1,065,174.5**

In addition, in the construction process, a small amount of debris is generated such as lime, mortar, iron and steel, soil, rock and cement packages, etc.

The volume of construction solid waste generated from the construction process of work items of the component 2 is relatively large in comparison with the construction of other urban infrastructure facilities. Overall, the impact of the construction solid waste in the construction phase of the component 2 is medium because the work items are located at different areas and along the road routes. On the other hand, the "successive construction method" is used, therefore amount of solid waste generated daily will be smaller than that has been calculated above.

Beside that, under the soil quality analysis result at all project areas, it all has the content of heavy metal indices that lower than the allowable limit (as mentioned in Chapter 2) and under the soil observation result within 5 recent years in Soc Trang province. However, because the nature of the excavation soil at all existing alley lines in all Lias areas that all are the stable grounds that mixed with rock/ pebble/garbage/,… it can not utilize this excavation soil for the agricultural purpose, but, it can use it to aggrade the hollow place, floor (if all households/units have the demand) or the sign the treatment and collection contract with URENCO.

d2. Solid waste discharged by construction workers:

Domestic solid waste are mainly packages, plastic bags, bottles, cans of food, etc. The volume is assessed by rapid assessment method of the World Health Organization, the volume of solid waste discharged every day is 0.5kg/person/day. The estimated volume of the total solid waste generated daily in the construction process of the component 2 is shown in the Table 4.29:

Table 4.29. Volume of domestic solid waste generated during construction of component 2

Work items	Number of workers (person)	Construction duration (month)	Domestic solid waste (kg/day)
Tra Men canal	50	24	25
Hi Tech canal	50	24	25
Nguyen Van Linh bridge	50	24	25
Bridge and ring road 2	100	24	50
Dien Bien Phu road_1	30	8	15
Dien Bien Phu road_2	50	18	25
Rehabilitate drainage	30	12	15
Total			**180**

The volume of domestic solid waste generated during construction of individual items of component 2 is small, which is about 15-50 kg/day. This is the main source of pollution due to the decomposition of organic matters that creates bad odor, leachate and pathogenic microorganisms. If this source is not collected reasonably, it will cause environmental pollution. Though the project areas are not centralized but scatered, on the other hand, and the successive construction method is used, but the construction duration is long. Therefore, the impact level is assessed as low.

d3. Hazardous waste:

Hazardous solid waste generated during construction process are mainly barrels/plastic containers containing motor oil, oil, gasoline, used fluorescent bulbs, greasy rags from the means of transportation etc. Hazardous waste generated during the construction process includes fluorescent bulbs, batteries, waste oil, greas, greasy equipment, etc. Amount of hazardous waste is estimated equal to 2% of total domestic solid waste, which is equivalent to 1- 3 kg/day.

Without appropriate management, these types of construction waste would have negative impacts on the soil, water, and air environment; residual grease and oil in containers can penetrate into the ground, causing soil pollution. The impact level is assessed to be medium.

e. Impacts on ecological

In the subproject area, neither environmentally sensitive locations as national park, natural preservation, biosphere reserves nor Red Book animals and plants are found. Therefore, the ecosystem and biodiversity will not be affected by the subproject execution.

The main activities of the subproject preparation include site clearance and preparation for carrying out components. Therefore, the environment in general and local ecosystem in particular will insignificantly be affected. Terrestrial ecosystem in the vicinity of the construction site of bridge and ring road 2 and resettlement sites and aquatic ecosystem in Maspero river and Tra Men A and Hi Tech canal will be affected, as analyzed below.

For terrestrial ecosystem:

Site clearance and excavation of soils would directly affect terrestrial ecosystem along both sides of the bridge and ring road 2 and the resettlement area. Survey results show that the affected vegetation within the subproject area mainly includes agriculture crops (rice, cash crops, etc), some fruit trees (jackfruit, coconut, banana, mango, etc) and others (tamarind, eucalyptus, acacia, bamboo, etc). In addition, there are some shrubby plants and trees in the fallow. Such plants and trees shall be cut down during the site clearance for the construction.

Removal of these plants and trees will affect domestic animals, insects living on the canal banks and agriculture field. However, the affected species are limited, including frogs, snakes, invertebrates, etc.

For water ecosystem:

According to results of the survey on entire subproject area, water ecosystem is distributed within Tra Men A, Hi Tech, Xang canal and Maspero river. Aquatic species vary based on the salinity, including coastal and shallow sea species broadly distributed in the West of Pacific Ocean. Some planktons and typical freshwater animals found as Monia dubia, Ilyocruptus halyl, Dianaphasomona leuchtenbergianam, D.paucispinosus, Desoctclops leuckatrti, Neodiatous visnu. No species are recognized as specious animals in the Vietnam and the World Red Book.

All organisms living the ecosystem within the subproject site shall be directly affected during the preparation and construction. These impacts are unavoidable. However, with the scope and current status of the subproject area as well as proposed construction measures, the impacts are assessed to be at LOW level and the area of influence is within the land acquisition boundary (mainly for work items in the Component 2). Also, these impacts are temporarily happening during construction and they will soon be stabilized once the subproject is in the operation phase.

* *The ecosystem recovery of the dredging area*: The recovery of disturbed habitats following dredging ultimately depends upon the nature of the new sediment at the dredge site, sources and types of re-colonizing species, and the extent of the disturbance (ICES 1992).

As reported by the USACE, if the substrate stabilizes for slow and medium speeds, the recovery time of the dredging area will be below 5 years. Meanwhile, the measurement of the USEPA on the recovery of the dredging area has pointed out that the recovery of biological diversity of invertebrate is determined to be in 1 year (A. M. Prussian et al. 1999).

The relationship between the speed of ecosystem recovery after dredging according to the nature of sediment and extent of disturbance, the recovery time observed in the dredging area as follow:

No.	Habitat type	Recovery time
1	The mud is often disturbed	4 weeks
2	Canals mud	6 months
3	Sand-gravel	1-2 years
4	Mud-Sand	18 months
5	Gravel	>2 years
6	Sand	3 years
7	Shell-sand	10 years

Based on the above statistics and the nature of the sediments in Hi Tech and Tra Men A canal belongs to canals mud, the ecosystems recovery time after dredging is predicted at around 6 months.

f. Impacts on traffic infrastructure

In the construction of items in component 2, the number of vehicles transporting waste and raw material is not much (10 trips/day). However, most of them are heavy vehicles and the project areas occupy several residential routes, impacts on traffic infrastructure are possible.

The increasing number of vehicle may affect the traffic safety and traffic jam on route. The transportation route includes Dien Bien Phu, 30/4, Le Duan, Phu Loi, Tran Hung Dao, NH 1A. This work also impacts on PCRs and sensitive receptors on route (see chapter 2, part 2.6), especially on holy days, rush hour.

These impacts will take places all the construction. However, the construction will be divided into several bidding packages and implemented successively so the quantity of vehicles is much fewer than calculation. The impact is temporary, interrupted but extended (1 - 2 years) so it should be assessed at a medium level.

g. Impact on City Landscape

The rehabilitation/construction activities would require excavation on 02 roads, 02 bridges, 02 canals (HiTech and Tra Men A) and pavement for the construction and rehabilitation, installation

of the combined sewers, setting up of wall fences for the construction sites. These operations would temporarily change the landscapes in these areas. Besides, construction materials would also be transported and gathered at construction sites. Without proper management, indiscriminate gathering of materials would take place, especially in narrow construction sites for the tertiary culverts, stormwater, and wastewater drainage systems, affecting the area landscape..

The rehabilitation / construction of these works would cause small impacts on the general landscape of the city. Conversely, this is an opportunity to create a general harmonious and beautiful landscape in the city.

The level of impact on urban beauty and landscape in these areas is assessed to be medium.

f. Impacts from risks and incidents

Labor accidents

In general, traffic accidents may happen at any stage during the construction of the subproject for which the causes include:

- Environmental pollution may cause fatigue, dizziness or fainting for workers during their work.
- The installation, construction and transport of materials with a lack of focus can cause labor accidents, traffic accidents, etc.
- Accidents due to negligence in work, lack of labor protection, or due to lack of awareness of strictly complying with the labor safety rules for construction workers.

Given the nature and scale of the construction activities under the component, this risk is assessed as moderate. The Subproject Owner will pay attention to the application of safety measures for workers.

Fire, explosion and leakage of fuel

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

- The temporary fuel and material warehouse (gas, DO oil, FO oil, welding gas, etc.) are the source of fire and explosion. The occurrence of such incidents can cause serious damage to people, society, economy and the environment.
- Temporary power supply system for machines and equipment during construction can cause problems of shortcircuit, fire, explosion, electric shock, etc leading to economic and labor accidents for workers.
- The subproject owner will implement the fire prevention and strictly comply with measures to prevent leakage, fire or explosion. The fire prevention shall be done regularly to minimize the possibility of incidents and the levels of impact.

4.1.4.2.2. Site-specific impacts due to construction of investments under component 2

A. Site-specific impacts due to dredging and embankment of Tra Men A and Hi-Tech canals (subcomponent 2.1)

Soc Trang City subproject has two canal upgrading items, which are Tra Men A Canal and Hi Tech Canal under Component 2 (see Table 1.1). At present, these two canals are polluted because waste is being disposed and discharged directly onto the canals by local people living along sides of the canals. In addition, people encroachment and the fact that the canals have not been dredged regularly also contribute to the environmental pollution, bad sanitation and poor drainage capacity.

Tra Men A and Hi Tech upgrading activities include (i) canals dredging (ii) construction of canals embankment; (iii) construction of operational roads and green area along the two sides of the canals.

a. Impact on ecological environment

Impacts on the aquatic ecosystem in the canals depend on the dredging methods to be applied. Both Tra Men A and Hi Tech canals are blocked at one end, and respectively connected with Maespero and Dinh Rivers at the other ends. Taking advantage of this characteristic, the feasibility studies proposed to dredge these canals in dry conditions. The dredging process will be carried out in a sequential manner, in 50-100 m canal increments, starting from the obstructed end. In each segment, water will be pumped out and spoil excavated down to the design depth. Excavated material will be transported immediately without temporary storage by small trucks (1-15 tons) to the Soc Trang solid waste treatment facility which is about 12 - 15 km far from the site. The canal banks will be reinforced by timber piles and soil revetments will be constructed. By dredging in dry condition, impacts to water quality are not expected, despite these urban canals already being highly polluted with solid waste and waste water, and without any rare or endangered species. Impacts to aquatic natural habitat are consequently minor and insignificant.

b. Odors from dredging

Upgrading of Tra Men A and Hi Tech canal would generate about 8,700 m^3 and 13,000 m^3 of excavated dredging materials respectively. Analytical results of sediment samples of Tra Men A and Hi Tech Canal reveals that toxic heavy metals are lower than allowable limits of QCVN 07:2009/BTNMT. However, the sediment is contaminated with high level of organic substances which are biodegradable and in anoxic conditions and release odorous compounds and likely to release odorous compounds such as inorganic gases, mercaptans, organic acids, phenol, and p-cresol among others causes nuisance smell. This impact mainly occurs at transfer sites, where dredged materials are stored and transported for further treatment. Local residents and workers could be exposed to the bad smell for a short period of dredging at each 50-100 m canal's segment. As a result, the magnitude of odor impacts is medium.

c. Nuisance and traffic disturbance due to transportation of dredged sediments

During the transportation of the spoil, local residents and those along the route could be exposed to noxious smells.

At Hi Tech area, access to the construction site and nearby is easy as the April 30 Road runs in parallel with the canal and many small alleys cut across. In contrast, at Tra Men A, there is no direct access to the construction sites, therefore for each canal segment (50-100 m), the work is

to be carried out by excavator in combination with manual labour. Excavated dredged material will be transported to small work boats with volume of 15-20 m3 and then conveyed to the intersection with the road. There it will be transferred into trucks and transported to the disposal site. The construction of the canal will cause odor nuisance and potential traffic obstruction to the local people, especially those near the dredged material transfer points, and those at the two ends of the canals where are highly populated areas. However, this impact can be assessed as medium, localized and short term intermittent.

d. Local flooding during the dredging process

There is the potential for the works in each of the sections being excavated to impede drainage, resulting in flooding, especially at each 50-100m canal segment However, the likelihood of this is generally low, due to its brief nature. It can be avoided by contractors considering adequate diversion of flow as may prove necessary.

e. Erosion of the canal banks and embankment subsidence risk

During the dredging and embankment process, there are risks to erosion of the canal bank and embankment subsidence, which could be caused by various reasons: (i) weak soil structure; (ii) Storage and movement of heavy machines and equipment on canal banks; (iii) dredging process unexpectedly encountering ground water; (iv) vibration during the piling process. Failures of the canal structures could result in risks to workers or residents or other assets in the local area. Sensitive receptors include infrastructure, workers and local residents living surrounding the canal, especially those at the highly populated areas. For Tra Men A canal, houses are distributed densely along the first 100 m of the canal, starting from Maspero River and at the segment between km+1.00 and km 1.30. For Hi Tech canal, populated area is from April 30 road along the first 1.2 km of the canal, starting from Le Duan Road.

These impacts are localized, short term during construction period, and avoidable if geotechnical data are considered during the detailed design, and via the application of good construction method.

f. Damages to small bridges on Hi Tech canal

There are 7 residential bridges (suitable for pedestrians, bicycles and motorbikes only) over the canal built by local people to access their houses. Embankment of the canal might cause some damages or create risk of collapse of these structures, and thereby interrupting the house access of the local people. The likelihood of this occurring is low and avoidable by appropriate mitigation.

g. Impacts on PCRs due to upgrading of Tra Men A canal

There are several pagodas in the area such as Long Hung pagoda (at 5 m distance), Ngọc Hưng pagoda (at 25m distance), Ngọc Phước (at 5m distance) along Tra Men A canal. These PCRs will be under direct exposure to dust, noise, vibration and land acquisition of some fence lines due to the construction work. Other potential issues could resulted from (i) hindrance of access, solid waste and wastewater due to construction activities; (iii) traffic congestion and accident risk and community safety due to construction and transportation; (iv) interference with pagoda religious events especially those organized on the 1st and 15th day of the lunar month due to construction activities; (v) Social conflicts between workers and visitors to the pagoda.

Vibration Impact and risk on structure collapse on PCRs

The embankment of Tra Men A canal will adopt pile jacking method for timber piling to the depth of 4m into the canal bed. The vibration impacts due to pile jacking might cause collapse to the nearby structures within a radius of 3- 5 m. All listed PCRs are situated at least 5m away from the canal. Therefore, the risk on structure collapse is assessed negligible. For precautionary, the mitigation measures to prevent, avoid or compensate for this risk on structure collapse will be included in the ESMP as the requirements for the contractors during the construction process.

Long Hung Pagoda's back side/gate is 5 m from Tra Men A canal.

The back side of Ngoc Hung pagoda at 25 m away from Tra Men A canal

The entrance to Ngoc Phuoc Pagoda is 5 m from Tra Men A canal.

B. Site-specific impacts during the construction of Nguyen Van Linh Bridge (subcomponent 2.2) and Ring Road No2 and the bridge on the road (Subcomponent 2.3)

Construction of Y shaped Nguyen Van Linh bridge (11m wide and 145 m long) and Bridge No2 (97 m long, and 11.5 m wide) over the Maspero River will require dredging of 2,200 m^3 of soils and sediment for the construction 4 piers for Bridge No2 and of 5 piers for Nguyen Van Linh's bridge. The construction will have some impacts on the water quality of the river, aquatic and benthic communities, and impacts associated with waterway transportation and disposal of the dredged soils and sediment.

a. Impacts on water environment and aquatic resources of Maspero River:

The dredging process and the movements of tugboats can cause suspension and re-suspension of fine sediment and suspended particles and pollutants from discharged storm water runoff could cause potential adverse effects to the water quality of the Maspero River.

The analysis of aquatic species shows that the water environment in Maspero has been affected by organic pollution. Aquatic plant species in the river include water hyacinth, water cabbage, water moss, water spinach, nipa palm, water ginger grass, etc. In this river section, there are no endemic or rare species listed in the Red Book which require protection, and there are no natural vegetation and no rare or typical fauna and flora.

In consideration of the small amount of dredging work, the existing polluted condition and the poor habitat in the water environment of Maspero River, the impact is assessed as minor.

b. Disposal of dredged soils and sediment:

The dredging of the river at some locations for bridge's abutments generates about 2,200 m^3 of

river sediments. Analysis of sediment sample showed that the sediments are not contaminated by heavy metals and within the permissible limit for agricultural purposes. The excavated materials could therefore be used for levelling of low land as needed or be transported to the disposal site for further treatment or uses.

c. Subsidence risk in pier construction phase

During the construction of the piers, there is a risk of soil subsidence and pier collapse, if bridge designs do not include thorough geotechnical survey or construction process do not comply with the specifications. Subsidence or landslides could also cause worker accidents as well as bridge structure, therefore designs need to be appropriate to site conditions and correct supervision is required.

d. Impact on waterway transportation on Maspero River

Nguyen Van Linh Y-shaped Bridge has five piers (one 2.5m-diameter pier and four 1.5m-diameter piers) and three abutments. Bridge No2 has four 1.5m-diameter piers and two abutments. The construction process includes installation of cofferdam, pile driving operation, completion of bridge structures. During 24 month of construction, although work items are to be implemented in a sequential manner, there will be certain impact to waterway transportation. However, on Maspero goods transportation by boat and barges is not high thus the impacts on waterway can be ranked as moderate. The mitigation can be made through the collaboration with the local waterway management company to provide necessitate information on alternative traffic routes for boats.

e. Impact to groundwater quality during the drilling process

According to the evaluation of all the construction activities, pile driving is likely to cause the greatest impact to groundwater quality. These impacts are evaluated as follows:

The impact of the use of additives during pile driving

The construction of the abutment requires deep bore piling through the complex shallow aquifers and has risks of contamination by potentially hazardous additives and drilling liquid spilled into the boreholes. By design, the construction of bored piles uses bentonite as a drilling fluid to lubricate the drill and flush away drill cuttings.

It often has additives applied to improve its property, and some of these can be potentially toxic to the environment, when they accumulate in water or soil.

Drilling through the shallow aquifers, (12 - 20 m), using an encased outer sleeve, inside of which is the drill string, the drilling mud or dirty water has potential to cause some contamination, however experience from similar work from previous projects has shown this to be very limited.

e. Impact on agriculture land along Ring Road No. 2

Along the Ring Road No2, there are still agriculture lands that local people cultivate rice and cash crops on. Construction activities, although conducted in a sequential manner can affect agriculture activities at different stage of seedlings, growing and harvesting. Runoff from construction site if not properly managed could contaminate irrigation water and soil, affecting productivity of crops. The impact can be small as it is localized and will cease upon the completion of construction work.

f. Impacts on PCRs and sensitive locations

Van Dien temple of Cao Dai religion, being located at alley 389, Kinh Xanh road, and ward 2 is 20 m away from the construction site of Nguyen Van Linh Bridge (subcomponent 2.2). This temple will be exposed to dust, noise, vibration and land acquisition of 328m^2 of garden land due to the construction work. More specifically, other potential adverse impacts could be resulted from (i) hindrance of access, (ii) reduce of number of visitors, (iii) increase in construction wastes and wastewater; (iv) risks of traffic accidents and safety, (v) localized flooding because of construction during rainy days and (vi) conflicts between workers and visitors to the temple. The sensitivity of the local residents is high however the overall impact could be ranked as moderate.

Vibration impact and risk on structure collapse to PCRs

The distance between the facilities of Van Dien Pagoda and the construction site of Nguyen Van Linh Bridge varies between 20 m – 100 m. The piling method selected for the bridge's abutment is bored pile drilling, which is considered an innovative method and able to minimize the vibration impact compared to the traditional pile driving methods. The vibration impacts and risk of collapse on Van Dien Pagoda will be small and manageable given the safe distance the pagoda is from the site and the piling methods the contractor will adopt. In addition, other mitigation measures should be put in place to minimize the vibration impact and risk on structure collapse.

Vân Điện Pagoda is situated from Nguyen Van Linh bridge's construction site (bridge's starting point in Ward 2) about 20 m – 100 m.

Bong Sen Market, located on Yet Kieu street of Ward 6 is considered to be a sensitive receptor as it is on the construction material and waste transportation route for construction of Nguyen Van Linh Bridge and Dien Bien Phu – section 1. During peak hours in the morning from 5-9h, noon from 11-12h and in the evening from 16-19h, the market, local traders and shopping customers will suffer from any traffic congestion, dust and noise caused by vehicles. The impact sensitivity is high to local people and overall impact can be considered as moderate. The impacts can be minimized if proper mitigation measures are adopted.

C. Site-specific impacts during the Upgrading of Dien Bien Phu Road (subcomponent 2.4)

Upgrading of Dien Bien Phu Road will be implemented on 2 sections (1) 1 km passing ward 6 and 1.9 km passing ward 8. Population is distributed densely along section 1 but relatively low along section 2. Following environmental impacts are considered.

a. Local flooding

Flooding could potentially occur when the construction works affect the existing drainage capacity, however the likelihood of impacting local people along section 1 is generally low as the work is to be over a short period. The impact can be mitigated if the water flow is diverted to ensure the canal's drainage capacity.

c. Social disturbance and traffic concern

Currently, the section 1 of Dien Bien Phu road is from 5-7 m width and heavily degraded, causing dangers to people traveling on the road. People are living at a quite high density from 10-50 m to the construction site. So, the construction process will cause more social disturbance and traffic inconvenience to local people around these areas. However, this impact can be mitigated if the contractor will fully comply with and implement measures specified in the ESMP.

There is a special festival (Ok Om Bok or Moon Fest) on the 15th day of the 10th Month according to the Lunar Calendar to Khmer and all local people across the Mekong provinces. In Soc Trang, the Ok Om Bok is organized with a boat racing competition on Maspero River. Construction of section 2 of Dien Bien Phu would hinder the access to the competition stage and the river bank. Prior to the event, the contractor should take extra care in clearing the access and should halt the construction work during this event.

d. Disruption of business activities

The road will pass 18 household-businesses which sell foods, vegetables or convenient good stuff near the road. Besides being a safety risk, noise and dust from road construction activities and equipment might temporarily disrupt business activities. The contractor should take caution on this matter to avoid accidents and dust staining of shops.

e. Impacts on PCRs

Long Hung pagoda (at 5 m distance), Ngọc Hung pagoda (at 5m distance) are the PCRs section 1 located on Dien Bien Phu road. Thus the construction of the road section will also cause impacts to these pagodas. Apart from the generic impacts from dust, noise, vibration due to the construction, these PCRs also under the impacts that are resulted from: (i) hindrance of access, (ii) reduce of number of visitors, especially on the 1st and 15th days every month according to the Lunar Year, (iii) increase in construction wastes and wastewater, (iv) risks of traffic accidents and safety, (v) localized flooding because of construction during rainy days, and (vi) conflicts between workers and visitors to these religious places. The sensitivity of the local residents is high however the overall impact could be ranked as moderate. The impacts can be minimized.

Impact on vibration to PCRs

Dien Bien Phu's road section 1 will be upgraded following the existing road therefore the construction work will involve with paving the concrete asphalt surface and installing of technical infrastructure along road sides. The work will not include stripping off the top soil and strengthening the road base therefore vibration impacts to the PCRs are small. Specifically, within a radius of 5 m, vibration could cause risk on structure collapse. Beyond this 5 m distance, potential impacts are just restricted to vibration with irregular frequency. As the two pagoda is about 5 m distant from the construction site, the collapse risk to Long Hung and Ngoc Phuoc Pagodas is only small.And if occur, it may only affect the fences of these pagodas. For

precautionary, the mitigation measures to prevent, avoid or compensate for this risk on structure collapse will be included in the ESMP as the requirements for the contractors during the construction process.

Long Hưng Pagoda is 5 m from Dien Bien Phu road.

Ngoc Hung Pagoda is 5 m from Dien Bien Phu road

D. Site-specific Impacts due to Construction of drainage system in Phu Loi and Tran Binh Trong Streets (Subcomponent 2.5)

a. Local flooding

Flooding is already an issue on these roads because the existing drainage system is under the required capacity. During rainy season, ward 2 is often flooded, especially along Phú Lợi and Trần Bình Trọng Streets, the level of flood can be up to 20 to 35 cm. So, the installation of new drainage system can cause some temporary flood on rainy days however the likelihood of impact is generally low as the work happens one at a time in a short period. The impact can be mitigated if the water flow can be carefully diverted to ensure the drainage capacity.

b. Social disturbance and traffic safety

The construction process will cause social disturbance, especially along section 1 of Dien Bien Phu road where local people live at high density. Daily routine and traffic convenience of local people around these areas will be affected. However, this impact can be mitigated if the contractor will fully comply with and implement measures specified in the ESMP.

The road will pass some businesses near the road. Besides being a safety risk, noise and dust from road construction activities and equipment might temporarily disrupt business activities. The contractor should take caution on this matter to avoid accidents and dust staining of shops.

4.1.4.3. Component 2: Potential Adverse Impacts during Operation

A. Impact during the opertion of the Tra Men A and HiTech canals

a. Water pollution and decreased landscape due to direct waste disposal into the canals

During the O&M, there is a risk that residents can pollute the water with either solid waste or untreated wastewater, if they do not change current behavior and there is a lack of enforcement from local authority. The level of impact is low to moderate and can be avoided if proper O&M practices are adopted and enforcement enhanced. Besides, behavior changes can happen as local

people can be proud of new green design of the canal and want to collaborate to maintain the canal's clean and pleasant environment.

b) Embankment subsidence risk during operation of Hi Tech and Tra Men Canals

During operation, there is a risk on embankment subsidence due to: (i) heavy rain, great flood, weak foundation causing embankment erosion; (ii) construction of adjacent infrastructures; (iii) failure to maintain trees and/or vegetation on the soft embankments could result in soil erosion and subsidence of the embankment.

Any incidents of damage to embankments could directly affect the life of local people, environment landscape and quality of infrastructure located in the area protected by the embankment system.

B. Impact due to operation of Nguyen Van Linh Bridge (subcomponent 2.2) and Ring Road No 2 and the bridge on the road (subcomponent 2.3)

Road Safety, Air, Noise

Road safety is likely to be the key impacts during operation of Nguyen Van Linh and Ring No.2 Bridges during the first few years when transportation of rural population (bicycles, carts, etc.) are mixed with motor vehicle operations (cars, motorcycles, trucks, etc.) and levels of traffic accident could increase. Experience in the country suggested that this can be managed by improving knowledge of local people on road use regulations and practices as well as monitoring and enforcement of driver speed and behavior.

In the longer term when traffic volume is high, generation of dust, exhausted gases, noise, and vibration could be an additional issue but this could be mitigated through long term planning.

C. Impact due to operation of Dien Bien Phu road

a. Road Safety, Air, Noise,

– Road safety is likely to be the key impacts during operation of road and bridge during the first few years when transportation of rural population (bicycles, carts, etc.) are mixed with motor vehicle operations ((cars, motorcycles, trucks, etc.) and level of traffic accident would be increased. Experience in the country suggested that this condition can be managed however improving knowledge of local people on road use regulations and practices as well as monitoring and enforcement of driver speed and behavior can help mitigating the impacts.

In the longer term when traffic volume is high, generation of dust, exhausted gases, noise, and vibration could be an additional issue but this could be mitigated through long term planning.

b. Local flooding on the roads due to inadequate maintenance

The invested facilities if not well maintained will be subject to negative impacts such as local flooding, due to inadequate maintenance. Solid waste management i.e. domestic waste from local people block the drain may also lead to congestion of sewer system, which in turn may easily cause flooding during the rainy water, and affect urban landscape.

D. Impacts due to operation of drainage system in Phu Loi and Tran Binh Trong Street (Subcomponent 2.5)

Blockage of drainage system due to inadequate maintenance

The invested facilities if not well maintained will be subject to negative impacts such as local flooding, due to inadequate maintenance. Solid waste management i.e. domestic waste from local people block the drain may also lead to congestion of sewer system, which in turn may easily cause flooding during the rainy water, and affect urban landscape.

4.1.5. Impacts Assessment for Investments under Component 3

Construction of a resettlement site with area of 1ha, including systems of water drainage and supply, power transmission line and social infrastructure. Detailed assessment on the potential adverse impacts during preparation, construction and operation of investments under component 3 are described below.

4.1.5.1. Component 3: Potential Adverse Impacts during Preparation

a) UXO risk

As indicated in section 4.1.4.1 above, the construction of the resettlement site presents a safety risk due to UXO. Therefore, UXO detection and clearance must be carried out before commencement of any construction work.

b. Impacts from the land acquisition the project:

Land acquisition, relocation and resettlement will affect physical and spiritual life of the affected households, causing social problems and even prolonged litigation. Relocating to a new place, households could be seriously affected by new living environment in the resettlement area and it takes time for them to integrate into new life, especially the relationship and new job.

For Component 3 - The resettlement site of the project, there are 6 households affected by the project and they are permanently affected in agricultural land with a total area of 10,023 m2 (about 1.0 hectare). The detail impacts will be assessed in detail in **the section 4.2.**

4.1.5.2. Component 3: Potential Adverse Impacts during Construction

4.1.5.2.1. Generic impacts during construction of investment under component 3

a. Impacts on air quality:

The main activities taking place in this phase is constructing drainage system; roadbase, curb, sidewalk; lighting, trees for the resettlement area of the project (1 ha). Air environment will be affected during construction due to dust, gases, noise, etc. from the activities of housing demolition, earthwork, transportation, material handling, operation of construction machinery, etc. However, these effects are not continuous and take place in a short time, most of the impacts are temporary.

a1. Dust generated from the demolition

As stated in the impact assessment of the preparation for component 3, as the permanently acquired land for construction of resettlement area is agricultural land of 6 households which is currently vacant, uncultivated and mainly grass, weeds, ... there is no demolition.

a2. Dust generated from excavation and backfill of works

The construction will be divided into several bidding packages that will be implemented at different timelines. According to the feasibility report of the project, the total volume of earthwork soil in component 3 is 18,000 m^3. Dust generated by excavation and backfilling activities under Component 3 is calculated in the same way as Components 1 and 2.

Calculation results show that dust contents generated by excavation activities at resettlement area construction locations are about 17.1 times higher than allowable level as per QCVN 05:2013 BTNMT, yet this type of dust settles down quickly and exist in a short period of time. Dust contents within allowable limit are estimated to be about 100m away from excavation location. Dust generation period is long (about 4 weeks), with resettlement area premise clear, without densely-populated areas around but just some scattered HHs, about 100 - 500m away from the construction locations. Therefore, the impacts are at MEDIUM level and can be mitigated.

a3. Dust generated from the transportation

The activities of transporting materials and waste disposal will generate exhausted gas from fuel combustion process of the internal combustion engine, such as dust, NO_2 , SO_2, CO, VOC. These emissions will reduce ambient air quality.

Total amount of materials for construction of the resettlement area is approximately 129,104 tons. The material will be transported from material mines to the construction area by 18 trips per day within 9 months. Dust concentration and emission is calculated in the same way as components 1 and 2. The results show that:

Table 4.30. Concentration of dust generated from Excavation of road and sewerage construction (component 3)

W (m)	Dust concentration (mg/m^3)				QCVN 05:2013/BTNMT (The average 1h)
	H=1,5	H=2	H=3	H=3.5	(mg/m^3)
5	**0.51**	**0.39**	0.18	0.11	**0.3**
10	**0.39**	**0.36**	0.26	0.17	
20	0.26	0.25	0.23	0.19	

For the construction phase of the resettlement area, the concentration of dust generated from the transport of materials and excavated soil exceeds permissible limit about 1.7 times at the distance of 5 m; exceeds 1.3 times at the distance of 10m; and achieve the allowable limit at the distance of 20 m (compared to QCVN 05:2013/BTNMT - National Technical Regulation on ambient air quality);

In general, due to long construction time in the resettlement area (9 months), the area is convenient and far away from the residential area, the level of impact due to the dust generated from the transport of materials and excavated soil of component 3 is LOW and can be compromised.

a4. Dust from the gathering, loading and unloading of materials:

Dust concentration and emission is calculated in the same way as components 1 and 2, calculate the dust concentration from the loading/unloading of materials according to the method of *Trần Ngọc Chấn, 1999, air pollution and exhaust gas treatment (volume 1),*

The calculation results showed that the concentration of dust generated from the process of loading and unloading of materials for construction of the resettlement site at the distance of 10 m and at the height of 1.5 - 5 m exceeds 1.4-4.0 times of the allowable limit compared to QCVN 05:2013/BTNMT depending on each project area; at the distance of more than 50 m, the dust concentration reaches the allowable limit.

However, as the construction time in the resettlement area is short (9 months), the construction area is convenient with the successive construction method, this work is not continuous, so the impact level of dust resulting from the process of loading and unloading of construction materials of component 3 is low and can be compromised.

a5. Exhaust gas and dust generated from transportation

The activities of transporting materials and waste disposal will generate exhausted gas from fuel combustion process of the internal combustion engine, such as dust, NO_2 , SO_2, CO, VOC. These emissions will reduce ambient air quality.

Total amount of materials for construction of the resettlement area is approximately 129,104 tons. The material will be transported from material mines to the construction area by 18 trips per day within 9 months. Dust concentration and emission is calculated in the same way as components 1 and 2. The results show that:

Dust concentrations vary between 0.17-0.28 mg/m^3 (compared with permissible standard limits of 0.3 mg/m^3); CO contents 9.12 mg/m^3 (compared with 30 mg/m^3); SO_2 contents 0.16 mg/m^3 (compared with 0.35 mg/m^3); and NO_x contents 0.24 mg/m^3 (compared with 5 mg/m^3). The dust and emission concentration would not exceed the national standards on ambient air quality (QCVN 05: 2013/BTNMT).

In general, the exhaust gas load generated by the operation of the vehicles and construction machines in the resettlement area is relatively small. On the other hand, the construction site is convenient but construction implementation period lasts 9 months, so this impact is LOW and can be minimized.

b. Impacts from noise and vibration:

b1. Impacts from vibration:

Noise generates from:

- Vehicle transporting sand, soil, construction material …
- Operation of construction facilities: excavator, bulldozer, concrete mixer…

The transmission of noise in space will decrease by distance and be calculated the same in Component 1 & 2, as following:

Table 4.31. Noise level by distance of construction vehicles and machinery in component 3

Item	Types of machine	Quantity	Distance to the noisy sources (m)					
			1	15	30	60	90	120
Resettlement area	**Total noise level**	**30**	**101**	**77**	**71**	**65**	**62**	**59**
	Bulldozer	4	99	75	69	63	60	57
	Excavator	4	92	68	62	56	53	50
	Truck	3	92	68	62	56	53	50
	Concrete mixer	4	87	63	57	51	48	45
	Roller	3	77	53	47	41	38	35
	Excavator	3	82	58	52	46	43	40
	Paving machine	3	92	68	62	56	53	50
	Electric generator	2	80	56	50	44	41	38
	Air compressor	2	84	60	54	48	45	42
QCVN 26:2010/BTNMT (6h-21h) – normal area		**70**						
QCVN 26:2010/BTNMT (21h-6h) – normal area		**55**						

The results show that:

- The noise of the vehicles operating within distance of more than 15 m (daytime) and more than 150m (night) is within the allowable limits of QCVN 26:2010/BTNMT - National Technical Regulations on noise (70dBA for normal areas from 6 - 21h, 55dBA for normal area from 21h - 6h).
- The resonant noise of the vehicles operating within the distance of more than 30m (daytime) and more than 180m (night) is within the allowable limit of QCVN 26:2010/BTNMT - National Technical Regulation on noise (70dBA for normal areas from 6 - 21h, 55dBA for normal area from 21h - 6h).

In general, the resettlement area has the sparse residential density, only several households are living at about 100-500 m away from the construction area. Therefore, the noise impacts are evaluated at LOW level and can be compromised.

- *Impacts from vibration:*

Construction activities can cause tremors, shaking of the ground at different levels depending on the devices and construction methods. However, the vibration intensity will reduce by the transmission distance. The buildings, residential areas near the project area will be affected by the vibration during the construction phase of the project. Vibration levels are classified into the following levels: from no perceptible effect at the lowest level, a low rumbling sound and perceptible vibration at the moderate level, and slight damage at the highest level.

As stated in the impact assessment content due to noise, the resettlement site has low population density with only a scattered number of households who are living at 100 - 500 m away from the construction area, the scale of technical utilities is small -> medium so the vibration impacts should be assessed at a low level and can be compromised.

c. Impacts on water environment:

During the period of construction of technical infrastructure for the resettlement site of the project, there are three main sources of impact on the aquatic environment, including: (1) Rainwater runoff at construction site; (2) Wastewater discharged by construction workers; (3) construction waste water.

c1. Rainwater runoff at construction site:

Total rainfall arising from the resettlement area during the construction process is estimated by the formula [3]. The calculated rainfall of the resettlement area during the construction phase is 2.0 l/s.

Generally, the rainwater runoff in this region is relatively larger than the construction areas of component 1 and 2. The rainwater runoff will flow into canals/rivers in the project area, however, the concentration of pollutants in rainwater is small and along with the control of emission sources arisen during this period, the impact of stormwater runoff on construction of component is LOW and can be minimized.

c2. Wastewater discharged by construction workers:

Similar to the calculation for component 1 and 2 in the construction period, the total amount of domestic wastewater generated from the construction of the resettlement area is 2.25 m3/day, the total amount of waste water generated in this period is 405 m3.

Domestic wastewater contains many suspended solids, organic matters, nutrients and microorganisms. The composition of waste water includes suspended solids, oil, grease, high organic concentration, precipitated substances, insoluble organic matters (through the indicators of BOD5, COD), nutrients (nitrogen, phosphorus) and microorganisms. Based on the emission factors of pollutants of the World Health Organization for developing countries, the load of pollutants in domestic waste water for construction of the component 3 (averaged for over 50 workers, the same as the average calculation for each item of component 2) is shown in Table 4.27.

In general, the quality of domestic waste water discharged by construction workers after being treated by septic tank still remains some indicators exceeding the allowable limits of BOD (2-4 times), TSS (1.6 times). Although the volume is not large (2.25 m3/day), if there is no appropriate measures to handle, the quality of wastewater discharged by workers in this period will be a local source of pollution for the construction sector, especially in the camp area. This impact is considered medium and can be minimized.

d. Impacts from solid waste:

d1. Solid waste (debris) from construction activities:

Waste from construction activities of the component 3 comes mainly from excavated soil/rock and debris during construction process.

Applying calculation method used in the construction phase of component 1 and 2, amount of the excavated soil is estimated at 8000 m3 (equivalent to 12,000 ton, the density of the land is 1.5). Excavated volume is relatively large. The existing land for construction of resettlement area is agricultural land. The analysis results of soil quality in the project areas showed that the content of heavy metal parameters is all lower than the allowable limit (as mentioned in Chapter 2), and according to the soil observation result within 5 recent years in Soc Trang province.

Therefore, the excavated soil can be utilized in the resettlement area (60%) for planting trees or filling the low-lying field for agricultural cultivation. The remaining volume that can not be utilized for agricultural purpose shall be used to aggrade the hollow place, floor (if all households/units have the demand) or contracting the treatment and collection contract with URENCO.

2. Domestic solid waste discharged by construction workers:

Domestic solid waste is mainly packages, plastic bags, bottles, cans of food, etc. The volume is assessed by rapid assessment method of the World Health Organization, the volume of solid waste discharged every day is 0.5 kg/person/day. The estimated volume of the total solid waste generated daily in the construction process of the resettlement area is 25kg/day (for about 50 workers), total volume is about 6,750 kg (construction duration is 9 months):

This is the main source of pollution due to the decomposition of organic matters that creates bad odor, leachate and pathogenic microorganisms. If this source is not collected reasonably, it will cause environmental pollution. The amount of domestic solid waste generated during construction of component 3 is small; the construction site is convenient and far away from the centralized residential area. Therefore, the impact level is assessed as low and can be minimized.

d3. Hazardous solid waste:

Hazardous solid waste generated during construction process are mainly barrels/plastic containers containing motor oil, oil, gasoline, used fluorescent bulbs, greasy rags from the means of transportation etc. Hazardous waste generated during the construction process includes fluorescent bulbs, batteries, waste oil, greas, greasy equipment, etc..

Amount of hazardous waste is estimated equal to 2% of total domestic solid waste, which is equivalent to 1 kg/day. Although volume of hazardous waste generated on site is not much, due to its hazardous nature, 100% of the volume must be collected, stored and handled in accordance with regulations on hazardous waste.

- **Local flooding**

During the construction, the occupation of machinery, gathering material at construction site and concreting the surface will narrow the flow or reduce the penetrability of land, and therefore cause risk of local flooding. Contractors shall find drainage solutions to the flooding in rainy season.

- **Impacts on traffic infrastructure**

In the construction of items in component 3, the number of vehicles transporting waste and raw material is medium (18 trips/day). However, most of them are heavy vehicles and the project areas occupy several residential routes, impacts on traffic infrastructure are possible.

The increasing number of vehicle may affect the traffic safety and traffic jam on route. The transportation route includes Mac Dinh Chi, Le Duan, Tran Hung Dao roads. The resident along roads will be affected by dust, noise, gases, etc. These impacts will take places all the construction. However, the construction will be divided into several bidding packages and implemented successively so the quantity of vehicles is much fewer than calculation. The impact is temporary, interrupted but extended (9 months) so it should be assessed at a medium level.

4.1.5.2.2. Site-specific due to construction of investments under component 3

Due to the construction of works under Component 3 are mainly roads, water supply, drainage pipes, lighting, trees, etc at small scale within 1ha site. Besides, through the field survey of resettlement area, there are no cultural and historical works like temple/pagoda and sensitive points such as schools/market/etc.

Therefore, the environmental impacts of the construction phase of component 3 are general impacts as assessed above. The impacts during construction period are generic and not beyond those as described in the ECOPs.

4.1.5.3. Component 3: Potential Adverse Impacts during Operation

a) Domestic waste

If we assume that each person generates about 0.5 kg of domestic waste per day, with average total number of members of a HH being 4.5 people/household (according to the result of RP survey), 64 relocated HHs will totally have 288 HH members there will be an increase of 144 kg/day for the resettlement area. This volume of waste, if not well managed and collected, will affect surface water, groundwater and cause uncomfortable odors at the resettlement area. Persistent inorganic waste such as bottles, plastic bags and other items present in the water will affect the area's landscape.

b) Wastewater:

With average total number of relocated members are 288 people above. Total daily needed water volume as per QCXDVN 01:2008/BXD is 80 liters/person/day (washing, cooking, and drinking water). Generated domestic water volume is taken as 100% of daily used water volume. So, total generated domestic WW volume is about 23 m^3/day.

Pollutants in the WW include suspended sediment, oil, grease, dissolved organic substances (BOD, COD), nutrients (N, P) and micro-organisms. The untreated wastewater has pollutant contents much higher than the allowable standard (QCVN 14: 2008/BTNMT (Column B). If there is no collection and treatment system developed, everyday there will be an amount of pollutant emitted to the environment. This is a considerable pollution source directly affecting living environment of and people in the project area, causing water-related diseases and directly affecting surface water and groundwater environments. Therefore, the project owner needs to allow application of proper treatment measures for this type of wastewater.

4.2. SOCIAL IMPACT ASSESSMENT

4.2.1. Positive social impacts

4.2.1.1. Positive social impacts during construction phase

Positive impacts of the project during construction phase are:

- Creating jobs for the local people
- Contributing to development of relevant local services, helping improve HH income and economic condition

The project will create temporary/long-term jobs for people in the project area. Site clearance and civil works will need a great number of workers. This will create jobs for people in the area, especially those not having a stable job. Some HHs near construction sites can develop services such as house renting, food/commodity selling, road-side tea shop, etc. which will help to improve their income. Although these positive impacts are considered to be short-term and not sustainable compared with macro-impacts brought about for local and regional economy as mentioned above, they are still instant benefit for the local economic development that the project can bring about.

4.2.1.2. Positive social impacts on operation phase

The project's infrastructure upgrading items will bring about many benefits for people in the province in general and people in low-income areas in particular.

- Infrastructure systems in LIA areas will be improved thanks to road construction, and rehabilitation of drainage and sanitation systems;
- Development of transport infrastructure system in Soc Trang City will contribute to better transport connection between northern bank and southern bank of Maspero River thanks to construction of Nguyen Van Linh Bridge and RR2 Bridge. Besides, the road investment items will also improve the city's land reserve and conditions to appeal investors in the future;
- Drainage – environmental sanitation and waste collection & treatment system is improved thanks to drainage and rehabilitation of canals;

Significant infrastructure changes, especially in LIA areas as mentioned above, will help improve living condition of more than 30,000 people. The benefits include:

- ✓ Living condition improvement: mitigation of waste, dust and sweat pollution
- ✓ Transport condition improvement: road quality, connection quality improvement will make travelling more convenient, easier and safer
- ✓ Working condition improvement: people have chance to work in a cleaner environment
- ✓ Social security improvement: drug use, stealing will be reduced thanks to clean, widen roads with sufficient lightning supply
- ✓ Real estate value improvement: real estate value is forecasted to increase 1.5 – 2 times thanks to infrastructure upgrading/rehabilitation
- ✓ Job creation: thanks to wider roads, especially services such as car, motorbike washing, junk food, tea, etc.

Besides, the project will also bring about unquantifiable impacts such as improving people's cultural value, improving working efficiency, improving life expectancy, etc. When people's material and spiritual lives have been improved, their environmental protection awareness will also be improved, and they will contribute positively to local and regional economic development.

Table 4.32. Positive Social Impacts in the project area

Component	Description of Impacts	Beneficiaries
General Impacts for all Components		
All components	Employment opportunities during the construction phase for unskilled workers	For all unskilled workers in project area
Component 1 Upgrading tertiary infrastructure in LIAs 1, 2 etc.	- Infrastructure upgrading in LIAs will improve living conditions for all HH in LIAs. Especially: (1) wastewater will be treated, (2) Flooding will be significantly improved, the environment and people health therefore enhanced.	4.241 Households (19.045 persons) including 129 poor HH and 742 Khmer HH
	Alleys and lanes are expanded and equipped with lightning system; Due to alleys widening, transport conditions are improved (so that ambulances and fire trucks can access to residential areas). Security of persons and assets are enhanced. Mobility will also be enhanced	4.241 Households (19.045 persons) including 129 poor HH and 742 Khmer HH
	By improving infrastructure and access in the LIAs, value of land and house will increase accordingly.	People living in LIAs, particularly people living along street/lane front houses.
Specific impacts for each Component		

Component	Description of Impacts	Beneficiaries
Component 2	Canal: - Tra Men A: Upgrading and protection of river banks, flood erosion protection, channel expansion to ensure flow, improving the living environment of the people in Ward 6, prevention of flooding and storm surges to residents in Ward 6 . - Hitech: Reconstruction of Hi Tech channel, ensure habitat for 2 people living on the banks of communication channels between 2 Hi Tech wards, Ward 3 and Ward 9	10.490 Households (47.519 persons) including 284 poor HH and 2329 Khmer HH
	Road: - Bridge and Ring Road 2: Improve the link, make a horizontal line connecting the shaft Mac Dinh Chi, Pham Hung, Ly Thuong Kiet. When players complete Ring 2 will help develop the area northeast of the city. - Nguyen Van Linh Bridge: Connecting Nguyen Van Linh road to Dien Bien Phu, Hung Vuong street market through Lotus Maspero River. Residential connections Ward 2 and Ward 6. - Dien Bien Phu road –section 1: Connect Lotus market for 1A and between neighborhoods, connecting traffic expected Cau Nguyen Van Linh. - Dien Bien Phu road –section 2: Connect Ward 8 residents and ward 4, Dien Bien Phu street connections with Le Duan and Pham Hung.	14.780 Households (66.953 persons) including 189 poor HH and 2851 Khmer HH

4.2.2. Negative social impacts

4.2.2.1. Land acquisition

Land acquisition remains the main negative social impacts. Screening of adverse impacts on involuntary resettlement indicated that land acquisition as a result of the project is inevitable. Significant resettlement impacts are expected due to the proposed investments, particularly under Component 2.

Measures have been taken to reduce land acquisition during the preparation stage. Specifically, in each LIA a Community Upgrading Plan (CUP) was developed based on extensive community consultations and social surveys to identify priority investments and to agree on the proposed design (i.e. width of alley expansion, location of drainage/sanitation etc.).

The inventory of losses (IOL) was conducted from August to October 2016. 100 % of the project affected households (PAHs) were surveyed through a semi-structured questionnaire. The results are summarized as follows:

- There are 908 PAHs; and 09 organizations affected in 06 wards of Soc Trang City.
- The total land acquired is 164,056 m2, of which:

  - Residential land: 24,227.3 m 2
  - Agricultural land: 137,631.5 m2
  - Public land: 2,197 m2
- Among the 908 PAHs, 143 PAHs are being severely affected; in which, 58 PAHs have to relocate due to the total loss of their house and 85 APHs losing more than 20% of their agricultural land (including13 vulnerable HHs who are losing more than10% of their agricultural land).
- 401 PAHs whose house being affected, of which 58 PAHs being totally (including 8 PAHs being partly affected but their remaining area is not viable to rebuilt their houses).
- 18 PAHs with business activities at Dien Bien Phu-section 1 and Hi Tech canal are temporarily affected (no relocation).These businesses are not registered among local authorities. Among these 18 PAHs, there are 3 ethnic minority HHs (one at Hi Tech canal and 2 at Dien Bien Phu – section 1).
- There are 12 vulnerable households; of which
  - 09 single women headed households (single, widow, disabled husband) with dependents and economic disadvantage, in which, 2 ethnic minority women.
  - No poor household has been identified (with certification of local authority).
  - 03 PAHs are social policy HH.

Below table are the details of classification of PAHs for each item:

Table 4.33. Affected HHs of Soc Trang subproject

Kinds of affected assets	Unit	Total		Component 1		Component 2		Component 3	
		Quantity	AH/Companies	Quantity	AH/Companies	Quantity	AH/Companies	Quantity	AH/Companies
Land affected									
Residential land	m2	24,227	706	7,751	541	16,476	165	0	0
Agriculture	m2	137,631	171	4,047	51	123,561	114	10,023	6
Other	m2	2,197	9	339	2	1,859	7	0	0
Total	m2	164,056	886	12,137	594	141,896	286	10,023	6
Main houses									
Type 1	m²	5,517	174	2,948	140	2,569	34	-	-
Type 2	m²	6,934	207	2,797	162	4,137	45	-	-
Type 3	m²	529	15	198	9	331	6	-	-
Type 4	m²	62	5	62	5	-		-	-
Total of area, in which:		13,041	401	6,004	316	7,037	85	-	-
- Totally affected houses	m²	6,773	58	853	7	5,920	51	-	-
- Partly affected houses	m²	6,268	343	5,151	309	1,117	34	-	-
Temporary houses	m²	2,917	160	-	-	2,917	160	-	-
Structures									
Gate (m2)	m²	62	16	0		62	16	0	
Yard (m2)	m²	1109.5	64	534.5	30	575	34	0	
Fence (m2)	m²	4587.7	96	3927.7	70	660	26	0	
Cage (m2)	m²	189.3	9	189.3	9	0		0	
Power meters	unit	74	74	24	24	50	50	0	
Water meters	unit	86	86	33	33	53	53	0	

Perennial and annual trees									
Fruit tree	Tree	458	317	407	302	51	15	0	0
Wood tree	Tree	17	32	0	0	17	11	0	0
Vegetable (m2)	m^2	692	22	72	16	0		620	6
Bonsai	Tree	229	48	207	31	22	17	0	0
Total of AHs									
Total AHs	HH	908		619		283		6	
DHs to RS	HH	55		7		48		0	
No of HHs have productive lands affected	HH	172		51		115		6	
No of HHs whose business stores affected	HH	18		0		18		0	
Vulnerable HHs									
Women headed with dependents: 66 (02 ethnic minority and 09 singles and widows; the rests are full family)	HH	11		4		7		-	
Minority HHs	HH	136		54		78		4	
Poor HHs	HH	0		0		0		0	
HHs under supported by social policies	HH	14		8		6		0	

(Source: Resettlement Action Plan Report – November of 2016)

Land acquired for the project is of two types: (i) temporarily acquired land for construction of auxiliary items serving work construction, such as material gathering area, worker camp area, disposal sites, etc.; Permanently acquired land for the work items.

For agricultural HHs, land is the most important means of production. Loss of productive land means loss of their main source of income – a great shock for these HHs. Besides, their life will experience changes such as receiving compensation money, being supported for job change. This is an opportunity for human resource development.

For small-business HHs (hair cut, nail care or agricultural production) which take up a small percentage, upon resettlement at another location there may be no favorable conditions for them to maintain their current livelihood (loss of customers, location, etc.) For HHs with land acquired and compensated and supported by the project, this is still the cause of great disruption to their work of livelihood.

To minimize land acquisition impacts, in Detailed Designed preparation process Consultant needs to consult local communities to work out mitigation measures for land acquisition impacts and other negative impacts on the residents. A Resettlement Policy Framework and a Resettlement Plan for each sub-project have been prepared to ensure that all losses of people affected by the project are compensated satisfactorily.

4.2.2.2. Impacts on the community's health and safety

During the construction, a large amount of soil, stones, sand and construction materials as well as equipment will be transported to the site, increasing the number of vehicles circulated on roads as a result of congestion at rush hours and high risks of traffic accidents.

During the construction period, households at the site will be suffered from dust, emissions, noise and bad odor affecting the community's health.

4.2.2.3. Generation of social problems

The important number of outside workers of whom male dominates at the site together with irregular residents and business and entertainment activities can cause serious social problems such as violence, drug use and prostitution. Some social diseases as HIV/AIDS, hepatitis B and C may appear and widely spread;

Social problems-related issues shall be consulted in the depth-interview with the local leaders and consultation with local people in the project area as well as affected households. Mitigation measures will be revealed in the following part.

4.2.2.4. Gender-related issues

Men and women often experience the impacts of land acquisition and resettlement in different forms and to different extents by nature of their gendered roles in society. Women tend to bear greater burdens in loss of livelihood and disruption to social networks.

Female-headed households face additional challenges associated with resettlement, especially when they are reliant on extended family and social networks for the care and socialization of children.

Women are also more susceptible to the risks of HIV/AIDS infection compared to men; Women are often managing home based business to be relocated and may be particularly affected by relocation. Specific consultation with women needs to be conducted during project implementation.

4.2.2.5. Ethnic minorities-related issues

Living and earning activities of Khmer people are affected by land acquisition: For upgrading secondary and tertiary infrastructure upgrading land acquisition is needed and will affect

living and earning activities of Khmer people. 136 Khmer households will be affected and 05 will need to be relocated.

Impacts from relocationof Khmer people: Resettlement in new area,for the 5 Khmer HH to be relocated, may cause difficulties at the beginning for traders, especially those selling near or at their house.

Permanentimpacts on small-scale business households (3 HH): Resettlement in newplaces will cause dificuties for them at the begining of re-establishing their business.

Impacts on transport during construction period. The construction affects the travel need of people, especially students go to schools. Beneficiaries: Households in project area

Upgraded lanes is higher than others. After upgrading lanes, the new road suface will be 20-60cm higher than the ground of households along sides. In rainy season, the flooding may occur and could affecthouseholds living along the alleys which have been raised.

HIV/AIDs, drug use, infectious diseases, environmental pollution, violence may increasedue to conflicts of workers during construction. During construction time, many workers come and stay in LIAs, thus the social problems may occur, affecting local security. Khmer young people are particularly at risk.

4.3. ASSESSMENT OF CUMULATIVE IMPACTS

Cumulative impacts are the environmental and social effects of a project in combination with the effects of other existing projects and/or projects that are being carried out, or are reasonably foreseeable, in respect of specific components of the environment and social conditions. The assessment focuses on the effects of concurrent construction and operation of the subproject with other spatially and temporally proximate projects to ensure that the cumulative impacts are identified and evaluated in an integrated manner in the area of Soc Trang City. As such, this cumulative analysis relies on a list of related projects that have the potential to contribute to cumulative impacts in the subproject area of influence. These projects are:

a) Wastewater treatment Plant of Soc Trang city funded by KfW, Germany phase 1 and 2 (WWTP); and

b) Soc Trang Solid Waste Treatment Plant funded by Nordic, Norway (SWTP)

Geographic Scope

Cumulative impacts are assessed for related projects within a similar geographic area. This geographic area may vary, depending upon the issue area discussed and the geographic extent of the potential impact. The WWTP is located in ward 8, in close vicinity with the project investments in LIA 6, and Dien Bien Phu road. The SWTP is located in Dai Tam commune of My Xuyen district and Phu My commune of My Tu district, Soc Trang province. The SWTP is about 15 km from the sub-project site.

Project Timing

In addition to the geographic scope, cumulative impacts also take into consideration the timing of related projects relative to the proposed subproject. The main constructions of both WWTP and SWTP have been completed by the time of this analysis. Under phase 1 of its investment, the WWTP has been operated successfully. The SWTP is now in its 3-month trial operation. The additional wastes generated by Soc Trang sub-project are within the treatment capacities of both facilities.

The Soc Trang WWTP will concurrently construct some tertiary drainage network in phase 2 during 2017-2018 in LIA 1 and LIA 4 with those investments under SUUP. However the scope of work would be small and potential dust, noise impacts will be addressed adequately. Thus the cumulative impact is negligible.

Overall, given the spatial and temporal boundary, there are no planned or foreseeable projects that will have significant adverse cumulative impacts in combination with the Soc Trang City Urban Upgrading subproject.

4.4. INDUCED IMPACTS

Induced development can be a positive as well as negative cumulative impact. If not planned to conform to local physical plans, it can lead to urban sprawl along the new roads (Dien Bien Phu, road, Ring Road No2) and improved canals (Hi Tech and Tra Men A canal). However, this impact can be manageable if proper planning adopted. The positive induced impacts however will outweigh the negative ones. It is foreseeable that the land value will increase therefore land-use will significantly changed along the new roads and improved areas. Undoubtedly, the city government and the community will be benefited from the land value capture financing. This is one among many other benefits that the urban upgrading project will bring.

CHAPTER 5. ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES

5.1. ENVIRONMENTAL MITIGATION MEASURES

5.1.1. General principles

In order to minimize adverse environmental impacts, many measures haven been proposed since the preparation stage of the subproject. Surveys and design activities have been prepared with many alternatives to minimize the subproject's impacts during construction and operation processes. During the preparation of the subproject, effort has been made to avoid potential adverse impacts on resettlement and land acquisition by reducing scope and/or modification of the basic design of the subproject investment. In developing the mitigation measures the strategies to minimize and/or rectify the impacts have been applied and where appropriate compensation has been incorporated. The proposed mitigation measures to reduce the impacts due to land acquisition and resettlement are described in the RP. The following principles have been adopted in devising the mitigation measures:

- Disturbance to the life and transportation of the local people must be minimized.
- The proposed measures must be environmentally and socio-economically feasible.
- Technical standards and regulations must be abided by.
- Construction equipment and methods must be environment-friendly.
- Monitoring activities must be conducted on a regular basis.

This chapter identifies mitigation measures of the key subproject impacts during the pre-construction and construction (including measures integrated into detailed techinical design, site clearance, ground leveling, construction, and restoration) and operation phases. Given that most of the key impacts will occur due to civil works and transportation of construction/waste materials, many of the potential negative impacts on physical, biological, and social environment could be mitigated through a set of general measures that are typically applied to most of construction subprojects to minimize impacts such as noise, dust, water, waste, etc. Since there are specific impacts, this chapter also address the site-specific measures both during the construction and operation phases.

5.1.2. Measures to be integrated into the detailed technical design

The following measures will need to be included in the detailed technical designs of the works items during subproject implementation.

Component 1: Upgrading tertiary infrastructure in 6 LIAs

- Expansion of the alleys will be carried out only for the major alleys and with consent of the local communities.
- The alleys with no possibility for expansion will be upgraded within their existing boundaries to limit site clearance and disturbances within the local communities.
- Consistent investments are to be made in all the alleys (drainage and lighting systems) to synchronize them with the secondary technical infrastructure of connecting lines.

Component 2: Upgrading primary and secondary infrastructure priorities

Rehabilitating Tra Men A & Hi Tech canals (Subcomponent 2.1)

- The detailed design for canal dredging shall include the update of Dredged Material Management Plan (DMMP) with additional analysis of sediment quality, detailed information on the amount of generated sediment, requirements on contractor's dredging method, transportation and disposal that are appropriate and cost-effective.
- Detailed design will consider adequate temporary drainage to avoid potential flooding

during construction.
- The design of the embankment has been calculated on the basis of surveys on hydrologic regimes (flood levels, flow regimes, etc.), topography and geology of the area to ensure the safety and effective operation of the embankment.
- The sewer system would be proposed to be designed with box culverts, CSO and anti-odor manholes where it comes across residential areas.
- The technical design must include the position for temporary gathering of dredged sediment. This position must be well distant from residential areas and to the tail end of the wind.
- Positions of placing public waste bins along the embankments are to be included in the design so that residents could dispose of garbage properly.
- Trees would be planted along Tra Men A and Hi Tech canals to improve the landscape.

Constructing 2 bridges (Nguyen Van Linh and Ring No2 bridges)

- The design of the bridges have been calculated on the basis of surveys on hydrologic regimes (flood levels, flow regimes, etc.), topography and geology of the area to ensure the safety and effective operation of the bridges.
- Detailed designs should take into consideration the stability of bridge piers, to avoid damage to subsidence risk.
- The works design should evaluate the effects of restricting river.

Upgrading/Constructing 2 routes (Ring road No2, Dien Bien Phu road)

- The design of the route has been calculated on the basis of surveys on hydrologic regimes (flood levels, flow regimes, etc.), topography and geology of the area to ensure the safety and effective operation of the route.
- The technical designs of the streets are to comply with Circular No. 01/2016/TT-BXD dated Feb 01, 2016 on promulgating the National Technical Regulation on technical infrastructure works; and Circular No. 21/2014/TT-BXD dated Dec 29, 2014 on promulgating the National Technical Regulation on construction works to ensure access for disabled people to use.
- The roads will have drainage systems and energy-saving lighting systems ensuring aesthetic beauty; traffic signs will be placed and green tree cells will be arranged along the roads.
- The surface of the road will be designed not to raise it elevation to avoid possible water run off to the households along the two sides of the roads.
- The electrical boxes, mainholes, green cells should be designed to be located between each two households.
- Positions of placing public waste bins along the streets are to be included in the design.

Component 3: Resetlement Area

The Subproject will build a green space within the Resettlement Site. The plant species to be planted shall be consulted with URENCO, prioritising native species and avoid invasive plants. Inside the park, there will be open spaces, leisure paths, green trees, decorative electrical lights and stone benches along the walkway.

Internal roads with drainage and sewers will also be built within the Resettlement Site. Trees are planted at every 10 m on sidewalks along the roads. 90W LED lamps will be used for lighting.

5.1.3. Mitigation measures during preparation phase

5.1.3.1. Mitigation Measures for Land Acquisition

During the project preparation, the Resettlement Consultant, Technical Consultant and PMU

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

On this basis, there are 07 resettled households in Component 1; 51 resettled households in component 2 and no resettled household in component 3 which utilizes and expands the available resettlement area. These are great efforts of stakeholders for mitigation and reduction of the land acquisition area and resettlement impacts.

As presented in Chapter 4, Soc Trang subproject will affect 908 PAHs; and 09 organizations 06 wards. Among the 908 PAHs, 143 PAHs are severely affected; in which, 58 PAHs have to relocate due to the total loss of their house; The total land acquired is 164,056 m2, of which: Residential land is 24,227.3 m2; Agricultural land is 137,631.5 m2 and Public land is 2,197 m2. There are 401 PAHs whose house being affected, of which 58 PAHs being totally; 18 PAHs with business activities are temporarily affected. There are 12 vulnerable households; of which 09 single women headed households (single, widow, disabled husband) and 03 PAHs are social policy HH.

The estimated cost for the Resettlement Action Plan of the subproject is approximately **168,446,977,776** VND (equivalent to **7,486,532.35** USD at the exchange rate of 22,500 VND = 1 USD). Of which:

Table 5.1. The estimated cost for the RAP of Soc Trang subproject

No.	Component	Total	
		VND	USD
1	Component 1	45,994,924,615	2,044,218.87
2	Component 2	119,787,425,162	5,323,885.56
3	Component 3	2,664628,000	118,427.91
	Total for subject	**168,446,977,776**	**7,486,532.35**

(Source: RP report, Dec 2016)

The estimated cost for land clearance and resettlement is calculated based on provisions set by People's Committee of Soc Trang province and the policies determined by the World Bank. The Detailed mitigation measures for land acquisition are provided in the RP of the subproject.

To minimize impacts on PCRs by affected land:

In Component 2, there are 3 affected PCRs on land, including (i) Van Dien religious facility (affected by construction of Nguyen Van Linh bridge – subcomponent 2.2) is 328 m2 gardening land; (ii) Ngoc Hung pagoda is 100 m2 gardening land and 200m fence and (iii) Long Hung pagoda is 36 m2 gardening land (affected by upgrading of Dien Bien Phu, section 1 – subcomponent 2.4). The activities of the project will not affect the tangible culture, historical monuments or religious symbols in the pagodas. The results of consultation with head of pagodas show that the project is supported by all representatives of pagodas. Therefore, it will be applied the compensation policy for these receptors similar to the affected households in the same project area.

For relocation of 16 graves

- There are 16 household graves which will need to be relocated for construction of Ring road No.2 for the residential area in ward 8 under Component 2 of the subproject.
- Compensation for the removal of these graves is included in the RP of the subproject and will include the cost for buying of land for re-burial, excavation, relocation and other related costs which are necessary to satisfy customary religious requirements.

Compensation in cash will be paid to each affected family or to the affected group as a whole as is determined through a process of consultation with the affected community. The level of compensation will be decided in consultation with the affected families/communities. All costs of excavation, relocation and reburial (4,800,000 VND/grave) will be reimbursed in cash. Graves to be exhumed and relocated in culturally sensitive and appropriate ways.

- During implementation the PMU will make early announcements to the households whose graves are affected so that they can make arrangement consistent with the spiritual practices of the people and compensate the affected household as required in the subproject RP and ESMP.

5.1.3.2. Mitigation of UXO Risks

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

5.1.4. Mitigation measures during preparation phase

5.1.4.1. General mitigation measures

Environmental Codes of Practice (ECOPs) describe the general, typical requirements which will be obliged to the contractors and supervised by the construction supervision consultants during the construction period. ECOPs will be attached to the Appendices of the bidding documents and contracts documents. The scope and contents of ECOPs are as follows:

Scope: General environmental impacts mitigation measures stipulated in ECOPs are the activities minimizing the social impacts at a limited extent, which are temporary and recoverable and readily managed by good construction practices.

The typical general impacts which are minimized by the mitigation measures defined in ECOPs include: (1) Dust, exhaust gases emission, impacts of the noise and vibration; (2) wastewater management; (3) Solid waste control; (4) Hazardous waste; (5) Water pollution control; (6) Methods for controlling the impacts on aquatic species and biological creatures; (7) Controlling effects on the urban landscape and aesthetics; (8) Controlling methods of sediments, erosion and floods; (9) Land subsidence and land slide control; (10) Traffic safety control; (11) Controlling the influence to the existing infrastructures and services; (12) Controlling the social impacts; (13) Controlling the impacts on cultural and religious structures; (14) Safeguard measures for the public health; (15) Safeguard measures for the workers' health.

ECOPs are presented in deails in **Section 6.2.1.**

5.1.4.2. Site-specific Mitigation Measures

The impact assessments on the construction of bridge and roads, and embankment rehabilitation are discussed in Chapter 4, Section 4.1, which indicated the medium level of most of the environmental impacts. The Contractors will have to take mitigation measures under ECOPs to control these impacts. In order to mitigate the site - specific impacts arising from the dredging and embankment construction as well as those generated from construction of roads and bridges, the Contractors shall take the following measures:

Table 5.2. Site-specific mitigation measures during construction phase

No	Sensitive receptors and Site-Specific impacts	Site-specific mitigation measures
I	**Component 1: Tertiary Infrastructure Upgrading in LIAs**	
1	Local flooding *Residents within LIAs areas (Lia 1, Lia 2, Lia 4, Lia 6)*	- PMU will ensure that the detailed design will consider adequate temporary drainage to avoid potential flooding during construction - The Contractors must apply the specific construction methods, incorporating flood prevention and control alternatives during construction divert flow accordingly to ensure effective drainage at work locations. - The contractors must set up temporary drainage if necessary and ensure they are cleared of mud and other obstructions - Arranging standby pumps for rapid drainage in case of heavy rain or extreme weather events.
2	Social disturbances and traffic safety concerns *Local people in Lia 3, Lia 5*	- Ensure that the contract requires the contractor, before commencing work, to provide a construction plan with a detailed health, safety, environment and traffic management plan - Inform local residents in advanced (at least 07 days) about construction and work schedules, interruption of services, traffic routes etc. - Put and maintain bulletin boards at the construction site, containing the following information: full name and phone number of the Contractor, Site Manager, Supervision Consultants and Subproject Owner, duration and scope of work. - Construction in a successive manner, section by section in a short a period as feasible. Avoid simultaneous construction and delays that may affect large sections of the LIAs. - Contractors should provide lighting at all construction sites at night; security guard staff at construction sites to moderate vehicles entering and exiting the construction site; - Put road construction warning signs at the site and maintain them for the duration of the work. - Avoiding transporting waste and bulk materials during rush hours; Construction by night time is not allowed - Limit the construction area to be within the site boundary - Assign staff to control traffic during transportation, loading and unloading.
3	Increased dust, noise, vibration, waste, traffic, social disturbance to daily activities of Huong Son pagoda (20m from the construction site in LIA5) Risk on structure collapse to Huong Son Pagoda	- Inform the pagoda of the construction activities and their potential impacts such as, waste, dust, noise, traffic, and construction schedule at least 01 month before start of the construction. - The contractor shall coordinate with local authorities (leaders of local wards or communes) for agreed schedules of construction activities at sensitive times (e.g., religious festival days). Avoid construction activities during religious events every first and 15th day of the lunar month and during festival days if possible. Prohibit storage of construction materials within 100m in front of the pagoda. - Environmental training for the workers includes codes of conducts when working in public areas and sensitive receptors such as pagoda. - The contractor shall provide safety measures including installation of fences, barriers warning signs, lighting system to prevent traffic

No	Sensitive receptors and Site-Specific impacts	Site-specific mitigation measures
		accidents as well as other risk to local people and pagoda visitors. - Spray sufficient water to suppress dust during dry and windy days at least three times a day at the area of the pagodas, or as required. - Truck drivers shall restrict the use of horns close to the pagoda location - Immediately address any issue/problem caused by the construction activities and any raised by the pagoda. - The construction method shall include the measures to protect the foundation of the fence/gate, main building of the pagoda, such as using supporting pillars or steel frame to prevent the risk on infrastructure collapse/damage. - The contractor should take photos at the initial sate of the construction site, especially the alley section that passes by Huong Son Pagoda. If damage happens to the pagoda's structures, the contractor should be responsible for reconstructing the damaged structures to return it to its initial state.
II	**Component 2: Priority Primary and Secondary Infrastructures**	
II.1	***Dredging and embankment of Tra Men A and Hi-Tech canals (subcomponent 2.1)***	
1	**Impact on ecological environment** *On Hi Tech and Tra Men A canal*	- The dredging is only to be conducted during the dry season; - Dredging methods must be carefully controlled, particularly the sequential dredging of sections e.g. in 50-100 m canal lengths, commencing at the blocked end. Prior to dredging, the canal bank foundation is to be protected by timber piles and sand bag to isolate the dredged section. In each segment, water will be pumped out and dry excavation undertaken down to the design depth. After completion of each section, the excavated material will be transported off site, to minimise issues associated with dredge spoil, such as odor generation; - Strict management of generated waste, especially oil and oily rags that must be collected immediately to prevent ground or water contamination; - Workers are strictly prohibited to discharge waste into the environment, particularly the canals
2	Odors from dredging process, and nuisance and leakage during the transportation of sediments - *Residents in ward 6 (for Tra Men A canal) and ward 3, 9 (for Hi Tech canal)* - *People commuting along transportation route*	*To control impacts by dredged material:* - The Dredged Materials Management Plans (DMMPs) for the Tra Men A and Hi-Tech canals have been prepared and included in Annex 1. Overall, dredged material will be disposed at Soc Trang City Solid Waste Treatment Plant (landfill site) or used for agricultural or tree planting purpose based on actual need of the local people. - Ensure that detailed design scope for the canals dredging will include the update of DMMP with additional analysis of sediment quality, detailed information on the amount of generated sediment, requirements on contractor's dredging method, transportation and disposal that are appropriate and cost-effective. The updated DMMPs will be incorporated into the related bidding documents and contracts - Prior to construction, the contractors shall develop a specific DMMP based on the updated DMMP. The contractor's DMMPs shall be

No	Sensitive receptors and Site-Specific impacts	Site-specific mitigation measures
		submitted to the Construction Supervision Consultant for approval before starting the work. The dredging plan will indicate volumes, physical-chemical-biological properties of dredged material, dredging procedures, temporary storage of dredged materials, and control of polluting material during temporary handling and transportation, pollution control, and risks at disposal sites. - Manage to ensure sediment will be disposed appropriately according to the approved DMMP. - According to the analyses, 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. This could rather 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 Soc Trang Waste Treatment facility. *To control impacts by odors from dredging process:* - Dredged material is to be deposited along the work sites on suitable sheeting to limit leachate entering the soil, and is to be transported for disposal within the day. The management plan on dredged materials will be prepared to instruct the contractors to manage the waste source. - Uncontrolled disposal of the dredged material is prohibited and must be managed effectively under the supervision of the PMU. - In order to limit the effects of odor or contamination from the dredged material, the workers shall be equipped with the minimum personal protective equipment (PPE), including masks, boots and gloves when working in/exposed to this waste. - Spraying EM (Effective Microorganisms) every day, to limit odors from H2S, CH4, etc. - Dredged sediment will be collected, transported and treated under contract in the Soc Trang City Solid Waste Treatment Plant (landfill site). Transportation of the dredged material must meet the environmental protection requirements and avoid dredged material leakage; the dredged material carrying trunks must be covered and not overloaded.
3	Local flooding during the dredging process *Residents at each 50-100m canal segment of Tra Men A and HiTech canals*	- Ensure that the detailed design includes adequate geotechnical survey, taking into account the possibility of encountering groundwater. - Ensure the detailed design includes temporary drainage to prevent potential flooding during construction - The Contractors must apply the specific construction methods, incorporating flood prevention and control alternatives during construction divert flow accordingly to ensure effective drainage at work locations. - Contractor shall et up temporary drains as required to ensure drainage at the construction site.

No	Sensitive receptors and Site-Specific impacts	Site-specific mitigation measures
		- Arranging standby pumps for rapid drainage in case of heavy rain or extreme weather events.
4	Risk on erosion of the canal banks and embankment subsidence risk, house cracking *(Distance of 5 – 10m from construction site of Tra Men A and Hi Tech canals)*	- Ensure that the detailed design for the embankment includes hydrological and geological surveys to ensure sustainable and stable of the embankment; - Ensure that the detailed design and contractor's construction method take into account the risk of potential damage to nearby houses or other structures - Before dredging, reinforcement of banks will be conducted if considered nececssary. The construction method proposed must be submitted to the relevant authorities for approval by the contractors. - Maximise the use of high-tech equipment to reduce vibration during embankment work and closely monitor the vibration levels; - Construction of side slope in accordance with the design - Limiting dredging works during the rainy season. - Do not place heavy macheryor loaded vehicles near the canals ban edges. - Inspection and supervision to prevent landslide risks must be done regularly to prepare the appropriate reinforcement plans. - Inform the potential affected people of the nature of work and get their agreement; - In the case that property damage is likely to occur, the affected households shall be temporarily relocated prior to construction. This temporary relocation shall be carried out with appropriate consultation and and adequate compensation.
5	Social disturbance and traffic issue during construction of Tra Men canal *Residents along the first 100 m of the Tra Men A canal, starting from Maspero River and at the segment between km+1.00 and km 1.30.* *For Hi Tech canal, residents along the first 1.2 km of the canal, starting from Le Duan Road.*	- Ensure that the contract requires the contractor, before commencing work, to provide a construction plan with a detailed health, safety, environment and traffic management plan, which has to be provided to the local authorities and approved by CSC - Inform local residents in advance (at least 07 days) of construction and work schedules, interruption of services, traffic routes. Inform the community of the planned night construction at least 2 days in advance. - Put and maintain bulletin boards at the construction site, containing the following information: full name and phone number of the Contractor, Site Manager, Supervision Consultants and Subproject Owner, duration and scope of work. - Contractors should provide lighting at all construction sites at night; security guard staff at construction sites to moderate vehicles entering and exiting the construction site; - Put road construction warning signs at the site and maintain them for the duration of the work. - Sediment shall be transported out of construction site or transfer site within the day. Do not transport sediment during rush hours; - Limit the construction area to that within the designated site boundary. - Assign staff to control traffic during transportation, loading and unloading, at construction sites and sediment transfer site.

No	Sensitive receptors and Site-Specific impacts	Site-specific mitigation measures
6	Damage impact to small bridges on Hi Tech canal	- Inform the local people of the construction activities and their potential impacts such as waste, dust, and noise, traffic, especially vibration, potential damage to infrastructure and construction schedule at least 02 weeks before start of the work. - Maximise the use of high-tech equipment to reduce vibration during embankment work and closely monitor the vibration levels; - Provide appropriate traffic control signage at each small bridge across Hi Tech canal during construction - Do not place heavy machinery or loaded vehicles near the canals bank edges. - Stabilize the canal bank surrounding bridges area prior to commencing the dredging and embankment activities if required - If damage to the bridges occurs, temporary access shall be provided for the local residents and damage should be repaired or compensations given following agreement with affected households.
7	Impacts on PCRs due to upgrading of in Tra Men A canal: - Long Hung Pagoda (at 5 m distance) - Ngoc Hung Pagoda (at 25m distance) - Ngoc Phuoc Pagoda (at 5m distance)	- Inform the pagodas of the construction activities and their potential impacts such, waste, dust, and noise, traffic, and construction schedule at least 01 month before start of the construction. - The contractor shall coordinate with local authorities (leaders of local wards or communes) for agreed schedules of construction activities at sensitive times (e.g., religious festival days). Avoid construction activities during religious events every first and 15th days of the lunar month and during festival days if possible. - Prohibit storage of construction materials within 100m in front of the pagodas. - Pile driving activities will not be carried out before 7 am or after 6 pm, or at days and hours advised by the local authorities. - Environmental training for the workers includes codes of conducts when working in public areas and sensitive receptors such as pagodas. - The contractor shall provide safety measures including installation of fences, barriers warning signs, lighting system to prevent traffic accidents as well as other risk to local people and pagoda visitors. - Spray sufficient water to suppress dust during dry and windy days at least three times a day at the area of the pagodas, or as required. - Truck drivers shall restrict the use of horns close to the pagoda area - Immediately address any issue/problem caused by the construction activities and raised by the pagodas. - The construction method shall include the measures to protect the foundation of the fence/gate, main building of the pagoda, such as using supporting pillars or steel frame to prevent the risk on infrastructure collapse/damage. - In case damages happen, the contractor should take full responsibility in compensating or reconstructing the broken facilities as agreed with the pagoda
II.2	***Construction of Nguyen Van Linh bridge (subcomponent 2.2) and Ring Road No and the bridge on the road subcomponent (2.3)***	

No	Sensitive receptors and Site-Specific impacts	Site-specific mitigation measures
1	Disposal of dredged soils and sediment of Maspero river	- Only conduct dredging work during the dry seasons - Upon forecasted stormy weather, suspend all the construction activities, tidy up the sites, stabilize and protect any loose materials and construction machinery. - In case construction needs to be executed at night time or early morning, inform the community at least 2 days in advance, and only carry out the activities that will not generate excessive noise and vibration. - Place warning signs along the construction route, both on land and water surface (arrange the road and waterway traffic guide). - The dredged materials will be used to backfill at low areas in the Soc Trang city (as per organizations / household needs) or used to level landfill cells at Soc Trang city solid waste treatment plant.
2	Impacts on water environment and aquatic resources of Maspero river	- In case of material leakage from the dredged materials, the contractors will have to take all necessary measures to tidy up the areas to prevent the spread of pollution. - The construction of the bridge and as well as structures at both sides should only take place in the dry season to minimize the possibility of wash out of material into the river - Upon forecasted stormy weather, suspend all the construction activities, tidy up the sites, stabilize and protect any loose materials and construction machinery. - Before drilling, consider isolating the abutment site a coffer dam to reinforce the foundation and prevent the impact to water quality - Strictly prohibit contractors from disposing of water pumped out from excavations into the river to avoid water quality issues. - Do not store construction materials or heavy machinery and equipment near the canal (at least 50m away). - Prevent hazardous waste, waste oils or particularly oily rags from entering the river. - Limit the use of construction vehicles working in-river, as there is a risk of oil or lubricating fluids contaminating the water and also causing vibration and noise that can affect the aquatic ecosystem. - If works require restrictions to river flow, they must be evaluated for their effect on aquatic species and allowances should be made.
3	Subsidence risk in pier construction phase *Maspero river bank at the construction site of Nguyen Van Linh and Ring No2 bridges*	- Detailed designs should take into consideration the stability of bridge piers, to avoid damage. - Construction plans should seek to minimize flow interruptions to the river; restrict works in the rainy season to reduce risk to water pollution accordingly; and ensure heavy equipment and loaded vehicles are parked a safe distance from all river banks; - Ensure the constant presence of supervision consultants and contractors during construction to monitor the potential risk of erosion and landslides and if necessary take the appropriate action.
4	Impact on waterway transportation on Maspero River	- The works design should evaluate the effects of restricting river flow - Coordinate with the local authority to inform local people of the construction plan prior to construction; - Coordinate with the Department of Inland Waterway to flag the

No	Sensitive receptors and Site-Specific impacts	Site-specific mitigation measures
		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).
5	Impact to ground water quality during the drilling process *In ward 2, 6 for construction of Nguyen Van Linh bridge* *In ward 4, 8 for construction of Ring No2 bridge.*	- The use of drilling mud during pile driving is often necessary. Water-based drilling mud most commonly consists of bentonite clay (gel) with additives such as barium sulfate (barite), calcium carbonate (chalk) or hematite. - Drilling muds should be carefully controlled to minimize the risk of polluting the surrounding environment and groundwater: - Contractors should evaluate the use of methods to contain mud and maximize its recirculation and avoid leakages outside the direct work site.. - All contaminated soils should be collected, transported and treated as hazardous wastes.
6	Impact on agriculture land *along Ring Road No. 2*	- Informing the community of the construction schedule at least one week before the construction. - Arrange drainage around the construction sites to prevent soil erosion and sedimentation into the rice fields and irrigation canals. - Regularly check the affected on-field irrigation canals to ensure they are not blocked by construction spoil or waste and if they are affected, provide alternative irrigation water from canals to the locations the local people request. . - Immediately rehabilitate irrigation canals if they are damaged by construction activities to ensure that water supply for the rice fields is maintained. - Closely consult with the local community to ensure that suitable solutions to problems are taken and communities' concerns related to construction activities are addressed.
7	Impacts on sensitive locations *- Van Dien temple of Cao Dai religion (20 m away from the construction site of Nguyen Van Linh bridge)* *- Relocation of 16 graves by construction Ring road No.2 (subcomponent 2.3)* *- Bong Sen market (on the construction material and waste transportation route for construction of Nguyen*	<u>*For Van Dien temple of Cao Dai religion:*</u> - The contractor shall coordinate with local authorities (leaders of local wards or communes) for agreed schedules of construction activities at sensitive times (e.g., religious festival days). Avoid construction activities during religious events every first and 15th days of the lunar month and during festival days if possible. - Inform the pagodas of the construction activities and their potential impacts such as, waste, dust, and noise, traffic, and construction schedule at least 01 month before start of the construction. - Prohibit storage of construction materials within 100m in front of the pagodas. - Pile driving activities will not be carried out before 7 am or after 6 pm, or at days and hours advised by the local authority. - The construction method shall include the measures to protect the foundation of the fence/gate of the temple, such as using supporting pillars or steel frame.

No	Sensitive receptors and Site-Specific impacts	Site-specific mitigation measures
	Van Linh bridge and Dien Bien Phu – section 1)	- In case damages happen, the contractor should take full responsibility in compensating or reconstructing the broken facilities as agreed with the temple. - Environmental training for the workers includes codes of conducts when working in public areas and sensitive receptors such as pagodas. - Spray sufficient water to suppress dust during dry and windy days at least three times a day at the area of the pagodas, or as required. - The contractor shall provide safety measures including installation of fences, barriers warning signs, lighting system to prevent traffic accidents as well as other risk to local people and pagoda visitors. - Truck drivers shall restrict the use of horns close to the pagoda area - Immediately address any issue/problem caused by the construction activities and raised by the pagodas. - The construction method shall include the measures to protect the foundation of the fence/gate, main building of the temple, such as using supporting pillars or steel frame to prevent the risk on infrastructure collapse/damage. - In case damages happen, the contractor should take full responsibility in compensating or reconstructing the broken facilities as agreed with the temple's owner. <u>*For Bong Sen market:*</u> - Limiting to transport materials/wastes (for constructing the items of Nguyen Van Linh bridge, Dien Bien Phu road –segment 1) when passing by Bong Sen Market at the peak hours (morning: 5-9h; noon: 11-12h; afternoon and evening: 16 - 19h) which does not create any obstacles to the travelling/business activities of the residents. - Spray sufficient water to suppress dust during dry and windy days at least two times a day along the market area. - Inform household businesses/market's management unit of the construction and transportation activities and their potential impacts such, waste, dust, and noise, traffic, and construction schedule at least 02 weeks before start of the construction.
II.3	***Upgrading of Dien Bien Phu Road (section 1 and 2, Item 2.4)***	
1	Local flooding *Residents along section 1 of Dien Bien Phu road (in ward 6)*	- PMU will ensure that detailed design will consider adequate temporary drainage to avoid potential flooding during construction - The Contractors must apply the specific construction methods, and flood prevention and control alternatives during construction period or the flow diverson alternatives to ensure the drainage in the location. - Set up a temporary sewers to ensure drainage at the construction site. - Arranging standby pumps for rapid drainage in case of heavy rain or extreme weather events.
2	Impact on existing services and infrastructure *along the section 1 of Dien Bien Phu road (in*	*To control impacts on existing services and infrastructure works:* - The Contractor must only use vehicles of sizes and loads within permissible limits for the roads along such vehicles' route. - All construction works in the vicinity of power lines and telecommunication cables require a (height and voltage) risk based

No	Sensitive receptors and Site-Specific impacts	Site-specific mitigation measures
	ward 6)	approach, safety signage and height restriction controls and close safety supervision - In the event of damage, works should be halted and the damage repaired in consultation with the service provider. Contractor is responsible for financing all equipment they may damage, as approved by the Supervisor Engineer. - Reinstall the road surface and sidewalks at construction sites after the construction of sewer lines has been completed.
3	Social disturbance and traffic concern *Local people at section 1 of Dien Bien Phu road;* *Impacts on the Festival (Ok Om Bok or Moon Fest) during construction phase of Dien Bien Phu road – section 2.*	*To control impacts on social disturbance and traffic concern at section 1 of Dien Bien Phu road:* - Ensure that the contract requires the contractor, before commencing work, to provides a construction plan with a detailed health, safety, environment and traffic management plan - Inform local residents in advanced (at least 07 days) about construction and work schedules, interruption of services, traffic routes. - Inform the community of the planned night construction at least 2 days in advance. Limit the contruction activities that cause great noise and vibration by nigh time. - Put and maintain bulletin boards at the construction site, containing the following information: full name and phone number of the Contractor, Site Manager, Supervision Consultants and Subproject Owner, duration and scope of work. - Contractors should provide lighting at a construction site at night; security guard staff at construction sites to moderate vehicles go out and in the construction site; - Put the road construction warning signs at the site all the time. - Avoiding the waste/material transportation during rush hours; - Inform the community of the planned night construction at least 2 days in advance. - The construction activities are only conducted in the designated boundary - Assign staff to guide the traffic during transportation, unloading, and loading. *For the Festival (Ok Om Bok or Moon Fest):* - Coordination with local activities on construction plan during for Dien Bien Phu road –section 2 during the boat racing festival (on the14^{th} & 15^{th} October by lunar calendar every year) in order to avoid disturbing the local people and government to participate in the festival. - Collecting materials and waste sand tidy up the construction site before the Festival especially. - Limit the construction area and put the road construction warning signs at the site carefully.
4	Disruption of business activities in section 1 of Dien Bien Phu road	- Inform the street household businesses of the construction activities and their potential impacts such, waste, dust, and noise, traffic, and construction schedule at least 02 weeks before start of the construction.

No	Sensitive receptors and Site-Specific impacts	Site-specific mitigation measures
		- Set up construction and traffic warning signs at the construction site. - Provide safe and easy access to the household businesses putting clean and strong thick wood panels or steel plates over the open ditches. - Do not gather materials and wastes within 20m from household businesses and shops. - Do not use machines generating loud noise and high vibration levels near the businesses. - Spray sufficient water to suppress dust during dry and windy days at least three times a day at site. - Deploy staff to guide the traffic during construction during transportation, loading and unloading of construction materials and wastes, and to guard high risk operations. - Ensure successive supply of materials according to construction schedule, and tidy construction materials and stockpiles every working session. - Cleaning up construction areas at the end of the day, especially construction areas in front of business shops. - Providing night lighting system with luminously painted fence and night lamp. - Manage the worker force to any avoid the conflict with the local people and traders. - Compensate goods, products damaged by construction activities of the subproject. - Immediately address any issue/problem caused by the construction activities and raised by the local household traders.
5	Impacts on PCRs *Long Hung pagoda (at 5 m distance),* *Ngọc Hưng pagoda (at 5 m distance)* *Risk of collase fence or gate of the pagodas*	- The contractor shall coordinate with local authorities (leaders of local wards or communes) for agreed schedules of construction activities at sensitive times (e.g., religious festival days). Avoid construction activities during religious events every first and 15th days of the lunar month and during festival days if possible. - Inform the pagodas of the construction activities and their potential impacts such, waste, dust, and noise, traffic, and construction schedule at least 01 month before start of the construction. - Prohibit gathering of construction materials within 100m in front of the pagodas. - Pile driving activities will not be carried out before 7 am or after 6 pm, or at days and hours advised by the local management. - The construction method shall include the measures to protect the foundation of the fence/gate of the pagoda, such as using supporting pillars or steel frame. - In case damages happen, the contractor should take full responsibility in compensating or reconstructing the broken facilities as agreed with the pagoda. - Environmental training for the workers includes codes of conducts when working in public areas and sensitive receptors such as pagodas. - Spray sufficient water to suppress dust during dry and windy days at

No	Sensitive receptors and Site-Specific impacts	Site-specific mitigation measures
		least three times a day at the area of the pagodas. - The contractor shall provide safety measures as installation of fences, barriers warning signs, lighting system against traffic accidents as well as other risk to local people and goers to pagoda. - Immediately address any issue/problem caused by the construction activities and raised by the pagodas. - The construction method shall include the measures to protect the foundation of the fence/gate, main building of the pagoda, such as using supporting pillars or steel frame to prevent the risk on infrastructure collapse/damage. - In case damages happen, the contractor should take full responsibility in compensating or reconstructing the broken structures as agreed with the pagodas
II.4	***Installation of drainage system in Phu Loi and Tran Binh Trong street (Item 2.5)***	
1	Local flooding *Residents along Phu Loi and Tran Binh Trong roads*	- During detailed design, PMU will ensure that detailed design will consider adequate temporary drainage to avoid potential flooding during construction - The Contractors must apply the specific construction methods, and flood prevention and control alternatives during construction period or the flow diverson alternatives to ensure the drainage in the location. - The contractors must set up temporary drainage at the construction site and ensure that they are cleared of mud and other obstructions - Arranging the standby pumps for rapid drainage in case of heavy rain or extreme weather incidents.
2	Social disturbance and traffic safety *Local people at the areas of Phu Loi and Tran Binh Trong roads*	- Ensure that the contract requires the contractor, before commencing work, to provide a construction plan with a detailed health, safety, environment and traffic management plan - Inform local residents in advanced (at least 07 days) about construction and work schedules, interruption of services, traffic routes etc. - Put and maintain bulletin boards at the construction site, containing the following information: full name and phone number of the Contractor, Site Manager, Supervision Consultants and Subproject Owner, duration and scope of work. - Construction in a successive manner, section by section in a short a period as feasible. Avoid simultaneous construction and delays that may affect large sections of the LIAs. - Contractors should provide lighting at all construction sites at night; and security guard staff at construction sites to oversee vehicles entering and exiting the construction site; - Put road construction warning signs at the site and maintain them for the duration of the work. - Avoiding transporting waste and bulk materials during rush hours; Construction by night time is not allowed - Limit the construction area to be within the site boundary - Assign staff to control traffic during transportation, loading and unloading,

No	Sensitive receptors and Site-Specific impacts	Site-specific mitigation measures
		- Ensure that the contract requires the contractor, before commencing work, to provide a construction plan with a detailed health, safety, environment and traffic management plan Inform the community of the planned night construction at least 2 days in advance. Limit the construction activities that cause excessive noise and vibration during nighttime.
3	Impact on existing utilities along Phu Loi and Tran Binh Trong roads	*To control impacts on existing services and infrastructure works:* - The Contractor must only use vehicles of sizes and loads within permissible limits for the roads along such vehicles' route. - All construction works in the vicinity of power lines and telecommunication cables require a (height and voltage) risk based approach, safety signage and height restriction controls and close safety supervision - In the event of damage, works should be halted and the damage repaired in consultation with the service provider. Contractor is responsible for financing all equipment they may damage, as approved by the Supervisor Engineer. - Reinstall the road surface and sidewalks at construction sites after the construction of sewer lines has been completed

Mitigation measures for impacts on traffic and traffic safety due to transportation of construction materials and wastes for Soc Trang subproject

During construction, under component 1,2,3, a number of sreets and roads will be affected by transportatin of construction materials and waste as indicated in Table 5.2 below.

Table 5.3. Material and waste transport routes for Soc Trang subproject

Construction site	Estimated length (km)	Roads for transportation of material and wastes
Component 1:		
LIA 1	12	Ly Thuong Kiet road → Le Duan → Tran Hung Dao → National Highway 1A → Provincial road 939
LIA 2	15	Huynh Phan Ho and Tran Quoc Toan roads → Hung Vuong → NH 1A → PR 939
LIA 3	10	Le Duan → Tran Hung Dao road → NH 1A → PR 939
LIA 4	12	Hung Vuong → NH 1A → PR 939
LIA 5	10	Truong Cong Dinh/ Tran Binh Trong road → Phu Loi →NH 1A → PR 939
LIA 6	12	Dien Bien Phu / Cau Den Road→ Le Duan→ Tran Hung Dao→ NH 1A → PR 939
Component 2 :		
Tra Men A canal	12	Hung Vuong → NH 1A → PR 939
Hi Tech canal	10	30/4 road → PR 934 → NH 1A → PR 939

Construction site	Estimated length (km)	Roads for transportation of material and wastes
Nguyen Van Linh bridge	10	Nguyen Van Linh → Tran Hung Dao → NH 1A → PR 939
Bridge and ring road 2	13	Dien Bien Phu →Le Duan → Tran Hung Dao → NH 1A → PR 939
Dien Bien Phu road (segment 1 and 2)	12	Le Duan → Tran Hung Dao → NH 1A → PR 939
Rehabilitation of drainage system on Phu Loi, Tran Binh Trong roads	10	NH 1A → PR 939
Component 3:		
Resettlement site	12	Mac Dinh Chi → Le Duan → Tran Hung Dao → NH 1A → PR 939

Mitigation measures for impacts include:

- Clean up the transport vehicles before leaving construction site. 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.
- Do not park vehicles in the roads longer than necessary. Do not allow construction vehicles and materials to encroach upon the pavements.
- Maintain the required speed limit and do not overuse horn.
- Periodically registry and supervise the quality of transport vehicles as required by the government regulations.
- Comply with the traffic safety regulations while participating traffic
- Clean up wastes dropped off on road.
- Assign staff to guide the traffic during transportation, unloading, and loading of construction materials, equipment, and wastes.
- Place stockpile materials at a designated place tidily and successively according to construction schedule.
- Spray water three times per day to reduce dust during dry days if required.
- Reinstall the road surface if occurring the damages during construction.

5.1.5. Mitigation measures during operation phase

Mitigation measures for Component 1:

The specific impacts occurred in the stage are mainly from the operation and maintenance (O&M) of the drainage system. At the same time, the effects on traffic safety must be controlled when the number of vehicles running through alleys highly increases. The mitigation measures for these particular effects are proposed as follows:

Measures for minimizing the effects of O&M of the drainage system

- Cooperating with the local government to disseminate information on hygiene practices to the people, and prohibiting disposal of wastes into the sewer pipes;
- Carrying out periodical dredging and clearing works of the sewer pipes;

- Sweeping and cleansing pavements must include clearing the rubbish and obstructing objects on the flow/sewer inlets/heads;
- Signing contracts with the responsible agencies on collecting dredged material.

Measures for traffic safety

- Ensure that traffic safety provisions, including signs, lights, and signals regulating speeds, allowed vehicles load that were installed during construction are permanently and effectively maintained, and renewed as necessary
- Ensure, with the assistance of the traffic control authority, that overloaded vehicles do not use the road.
- Cooperating with the local government to appoint the staff for traffic regulation at peak hours;
- Ensure the city's operations and maintenance plan, and related budget, includes the work and resources required to maintain the alleys in its as-completed condition;

Mitigation measures for Component 2:

Measures for the status of direct waste disposal into the Tra Men A and Hi Tech canals

During the O&M, to control risks of pollution and flow stagnation due to disposal of waste from households living along the canals, the O&M unit will be implemented mitigation measures follow:

- Cooperating with the local government to disseminate information on hygiene practices to the people, and prohibiting to release wastes into the canals; PMU and DONRE should be in collaboration to impose much more serious penalty to polluter
- Properly arranging the waste baskets along the canal and launching programs of increasing awareness of the community toward environmental protection;
- Carrying out periodical dredging and clearing works of the canals at least 6 months/time especially before the wet season;
- Signing contracts with the responsible agencies on collecting, transporting and treating dredged material.

Measures to reduce embankment subsidence risk during operation of Hi Tech and Tra Men Canals

- City shall provide O &M Plan as well as budget source should be approved and arranged by Soc Trang City.
- Ensure the city's operations and maintenance plan, and related budget, includes the work and resources required to maintain the embankment periodically
- Closely monitor the construction of other infrastructures within the area that potentially affect the embankment structures

For Nguyen Van Linh bridge (subcomponent 2.2); Ring No.2 bridge and road (subcomponent 2.3) and Upgrading of Dien Bien Phu Road (subcomponent 2.4):

Road safety

During operation of the improved road, various vehicles will use the roads, potentially leading to an increase in traffic and pedestrian accidents, due to more,faster traffic; premature failure of pavements, drainage structures due to inadequate maintenance. Other impacts would be possibly localized flooding related.

To mitigate these impacts the following measures will be carried out by the city road maintenance agency:

- Ensure that traffic safety provisions, including signs, lights, and pavement markings that were installed during construction are permanently and effectively maintained, and renewed as necessary.
- Ensure the city's operations and maintenance plan, and related budget, includes the work and resources required to maintain the road in its as-completed condition.
- Ensure, with the assistance of the traffic control authority, that overloaded vehicles do not use the road.
- Ensure effective road inspection for any signs of damages, soil erosion and landslide for immediate repairing actions.
- Cooperating with the local government to appoint the staff for traffic regulation at peak hours;

Mitigation measures for blockage of drainage system due to inadequate maintenance

To minimize impacts by the status of blockage of drainage system due to inadequate maintenance during operation phase of Ring road No.2, Dien Bien Phu road, Phu Loi and Tran Binh Trong roads, the O&M units will be implemented mitigation measures follow:

- The management of stormwater drainage along the roads should be focused and examined regularly to detect the congested drainage sewer sections and carry out dredging.
- Conduct periodic planning decentralization and dredging sewer sections and manholes in order to minimize the flow congestion (every 6 months).
- Control disposal of dredged material: Similar to the construction phase, those who manage the water drainage systems would have contracts with relevant authorities of dredged material dredging from the sewer sections and manholes and then transport to the landfill by specialized tank trucks to avoid odor emission and spillage during transportation.

Mitigation measures for Component 3:

Implementation of the mitigation measures for impacts from dusts, noise, exhaust gases and traffic safety issues as mentioned in Component 2.

Considering potential impacts from domestic wastewater and solid waste generated from the resettlement sites, the operation management agency has to take the following mitigation measures:

- Households in the resettlement sites have to build toilets with septic tanks in accordance with regulations of the Government; the wastes from the toilets must be primarily treated in the septic tanks of each household before discharging into the public drainage system. The wastewater will be then connected to the wastewater collection and treatment system of Soc Trang city (funded by German KfW).
- The volume of the solid waste is very few and will be collected and managed by Soc Trang URENCO.

In general, the resettlement areas where there are current drainage system and waste collection areas, these impacts are very minor and under control.

5.2. SOCIAL NEGATIVE IMPACT MITIGATION MEASURES

5.2.1. Mitigate measures for land acquisition impacts

During the project preparation, the Ressettlement Consultant, Technical Consultant and PMU

has worked together to figure out technical and comparative method and selected construction method on the principle of (i) mitigating impacts from land acquistion for households in the project area; (ii) prioritizing the construction option which requires the smallest land acquisition area.

On the basis, there are 07 relocated households in Component 1; 51 relocatedhouseholds in component 2 and no relocatedhousehold in component 3. These was agreat effort of stakeholders during project preparation for mitigation and reduction of the land acquisition area and resettlement impacts

In addition, stakeholders Selected a Resettlement Site location close to former location of AHs located at 5A, Mac Dinh Chi, Soc Trang city. The average distance from theinvestments (where households to be relocated are living) to the resettlement areais 2.61 km. This is a reasonable distance to limit social and economic disruption.

To address the adverse impacts related to land acquisition and resettlement, a Resettlement Policy Framework and a Resettlement Plan for Soc Trang City have been prepared. The main principles of RPF and RP are:

- Compensate HH on the basis of replacement cost.
- Implement assistance programs to reduce to the minimum, difficulties for households during and after relocation to ensure the life of PAPs after relocation to be "better than or at least equal "as before resettlement.
- The project implementation agencies will endeavor to create favorable conditions for PAPs in order to improve living conditions, income and production levels, and at the minimum to maintain the standard of living at the pre-project level.

5.2.2. Mitigation measures for events/risks during the construction

For events/risks that may be generated from the construction period, the Project Owner and the construction unit need to make commitments and take measures on monitoring the labor safety commitments. In which:

- The Contractor must comply fully with all Vietnam’s regulations on labor safety;
- Prepare and implement the action plan for responding to risks and emergency situations;
- At each construction site and worker camp, the Contractor must equip full emergency medical services at the site (medical cabinet, necessary medical objects such as bandage, first aid medicine, etc);
- Training workers of occupational safety regulations;
- In cases of using any explosive methods, mitigation measures and safety measures should be incorporated in the environmental management plan;
- Providing workers with full labor protection equipment, especially those operate noise-causing machines, welder workers, etc in order to control noise and protect workers;
- During the demolition of existing infrastructures, workers and people should be protected from fragments by installing chutes; the traffic control and utilization of an uncrowned area are recommended.
- Erecting fences, signs of warning surrounding the site to warn people of dangerous risks;
- The Contractor will provide safety methods such as erecting fences, signals of warning, lighting system to prevent traffic accidents as well as other risks on people

and sensitive sites.

5.2.3. Mitigation measures for arising social evils

With possible social evils during the construction time: the construction unit should prioritize to recruit local workers so as for generating jobs for local people and strengthening the support of the community during the period, saving costs of building camps, reducing disturbances as a result from temporary migration, and not creating social evils caused from free immigration. At the same time, local government should prepare an active plan on communication, instructing the business households to comply with the regulations which are still satisfactory with local traditions/practices.

In addition, preparation and implementation of community's health management plan are proposed, including: control negative effects and risks on the community's health, actively prevent diseases and epidemics, efficiently respond to the epidemics and promote the communication and education in regards of risks and potentials of epidemics during the subproject construction for people and local authorities.

5.2.4. Mitigation measures for traffics disturbances

Traffic disturbances: The Construction unit must take specific consideration into location, transportation time and volume of transportation of machines, materials to avoid conflicts with the traffics at the rush hours or to prevent disturbances on traffics. The measures consist of:

- Before construction, holding consultations with the local authorities and community as well as local traffic police;
- The high increase in the number of vehicles must be integrated into the construction method which is approved before the construction phase. The distribution of transportation means, especially heavy duty vehicles must take consideration into sensitive structures as schools, hospitals and markets;
- A lighting system at night if required must be installed to ensure traffic safety;
- Placing signs/signals surrounding the construction site to ensure traffic safety, erecting instructions to other areas of the site, providing safety signs;
- Using traffic safety methods, including signs of roads/rivers/canals and appointing a flagger to warn of dangerous situations;
- Avoiding transportation of materials at rush hours;
- Corridors for pedestrians and motor vehicles going in and out of the construction site must be separated with the site and easy, suitable and safe to approach. Signs of warning must be installed in a visible position for both waterway and roadway.

5.2.5. Mitigation measures for benefit conflicts and impacts on the local economy

According to the survey, the most outstanding concern is the free migration group of workers. As mentioned, such immigration will put burden on the demographic, medical, cultural and environmental sanitation management. In fact, issues caused by the free migration can be controlled by recruiting local worker. Currently, as the unemployment rate in the project area is approximately 7%, the demand on construction workers, mason required by the project is completely fulfilled. Also, local authorities and the investor should make a consistent direction to the construction unit on this issue.

5.2.6. Impact mitigation measures on gender

A gender action plan should be established to call for the participation of women in the construction phase of the project, creating new opportunities for women to increase their

income (especially for female headed households), but not put burden on their lives, and contribute to promoting the role and status of women in the project area.

5.2.7. Impact mitigation measures on EMs

To address impacts on the Khmer community and to maximize benefits for the community, an Ethnic Minority Development Plan (EMDP) was prepared for Soc Trang City. The main content of this EMDP is summarized below.

Living and earning activities of Khmer people are affected by land acquisition: Design for limiting land acquisition: social assessment survey, consultation with Khmer people. Supply information about project components and summarize decisions of Khmer people through confirmation of the project

Impacts from replacement on Khmer people: Change the design to reduce the resettlement, for example upgrading current canal and drainage system, construct works on public land. Resettlement must satisfy cultural requirement and needs for Khmer people and arrangement in a same resettlement area to reduce impacts on their culture.

Temporary impacts on small-scale business households: Measures related to construction are taken to shorten the affecting time on business activities of these households. Income losses by the project implementation shall be compensated.

Impacts on transport during construction period: Establish rapid and precise action plan for impact mitigation. Carry out construction in peak-off hours. Implement proposed environmental plan. Suspend the construction during festivals in pagodas. Place signs and temporary fence in front of holes. Improve the capacity of accident first aid.

Upgraded lanes is higher than others: Provide loans for Khmer households to upgrade their households as part of measure on life recovery.

HIV/AIDs, drug use, infectious diseases, environmental pollution, violance increaseddue to conflicts of workers during construction: Raise awareness of contractors, workers and Khmer people of social problems and protection measures. Monitor environmental protection during construction.

5.2.8. Information disclosure and social and monitoring accountability

For ensure the participation of affected households, households and local authorities as well as relevant organizations in the project's information dissemination, the consultant for selection of technical methods will take responsibility for forecasting possible impacts on land, income and assets on land. The information disclosure document is an important contribution to speeding up the progress of the project preparation, implementation and operation with strong support of the community and PMU. This will make contribution to reducing the arising conflicts and other risks, affirming the investment efficiency and the project's social meanings.

5.3. MEASURES TO MITIGATE CUMULATIVE IMPACTS

The assessment indicates that the cumulative impacts of the Subpjoject and the associated projects are mostly positive. The negatives cumulative impacts are minor to moderate and can be addressed individually at the project level.

CHAPTER 6. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Based on the assessments of the potential adverse environmental impacts and mitigation measures proposed in Chapters 4 and 5, this Chapter presents an Environmental and Social Management Plan (ESMP) for Soc Trang project. The ESMP consists of the set of mitigation, monitoring, and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts. EMP also includes the actions needed to implement these measures. The ESMP, in this Chapter, has to be a standalone document as it would be eventually attached to the bidding and contractual documents to oblige the contractor and the subproject owner for compliance.

6.1. BASIC PRINCIPLES

The ESMP is prepared for the subproject, taken into account the needs to comply with the government's EIA regulations and WB's safeguard policies and Environmental, Health, and Safety (EHS) Guidelines.

The ESMP is developed to ensure that all pollution sources arising from the subproject activities during the preparation stage and the construction stage as well as in the operation period will not cause any negative impacts on the environment and public health. It is compulsory that the management, monitoring and supervision of environmental quality are executed in a scientific, systematic and regular manner.

ESMP's mitigation measures are divided into 2 basic parts: (1) ECOPs, (2) Specific mitigation measures for the specific types of works..

(1) All of the potential negative impacts on physical, biological, and social environment could be mitigated through a set of general measures that are typically applied to most of construction projects to minimize impacts such as noise, dust, vibration, waste generation, traffic hindrance, public safety, etc. In this context, an ECOPs has been prepared to describe the specific requirements to be carried out by contractor to mitigate the subproject potential impacts which are considered as the general ones (Section 6.2.1). The contractors will also be required to mitigate site-specific impacts which will be identified in order to address specific issues of the subproject.

(2) In addition to adopting the ECOPs, the specific mitigation measures have been identified (Section 6.2.2) for addressing the impacts associated with the specific types of works under the subproject such as canals, bridges, roads. These measures will be included in the contracts for corresponding packages.

Measures to mitigate impacts from land acquisition and resettlement are mentioned separately in the Resettlement Action Plan (RAP) and those measures will be carried out and supervised separately.

6.1.1. ECOPs

Typical common impacts which will be minimized by mitigation measures defined in ECOP include: (1) Dust, exhaust gases, noise and vibration; (2) wastewater management; (3) Solid waste management; (4) Hazardous waste; (5) Water pollution control; (6) Impacts on aquatic species and terrestrial ecology; (7) Management of impacts on urban landscape and beauty; (8) Management measures of sedimentation, erosion and flooding; (9) Traffic safety management; (10) Influence to existing infrastructure and services,(11) Management of impacts on social activities; (12) Management of impacts on cultural and religious works; (13) Measures to secure community health and safety; (14) Measures to secure worker's health and safety, (15) Management of warehouses and borrow pits, (16) Communication to local community.

Table 6.1. Environmental Codes of Practices for addressing general construction impacts (ECOPs)

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
1. Generated dust, noise, vibration, exhaust gas	• Maintain the level of emission at construction sites within the permissible limit provided for in QCVN 05: 2013/BTNMT: National Technical Regulation on Ambient Air Quality. • Vehicles in Vietnam must undergo a regular emissions check and obtain certification: "Certificate of conformity from inspection of quality, technical safety and environmental protection" following Decision No. 35/2005/QD-BGTVT. • Carry out watering for dust control at least 2 times a day: in the morning and in the afternoon during dry weather with temperatures of over 25^{o}C, or in windy weather. Avoid overwatering as this may make the surrounding muddy. • 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 by workers where dust levels are excessive • There should be no burning of waste or construction materials on site. • Cement processing plants should be far from residential areas. • Only use transportation vehicles with valid registry. • Neatly gather construction materials and wastes. Arrange for the workers to collect and gather construction materials and wastes to the designated places at the end of each day or shift. • Do not overload the materials/soils and stones to extreme heights onto trucks, as this may result in drops along transportation routes. Tightly cover the trucks carrying wastes and bulk materials before getting out of construction sites or quarries and borrow pits so as to restrict scattering along transportation routes. • Put temporarily gathered materials and waste heaps with a volume of	• QCVN 05: 2013/BTNMT: National technical regulation on ambient air quality • QCVN 26:2010/BTNMT: National technical regulation on noise • QCVN 27:2010/BTNMT: National technical regulation on vibration • 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;	Contractor	PMU, CSC, IEMC

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	about 20m^3 within barriers or covered so as to avoid dust dispersion. • Transport wastes out of construction sites to the designated locations for reuse or to the disposal sites in the soonest possible time. • Do not put vehicles and machines to run idle in more than 5 minutes. • Avoid preparations of construction materials such as mixing concrete near local people's houses or other sensitive works like pagodas, schools, markets, gates, or offices. • Locate vehicle washing stations at the exit/entrance of construction of component 1, 2, 3. • Periodically wash the trucks used for transporting materials and construction wastes. • Avoid construction operations generating great vibration and loud noise within the time between 6pm and 7am when construction takes place near residential areas. Night construction must be informed to the community at least 2 days in advance. • Perform the method of successive construction for each sewer section in construction sites of long sewer lines. • Observe and secure construction progress correctly. • Installing picket fence with height of 2.5m at construction locations for Dien Bien Phu (section 1 & 2), Ring road No.2, Phu Loi and Trang Binh Trong roads and Nguyen Van Linh, Ring No.2 bridges, resettlement site. • When needed, measures to reduce noise to acceptable levels must be implemented and could include silencers, mufflers, acoustically dampened panels or placement of noisy machines in acoustically protected areas • Avoiding or minimizing transportation through community areas and avoiding as well as material processing areas (such as cement mixing)			
2. Wastewater management	• The Contractor must be responsible for compliance with Vietnamese legislation relevant to wastewater discharges into watercourses.	• QCVN 14:2008/BTNMT:	Contractor	PMU, CSC, IEMC

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	• Employ local workers to limit the amount of generated domestic wastes and wastewater. • Provide septic tanks for toilets for treating wastewater before it can be discharged into the environment. On-site mobile toilets with 3-compartment septic tanks can be used in areas for major work items as traffic roads and canal. Wastewater from toilets as well as kitchens, showers, sinks, etc. shall be discharged into a conservancy tank for removal from the site or discharged into municipal sewerage systems; there should be no direct discharges to any waterbody • Wastewater containing pollutants over standards set by relevant Vietnamese technical standards/regulations must be collected in a conservancy tank and removed from site by licensed waste collectors**.** • Clear ditches around the workers' camps every week. • Creating ditches for rain water collection and diversion. • Make appropriate arrangements for collecting, diverting or intercepting wastewater from households to ensure minimal discharge or local clogging and flooding. • Before construction, all necessary wastewater disposal permits/licenses and/or wastewater disposal contracts have been obtained. • At completion of construction works, wastewater collection tanks and septic tanks shall be safely disposed or effectively sealed off.	National technical regulation on domestic wastewater; • QCVN 40:2011/ BTNMT: National technical regulation on industrial wastewater		
3. 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 the Contractors and it must be carefully followed during construction activities. • Before construction, all necessary waste disposal permits or licenses must be obtained. • Solid waste may be temporarily stored on site in a designated area approved by the CSC and relevant local authorities prior to collection	• Decision No, 59/2007/NĐ-CP on garbage management; • Decision No,38/2015/NĐ-CP dated 24/04/2015 on waste and scrap	Contractor	PMU, CSC, IEMC

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	and disposal through a licensed waste collector. • Waste storage containers shall be covered, tip-proof, weatherproof and scavenger proof. • No burning, on-site burying or dumping of solid waste shall occur. • If not removed off site, solid waste or construction debris shall be disposed of only at sites identified and approved by the CSC 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. • Limit waste pollution from litter and drop of materials. Place dustbins at the workers' camps. • Temporarily collect and separate domestic wastes. Provide watertight dustbins for domestic waste and tightly cover them to avoid giving rise to bad odors and leachate leakage, attracting flies, mice and other pathogenic species. • Perform concrete mixing on impermeable ground. Collect waste and wastewater containing cement through drainage ditches with sedimentation pits in construction sites before being discharged into receiving waters. • Separate the components and parts which can be reused or recycled in the construction wastes before transporting the waste to treatment in accordance with design documents acceptable to the supervision engineer. • Weathered soil, wood and bricks can be reused for useful purposes such as ground leveling. Wood scraps may be used for cooking. Corrugated iron, iron, steel, packing materials and other materials which can be recycled can be delivered and sold to scrap traders. • Collect waste and tidy up construction sites at the end of a working day/shift and the transport waste out of the construction sites in the soonest possible time. If dredged materials are to be temporarily stored,	management		

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	necessary measures must be applied to control pollution such as gathering them within enclosures, under coverings, within fenced areas, etc. with warning signs. • The Contractor will sign a contract with Soc Trang URENCO to collect solid waste, conforming to Decree No. 38/2015/ND-CP dated 24 April 2015 on management of waste and waste materials.			
4. Hazardous waste management	• Temporarily 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. • At each site or worker camp and maintenance area, the Contractor must arrange storage area or containers for hazardous waste (drum/plastic/composite containers can be used). These containers are only used to store hazardous waste and must be covered and labelled outside as "HAZARDOUS WASTE CONTAINER". • Sign contracts with for oil and grease to be delivered to suppliers/ manufacturers. • Chemical waste of any kind shall be disposed of at an approved appropriate landfill site and in accordance with local legislative requirements. The Contractor shall obtain needed disposal certificates. • The removal of asbestos-containing materials or other toxic substances shall be performed and disposed of by specially trained and certified workers. • Used oil and grease shall be removed from site and sold to an approved used oil recycling company. • Used oil, lubricants, cleaning materials, etc. from the maintenance of vehicles and machinery shall be collected in holding tanks and removed from site by a specialized oil recycling company for disposal at an approved hazardous waste site. • Used oil or oil-contaminated materials that could potentially contain	• Circular No. 36/2015/TT-BTNMT on hazardous waste management; • Decision No.38/2015/NĐ-CP dated 24/04/2015 on waste and scrap management	Contractor	PMU, CSC, IEMC

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	PCBs shall be securely stored to avoid any leakage or affecting workers. • Unused or rejected tar or bituminous products shall be returned to the supplier's production plant. • Relevant agencies shall be promptly informed of any accidental spill or incident. • Store chemicals appropriately and with appropriate labeling. • Appropriate communication and training programs should be put in place to prepare workers to recognize and respond to workplace chemical hazards. • Prepare and initiate a remedial action following any spill or incident. In this case, the contractor shall provide a report explaining the reasons for the spill or incident, remedial action taken, consequences/damage from the spill, and proposed corrective actions			
5. Water pollution	• The Contractor is responsible for controlling the surface water quality when discharging it out of the construction site, in accordance with QCVN 08-MT:2015/BTNMT – *National Technical Regulation on surface water quality* and QCVN 14:2008/BTNMT – *National Technical Regulation on domestic wastewater quality*. • Provide preliminary sedimentation ponds and ditches of storm water runoff at the construction sites. • Provide construction workers on site with mobile toilets. • Avoid excavation and backfilling during rains. • Gather materials and wastes generated during excavation and backfilling, collect and transport them out of the construction site to the approved disposal sites within the soonest possible time. • Do not allow temporary gathering of bulk materials and mixing of concrete within 50m from ponds, lakes, rivers, streams, or other water sources. • Store used and unused oil and petrol in closed containers on	• QCVN 08-MT:2015/BTNMT – National Technical Regulation on surface water quality • QCVN 09-MT:2015/BTNMT: National Technical Regulation on Underground Water Quality • QCVN 14:2008/BTNMT: National technical regulation on domestic	Contractor	PMU, CSC, IEMC

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	impermeable ground covered with roofs and contained within surrounding banks for easy control and collection in case of leakage. Do not locate oil and petrol storages within 25m from rivers/canals. • Collect and transport excavated soils from the construction of sewers and ditches out of the construction site within 24 hours. • Only perform maintenance work of motored vehicles and equipment, including oil replacement or lubrication in designated areas, without allowing chemicals, petrol, oil, or grease to leak onto soil or into the drainage system or water sources. Trays are to be used to hold rags and materials used in maintenance. Collect and discard wastes in accordance with hazardous waste management regulation	wastewater; • QCVN 40: 2011/ BTNMT: National technical regulation on industrial wastewater; • TCVN 7222: 2002: General requirements for concentrated wastewater treatment plants		
6. Impacts on plants and aquatic species	• The Contractor shall prepare a Clearance, Revegetation and Restoration Management • Plan for prior approval by the Construction Engineer, following relevant regulations. The Clearance Plan shall be approved by the Construction Supervision Consultant and followed strictly by the contractor. Areas to be cleared should be minimized as much as possible. • Limit disturbances to areas with construction operations, especially in locations covered with green trees or vegetation. Do not use chemicals to clear vegetation. • Do not gather materials and wastes at places covered with vegetation or with green trees, but on vacant land instead. • Use sheet pile driving method using Larsen piles to limit impacts on the water quality. • If possible, green trees should be moved and replanted in other places if the trees are in the way of the pipelines to be constructed. • The contractor shall remove topsoil from all areas where topsoil will be impacted by construction activities, including temporary activities such	• Law on environmental protection No. 55/2014/QH13	Contractor	PMU, CSC, IEMC

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	as storage and stockpiling, etc.; the stripped topsoil shall be stockpiled in areas agreed to by the Construction Supervision Consultant for later use in re-vegetation and shall be adequately protected. • Trees cannot be cut down unless explicitly authorized in the vegetation clearing plan. • When needed, temporary protective fencing will be erected to efficiently protect the preserved trees before commencement of any works within the site. • No area of potential importance as an ecological resource should be disturbed unless there is prior authorization from CSC, who should consult with PMU, IEMC and the relevant local authorities. This could include areas of breeding or feeding for birds or animals, fish spawning areas, or any area that is protected as a green space. • The Contractor shall ensure that no hunting, trapping, shooting, poisoning of fauna takes place.			
7. Impacts on urban landscape and beauty	• Carefully cover transport vehicles for materials and waste and periodically wash and clean the vehicles. • Dismantle the camps as well as other temporary works set up during construction and restore the site before the completed work could be handed over to the subproject owner. Back fill and tightly seal toilet pits, septic tanks, and temporary sewerage ditches. • Do not temporarily gather construction materials and wastes within 20m from the gate of schools, offices temples, pagodas, etc. • The Contractor will have to work out construction plans in such a way as to avoid the 1st and 15th days of each lunar month if construction is to be carried out near historical and cultural works such as pagodas, temples, etc. • Regularly collect materials and wastes and tidy up the construction site**.**	• Law on environmental protection No. 55/2014/QH13 • TCVN 4447:1987: Construction regulation • Circular No. 22/2010/TT-BXD on requirements on safety	Contractor	PMU, CSC, IEMC

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
8. Sedimentation, erosion, flooding, subsidence and slides	• Avoid disturbances and damage to the existing vegetation and green trees. • 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 storm water. • Carry out ground leveling and rolling after discarding materials at disposal sites.	• TCVN 4447:1987: Construction regulation • Circular No. 22/2010/TT-BXD: Regulation on construction safety • QCVN 08-MT:2015/BTNMT – National technical regulation on surface water quality	Contractor	PMU, CSC, IEMC
9. Traffic management	• Before construction, carry out consultations with local government and community and with traffic police. • Set up traffic and maintain instruction signs and warnings to secure safety for people and means of transport during construction. • 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. • Put speed limit signs at a distance of 200 m 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.	• Law on communication and transport No. 23/2008/QH12; • Law on construction No. 50/2014/QH13; • Law No. 38/2009/QH12 dated 19/6/2009 amending and supplementing some articles of the Law relating to capital construction investment • Circular No. 22/2010/TT-BXD on regulation on	Contractor	PMU, CSC, IEMC

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	• During construction near schools, deploy staff at the site to guide the traffic at the start of school time and when school is over. Water the roads to prevent dust, limit the speed of traveling trucks, do not allow flared horns, and do not dispose the waste and wastewater onto areas near schools. • Install night lighting of all construction sites. • 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. • Installation of lighting at night must be done, if necessary, to ensure safe traffic circulation. • Employ safe traffic control measures, including road/rivers/canal signs and flag persons to warn of dangerous conditions. • Avoid material transportation for construction during rush hours. • Passageways for pedestrians and vehicles within and outside construction areas should be segregated and provide for easy, safe, and appropriate access. Signposts shall be installed appropriately in both water-ways and roads where necessary.	construction safety		
10. Influence to existing infrastructure and services	• Provide information to affected households on working schedules as well as planned disruptions (at least 2 days in advance). • The Contractor must only use vehicles of sizes and loads within permissible limits for the roads along such vehicles' route. • During the construction under power lines, deploy qualified staff to observe and give instructions to the drivers of cranes and excavators so as to avoid causing damages to power lines, telecommunications lines, etc. • Stop construction when existing works are damaged. Identify causes of related incidents and work out solutions. In case the damages are due to	• Decree No. 73/2010/ND-CP on administrative penalization of violations related to security and social affairs	Contractor	PMU, CSC, IEMC

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	the Contractors' faults, the Contractors have to repair, recover, and compensate for all damages at their own expenses. The results of handling such damages must be approved by the Supervisor Engineer. • Reinstall the road surface and sidewalks at construction sites after the construction of sewer lines has been completed. • The contractor should ensure alternative water supply to affected residents in the event of disruptions lasting more than one day. • Any damages to existing cable utility systems shall be reported to the authorities and repaired as soon as possible.			
11. Social mitigation measures through worker management	• Inform the community at least 2 weeks before commencement of the construction. In case electricity and water supplies are to be disrupted, the PMU must inform PAHs of the same at least 2 days in advance. • Employ local laborers for simple tasks. Instruct workers on environmental issues, safety and health before construction tasks are assigned. It is advisable to communicate to migrant workers on local customs, practices and habits in order to avoid conflicts with local people. • The subproject 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 subproject owner and contractor are to cooperate with local authorities in preventing and fighting against social evils. Conduct sensitization campaigns with both workers and communities on these issues, liaison with local organizations to ensure monitoring, and a grievance redress system to which the community can refer to. • The subproject will cooperate with the local health agency in developing and implementing plans for control of diseases among workers. • Workers temporarily residing at the camps and rented houses must be registered with the local authorities for temporary residence.	• Decree No. 73/2010/ND-CP on administrative penalization of violations against security and social affairs • Circular No. 22/2010/TT-BXD regulation on construction safety • Directive No. 02/2008/CT-BXD on safety and sanitation issues in construction units • TCVN 5308-91: Technical regulation on construction safety • Decision No.	Contractor	PMU, CSC, IEMC

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	• Train workers on issues related to social security, social evils, diseases and epidemics, prostitution and drug use, environment, safety and health, HIV/AIDS and infectious diseases within 2 weeks prior to the commencement of packages with construction items lasting at least 6 months. • Prohibit workers from: + Consuming alcoholic drinks during working time + Quarreling and fighting + Gambling and indulging in social evils such as drug use and prostitution + Disposing of garbage indiscriminately.	96/2008/QD-TTg on clearance of UXOs		
12. Control of impacts on cultural works	• Do not gather materials and wastes within 20m from cultural, historical, and religious works such as temples, pagodas, churches, monuments, historic relics, etc. Spray water the construction sites next to such works. • Do not use machines generating loud noise and high vibration levels near cultural, historical, and religious works. • In case of archeological objects being unearthed during the implementation of earthwork, all parties will conform to the following procedures: + In case of archeological objects being unearthed during the implementation of earthwork, all parties will conform to the following procedures: + Suspend construction operations at the place of discovery; + Preliminarily describe the area where the archaeological objects are to be unearthed; + Strictly protect the area of the discovery so as not to damage or lose moveable objects. In case the unearthed objects are moveable or sensitive ruins, provide night protection until the local authorities, the Department of Culture, Sports and Tourism or the Institute of	• Law on cultural heritage No. 28/2001/QH10; • Amended and supplemented Law on cultural heritage No. 32/2009/QH12; • Amended and supplemented Decree No. 98/2010/ND-CP	Contractor	PMU, CSC, IEMC

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	Archaeology takes over these unearthed objects; + Inform the Supervision Engineer of the event and who in turn will immediately inform the subproject owner, the local authorities in charge of the case and the Institute of Archaeology (within 24 hours or less); + Local relevant agencies and the Vietnam National Administration of Tourism will be responsible for protecting and preserving such archaeological relics before making decisions on the next suitable formalities. The Institute of Archaeology may be needed in the preliminarily assessment of the unearthed objects. The significance and importance of such discovered objects will be assessed by different criteria related to the nature of cultural heritages; such criteria would include aesthetic, historical, scientific, social or economic values; + Decisions on handling such discovered objects will be made by competent levels. Such decisions can result in changes in site arrangements (e.g. when the discovered item is a cultural relic which cannot be displaced or is archaeologically important, it is necessary to preserve, recover and excavate it); + The implementation of such decision by competent agencies related to the management of discovered objects will be communicated in writing by local competent agencies; and + Only resume construction activities at the site after being permitted by the local competent agencies and the PMU in relation to safeguarding such relics.			
13. Community 's safety and health	• The Contractor will have to conform to regulations in Circular No. 22/2010/TT-BXD by the Ministry of Construction on safety in construction. • The subproject owner and contractor are to cooperate closely with the local government in performing effective community sanitation in case	• Circular No. 22/2010/TT-BXD regulation on construction safety • Directive No.	Contractor	PMU, CSC, IEMC

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	of epidemic symptoms breaking out in the area. • The subproject owner and contractor are to cooperate with local authorities in preventing and fighting against social evils. • 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 weak temporary works to restrict vibration. • The subproject will cooperate with the local health agency in developing and implementing plans for control of diseases among workers.	02/2008/CT-BXD on safety and sanitation issues in construction units • TCVN 5308-91: Technical regulation on construction safety • Decision No. 96/2008/QD-TTg on clearance of UXOs		
14. Workers' health safety	• Train workers on issues related to environment, safety and health, thus enhancing their awareness of HIV/AIDS and infectious diseases within 2 weeks prior to the commencement of packages with construction items lasting at least 6 months. • Provide workers with and request them to use adequate safety gear such as masks, helmets, shoes/boots, goggles, etc. depending on job characteristics. • 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. • Limit the speeds of vehicles traveling inside construction sites to be 5km/hour. • Provide fire-extinguishers, first-aid bags, and medical cabinets with sufficient medicines for treating general diseases in the locality must be provided at construction sites.	• Decree No. 22/2010/TT-BXD on regulation of construction safety; • Directive No. 02 /2008/CT-BXD on safety and sanitation issues in construction units; • TCVN 5308-91: Technical regulation on safety in construction; • Decision No. 96/2008/QD-TTg on	Contractor	PMU, CSC, IEMC

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	• Safely store fuels and chemicals 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. • In case of chemical and fuel leakage, the following steps will have to be taken: + Immediate check must be carried out to detect any possible case of injury. In case of injury, first-aid must be given and the injured person must be rushed to the nearest medical station for healthcare, and at the same time the case must be informed to the Supervision Engineer and the PMU; + Carry assessment to determine the kind of leaking/overflowing fuel/chemical; + Do not flush overflowing chemicals into drainage systems. Send staff with suitable safety gear to the site to handle the leakage by scattering sawdust (in case of small volumes of leaks/overflow) or sand (for high volumes of leaks/overflow). Use shovels to remove the surface soil layer if the leakage/overflow takes place on vacant land; and + Subsequent to the occurrence of such incident or accident, the Contractor will have to prepare a detailed report describing the incident and performed activities and submit the same to the Supervision Engineer and the PMU for consideration and filing. Such report will also be presented to the Department of Natural Resources and Environment or functional agencies at their request.. • Set up the camps with sufficient supplies of clean water, power, and sanitation facilities. There must be 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	clearance of UXOs.		

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	in good sanitation conditions. 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			
15. Management of warehouses and borrow pits	• All borrow pit locations to be used must be previously identified in conformity with approved construction technical specifications. Sensitive sites such as scenic spots, areas of natural habitat, areas near sensitive receiving waters, or areas near water sources should be avoided. An open ditch shall be built around the stockpile site to intercept wastewater. • Retaining walls are to set uparound disposal areas if necessary. • The use of new sites for stockpiling, gathering or exploiting materials necessary for construction operations must obtain prior approval from the Construction Engineer. • In case landowners are affected by the use of their areas for stockpiling, gathering or exploiting materials, such landowners must be included in the project resettlement plan. • If access roads are needed for these new sites, they must be considered in the environmental assessment report.		Contractor	PMU, CSC, IEMC
16. Communication to local community	• Open communications channels are to be maintained with the local government and concerned communities; the contractor shall coordinate with local authorities (leaders of local wards or communes, leaders of hamlets) for agreed schedules of construction operations in areas nearby sensitive places or during sensitive times (e.g. religious festival days). • Copies of Vietnamese versions of these ECOPs and of other relevant environmental protection documents shall be made available to local communities and to workers at the site. • Project information will be disseminated to affected parties (e.g. local authorities, enterprises and affected households, etc.) through	• Decree No. 73/2010/ND-CP on administrative penalization of violations related to security and social affairs	Contractor	PMU, CSC, IEMC

Environmental – social issues	Mitigation measures	Vietnamese regulation	Responsibility	To be supervised by
	community meetings before construction commencement. • A contact address will be provided to the community. • The community will be provided with all information, especially technical findings, in a language that is understandable to the general public and in a form convenient to interested citizens and elected officials through the preparation of fact sheets and news releases, when major findings become available during project phase. • Community concerns and requested information are to be monitored as the project progresses. • Inquiries must be responded by telephone and written correspondence in a timely and accurate manner. • Local residents must be informed about construction and work schedules, interruption of services, traffic detour routes and provisional bus routes, blasting and demolition operations, as appropriate. • Technical documents and drawings will be provided to local People's Committees, especially the sketch of construction areas and the EMP 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 staff, health and safety staff, telephone numbers and other contact information so that affected people could have a channel to voice their concerns and suggestions.			

The details on the DMMP (for Tra Men A and HiTech canals):

Prior to construction, the contractors shall prepare a specific DMMP based on the updated DMMP (see the Annex 1). The contractor's DMMPs shall be submitted to the Construction Supervision Consultant for approval before starting the work. The dredging plan will indicate volumes, physical-chemical-biological properties of dredged material, dredging procedures, temporary gathering of dredged materials, and control of polluting material during temporary gathering and transportation, pollution control, and risks at disposal sites.

6.1.2. Site-specific ESMP

Table 6.2 presents site-specific impacts and mitigation measures that are not fully addressed by the application of ECOPs. This may be because the impact is not a typical one and is not included in the ECOPs, because the severity of the impact goes beyond the scope of the mitigation measures in the ECOPs, or simply because of the very specific nature of the mitigation measure that is needed.

Table 6.2. Site-specific ESMP for Soc Trang subproject

Site-specific impacts **Sensitive receptors**	**Specific mitigation measures**	**Responsibility**	**Monitored**	**Budget & Implementing Mechanism (IM)**
COMPONENT 1: TERTIARY INFRASTRUCTURE UPGRADING IN LIAs (LIA 1, 2, 3, 4, 5, 6)				
Component 1: Preparation				
UXO clearance	The subproject owner (the subproject PMU) will sign a contract with the military civil engineering agency or Soc Trang Provincial Military Base for UXO detection and clearance at the construction sites. UXO clearance will be executed right after the completion of site compensation and before the implementation of demolition and ground leveling. The estimated cost is approximately 50 million VND/ha. No construction activity will be allowed until the UXO clearance is completed.	Competent Military Unit	PMU	- Counterpart fund. - IM: Contract
Lan acquisition and resettlement, grave relocation	Implementation of approved RP in accordance with its provision	PMU, City People's Committee	ISMC	- Counterpart fund - IM: approved RP
Component 1: Construction				
Local flooding *Residents within LIAs areas (Lia 1, Lia 2, Lia 4, Lia 6)*	- PMU will ensure that the detailed design will consider adequate temporary drainage to avoid potential flooding during construction	Detailed design consultant	PMU	- Fund: City/ or IDA/IDA SUF - IM: detailed design contract

Site-specific impacts Sensitive receptors	Specific mitigation measures	Responsibility	Monitored	Budget & Implementing Mechanism (IM)
	- The Contractors must apply the specific construction methods, incorporating flood prevention and control alternatives during construction divert flow accordingly to ensure effective drainage at work locations. - The contractors must set up temporary drainage if necessary and ensure they are cleared of mud and other obstructions - Arranging standby pumps for rapid drainage in case of heavy rain or extreme weather events.	Contractor	PMU, CSC IEMC	- Fund: IDA/IDA SUF - IM: Construction contract conditions
Social disturbances and traffic safety concerns - *Local people in Lia 3, Lia 5*	- Ensure that the contract requires the contractor, before commencing work, to provide a construction plan with a detailed health, safety, environment and traffic management plan - Inform local residents in advanced (at least 07 days) about construction and work schedules, interruption of services, traffic routes etc. - Put and maintain bulletin boards at the construction site, containing the following information: full name and phone number of the Contractor, Site Manager, Supervision Consultants and Subproject Owner, duration and scope of work. - Construction in a successive manner, section by section in a short a period as feasible. Avoid simultaneous construction and delays that may affect large sections of the LIAs. - Contractors should provide lighting at all construction sites at night; security guard staff at construction sites to moderate vehicles entering and exiting the construction site; - Put road construction warning signs at the site and maintain them for the duration of the work. - Avoiding transporting waste and bulk materials during rush hours; Construction by night time is not allowed - Limit the construction area to be within the site boundary - Assign staff to control traffic during transportation, loading and unloading.	Contractor	PMU, CSC IEMC	- Fund: IDA/IDA SUF - IM: Construction contract conditions
Impacts on the Huong Son pagoda	- Inform the pagoda of the construction activities and their potential impacts such as, waste, dust, noise, traffic, and construction schedule at least 01 month before start of	Contractor	PMU, CSC IEMC	- Fund: IDA/IDA SUF

Site-specific impacts Sensitive receptors	Specific mitigation measures	Responsibility	Monitored	Budget & Implementing Mechanism (IM)
(20 m from the construction site in LIA5)	the construction. - The contractor shall coordinate with local authorities (leaders of local wards or communes) for agreed schedules of construction activities at sensitive times (e.g., religious festival days). Avoid construction activities during religious events every first and 15th day of the lunar month and during festival days if possible. Prohibit storage of construction materials within 100m in front of the pagoda. - Environmental training for the workers includes codes of conducts when working in public areas and sensitive receptors such as pagoda. - The contractor shall provide safety measures including installation of fences, barriers warning signs, lighting system to prevent traffic accidents as well as other risk to local people and pagoda visitors. - Spray sufficient water to suppress dust during dry and windy days at least three times a day at the area of the pagodas, or as required. - Truck drivers shall restrict the use of horns close to the pagoda location - Immediately address any issue/problem caused by the construction activities and any raised by the pagoda. - The construction method shall include the measures to protect the foundation of the fence/gate, main building of the pagoda, such as using supporting pillars or steel frame to prevent the risk on infrastructure collapse/damage. - In case damages happen, the contractor should take full responsibility in compensating or reconstructing the broken structures as agreed with the pagodas			- IM: Construction contract conditions
Component 1: Operation				
Measures for minimizing the effects of O&M of the drainage system in LIAs	- Cooperating with the local government to disseminate information on hygiene practices to the people, and prohibiting disposal of wastes into the sewer pipes; - Carrying out periodical dredging and clearing works of the sewer pipes; - Sweeping and cleansing pavements must include clearing the rubbish and obstructing objects on the flow/sewer inlets/heads; - Signing contracts with the responsible agencies on collecting dredged sludge.	Soc Trang URENCO	City	- City Budget - IM: City Operation and Maintenance Plan
Measures for traffic	- Ensure that traffic safety provisions, including signs, lights, and signals regulating	Soc Trang	City	- City Budget

Site-specific impacts Sensitive receptors	Specific mitigation measures	Responsibility	Monitored	Budget & Implementing Mechanism (IM)
safety in LIAs	speeds, allowed vehicles load that were installed during construction are permanently and effectively maintained, and renewed as necessary - Ensure, with the assistance of the traffic control authority, that overloaded vehicles do not use the road. - Cooperating with the local government to appoint the staff for traffic regulation at peak hours; - Ensure the city's operations and maintenance plan, and related budget, includes the work and resources required to maintain the alleys in its as-completed condition.	city PC		- IM: City Operation and Maintenance Plan
COMPONENT 2: PRIORITY PRIMARY AND SECONDARY INFRASTRUCTURE				
Component 2: Preparation				
UXO clearance	The same component 1	Competent Military Unit	PMU	- Counterpart fund. - IM: Contractor's conditions
Lan acquisition and resettlement	The same component 1	PMU, City People's Committee	ISMC	- Counterpart fund - IM: approved RP
Impacts on PCRs by affected land: - Van Dien religious facility is 328 m2 gardening land - Ngoc Hung pagoda is 100 m2 gardening land and 200m fence - Long Hung pagoda is 36 m2 gardening land	- The activities of the project will not affect the tangible culture, historical monuments or religious symbols in the pagodas. The results of consultation with head of pagodas show that the project is supported by all representatives of pagodas. Therefore, it will be applied the compensation and support policies are presented in the RP, which is developed base on RPF of SUUP. - Implementation of approved RP in accordance with its provision	PMU, City People's Committee	ISMC	- Counterpart fund - IM: approved RP

Site-specific impacts Sensitive receptors	**Specific mitigation measures**	**Responsibility**	**Monitored**	**Budget & Implementing Mechanism (IM)**
For relocation of 16 graves for construction of Ring road No.2	- Compensation for the removal of these graves is included in the RP of the subproject and will include the cost for buying of land for re-burial, excavation, relocation and other related costs which are necessary to satisfy customary religious requirements. Compensation in cash will be paid to each affected family or to the affected group as a whole as is determined through a process of consultation with the affected community. The level of compensation will be decided in consultation with the affected families/communities. All costs of excavation, relocation and reburial (4,800,000 VND/grave) will be reimbursed in cash. Graves to be exhumed and relocated in culturally sensitive and appropriate ways. - During implementation the PMU will make early announcement to the households whose graves are affected so that they can make arrangement consistent with the spiritual practices of the people and compensate the affected household as required in the subproject RP and ESMP. - Implementation of approved RP in accordance with its provision	PMU, City People's Committee	ISMC	- Counterpart fund - IM: approved RP
Component 2: Construction				
Dredging and embankment of Tra Men A and Hi-Tech canals (subcomponent 2.1)				
Impact on ecological environment *On Hi Tech and Tra Men A canal*	- The dredging is only to be conducted during the dry season; - Dredging methods must be carefully controlled, particularly the sequential dredging of sections e.g. in 50-100 m canal lengths, commencing at the blocked end. Prior to dredging, the canal bank foundation is to be protected by timber piles and sand bag to isolate the dredged section. In each segment, water will be pumped out and dry excavation undertaken down to the design depth. After completion of each section, the excavated material will be transported off site, to minimise issues associated with dredge spoil, such as odor generation; - Strict management of generated waste, especially oil and oily rags that must be collected immediately to prevent ground or water contamination; - Workers are strictly prohibited to discharge waste into the environment, particularly the canals	Contractor	PMU, CSC IEMC	- Fund: IDA - IM: Construction contract conditions

Site-specific impacts Sensitive receptors	Specific mitigation measures	Responsibility	Monitored	Budget & Implementing Mechanism (IM)
Odors from dredging process, and nuisance and leakage during the transportation of sediments - *Residents in ward 6 (for Tra Men A canal) and ward 3, 9 (for Hi Tech canal)* - *People commuting along transportation route*	*To control impacts by dredged sludge: Tra Men A canal (8,700 m3) and HiTech canal (13,000 m3)* - The Dredged Materials Management Plans (DMMPs) for the Tra Men A and Hi-Tech canals have been prepared and included in Annex 1. Overall, sludge will be disposed at Soc Trang City Solid Waste Treatment Plant (landfill site) or used for agricultural or tree planting purpose based on actual need of the local people. - Ensure that detailed design scope for the canals dredging will include the update of DMMP with additional analysis of sediment quality, detailed information on the amount of generated sediment, requirements on contractor's dredging method, transportation and disposal that are appropriate and cost-effective. The updated DMMPs will be incorporated into the related bidding documents and contracts - Prior to construction, the contractors shall develop a specific DMMP based on the updated DMMP. The contractor's DMMPs shall be submitted to the Construction Supervision Consultant for approval before starting the work. The dredging plan will indicate volumes, physical-chemical-biological properties of dredged material, dredging procedures, temporary storage of dredged materials, and control of polluting material during temporary handling and transportation, pollution control, and risks at disposal sites. - Manage to ensure sediment will be disposed appropriately according to the approved DMMP. - According to the analyses, 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. This could rather 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 Soc Trang Waste Treatment facility. *To control impacts by odors from dredging process:* - Sludge is to be deposited along the work sites on suitable sheeting to limit leachate entering the soil, and is to be transported for disposal within the day. The management plan on dredged materials will be prepared to instruct the contractors to manage the waste source. - Uncontrolled disposal of the dredged sludge is prohibited and must be managed	Detailed design consultant Contractor	PMU, CSC IEMC	- Fund: IDA - IM: Construction contract conditions

Site-specific impacts Sensitive receptors	**Specific mitigation measures**	**Responsibility**	**Monitored**	**Budget & Implementing Mechanism (IM)**
Local flooding during the dredging process *Residents at each 50-100m canal segment of Tra Men A and HiTech canals*	- Ensure that the detailed design includes adequate geotechnical survey, taking into account the possibility of encountering groundwater. - Ensure the detailed design includes temporary drainage to prevent potential flooding during construction	Detailed design consultant	PMU	- Fund: City/ or IDA - IM: detailed design contract
	- The Contractors must apply the specific construction methods, incorporating flood prevention and control alternatives during construction divert flow accordingly to ensure effective drainage at work locations. - Contractor shall et up temporary drains as required to ensure drainage at the construction site. - Arranging standby pumps for rapid drainage in case of heavy rain or extreme weather events.	Contractor	PMU, CSC IEMC	- Fund: IDA - IM: Construction contract conditions
Risk on erosion of the canal banks and embankment subsidence risk,	- Ensure that the detailed design for the embankment includes hydrological and geological surveys to ensure sustainable and stable of the embankment; - Ensure that the detailed design and contractor's construction method take into account the risk of potential damage to nearby houses or other structures	Detailed design consultant	PMU	- Fund: City/ or IDA - IM: detailed design contract

Site-specific impacts Sensitive receptors	**Specific mitigation measures**	**Responsibility**	**Monitored**	**Budget & Implementing Mechanism (IM)**
house cracking *(Distance of 5 – 10m from construction site of Tra Men A and Hi Tech canals)*	- Before dredging, reinforcement of banks will be conducted if considered nececssary. The construction method proposed must be submitted to the relevant authorities for approval by the contractors. - Maximise the use of high-tech equipment to reduce vibration during embankment work and closely monitor the vibration levels; - Construction of side slope in accordance with the design - Limiting dredging works during the rainy season. - Do not place heavy macheryor loaded vehicles near the canals ban edges. - Inspection and supervision to prevent landslide risks must be done regularly to prepare the appropriate reinforcement plans. - Inform the potential affected people of the nature of work and get their agreement; - In the case that property damage is likely to occur ,the affected households shall be temporarily relocated prior to construction. This temporary relocation shall be carried out with appropriate consultation and and adequate compensation.	Contractor	PMU, CSC IEMC	- Fund: IDA - IM: Construction contract conditions
Social disturbance and traffic issue during construction of Tra Men canal *Residents along the first 100 m of the Tra Men A canal, starting from Maspero River and at the segment between km+1.00 and km 1.30.* *For Hi Tech canal, residents along the first 1.2 km of the*	- Ensure that the contract requires the contractor, before commencing work, to provide a construction plan with a detailed health, safety, environment and traffic management plan, which has to be provided to the local authorities and approved by CSC - Inform local residents in advance (at least 07 days) of construction and work schedules, interruption of services, traffic routes. Inform the community of the planned night construction at least 2 days in advance. - Put and maintain bulletin boards at the construction site, containing the following information: full name and phone number of the Contractor, Site Manager, Supervision Consultants and Subproject Owner, duration and scope of work. - Contractors should provide lighting at all construction sites at night; security guard staff at construction sites to moderate vehicles entering and exiting the construction site; - Put road construction warning signs at the site and maintain them for the duration of the work.	Contractor	PMU, CSC IEMC	- Fund: IDA - IM: Construction contract conditions

Site-specific impacts Sensitive receptors	Specific mitigation measures	Responsibility	Monitored	Budget & Implementing Mechanism (IM)
canal, starting from Le Duan Road.	- Sediment shall be transported out of construction site or transfer site within the day. Do not transport sediment during rush hours; - Limit the construction area to that within the designated site boundary. - Assign staff to control traffic during transportation, loading and unloading, at construction sites and sediment transfer site.			
Damage impact to small bridges on Hi Tech canal	- Inform the local people of the construction activities and their potential impacts such as waste, dust, and noise, traffic, especially vibration, potential damage to infrastructure and construction schedule at least 02 weeks before start of the work. - Maximise the use of high-tech equipment to reduce vibration during embankment work and closely monitor the vibration levels; - Provide appropriate traffic control signage at each small bridge across Hi Tech canal during construction - Do not place heavy machinery or loaded vehicles near the canals bank edges. - Stabilize the canal bank surrounding bridges area prior to commencing the dredging and embankment activities if required - If damage to the bridges occurs, temporary access shall be provided for the local residents and damage should be repaired or compensations given following agreement with affected households.	Contractor	PMU, CSC IEMC	- Fund: IDA - IM: Construction contract conditions
Impacts on PCRs due to upgrading of in Tra Men A canal: - Long Hung pagoda (at 5 m distance) - Ngoc Hung pagoda (at 25m distance) - Ngoc Phuoc	- Inform the pagodas of the construction activities and their potential impacts such, waste, dust, and noise, traffic, and construction schedule at least 01 month before start of the construction. - The contractor shall coordinate with local authorities (leaders of local wards or communes) for agreed schedules of construction activities at sensitive times (e.g., religious festival days). Avoid construction activities during religious events every first and 15th days of the lunar month and during festival days if possible. - Prohibit storage of construction materials within 100m in front of the pagodas. - Pile driving activities will not be carried out before 7 am or after 6 pm, or at days and hours advised by the local authorities. - Environmental training for the workers includes codes of conducts when working in	Contractor	PMU, CSC IEMC	- Fund: IDA - IM: Construction contract conditions

Site-specific impacts Sensitive receptors	Specific mitigation measures	Responsibility	Monitored	Budget & Implementing Mechanism (IM)
pagoda (at 5m distance)	public areas and sensitive receptors such as pagodas. - The contractor shall provide safety measures including installation of fences, barriers warning signs, lighting system to prevent traffic accidents as well as other risk to local people and pagoda visitors. - Spray sufficient water to suppress dust during dry and windy days at least three times a day at the area of the pagodas, or as required. - Truck drivers shall restrict the use of horns close to the pagoda area - Immediately address any issue/problem caused by the construction activities and raised by the pagodas. - The construction method shall include the measures to protect the foundation of the fence/gate, main building of the pagoda, such as using supporting pillars or steel frame to prevent the risk on infrastructure collapse/damage. - In case damages happen, the contractor should take full responsibility in compensating or reconstructing the broken structures as agreed with the pagodas			
Construction of Nguyen Van Linh bridge (subcomponent 2.2) and Ring Road No and the bridge on the road subcomponent (2.3)				
Disposal of dredged soils and sediment of Maspero river (2,200 m3)	- Only conduct dredging work during the dry seasons - Upon forecasted stormy weather, suspend all the construction activities, tidy up the sites, stabilize and protect any loose materials and construction machinery. - In case construction needs to be executed at night time or early morning, inform the community at least 2 days in advance, and only carry out the activities that will not generate excessive noise and vibration. - Place warning signs along the construction route, both on land and water surface (arrange the road and waterway traffic guide). - The dredged materials will be used to backfill at low areas in the Soc Trang city (as per organizations / household needs) or used to level landfill cells at Soc Trang city solid waste treatment plant.	Contractor	PMU, CSC IEMC	- Fund: IDA SUF - IM: Construction contract conditions
Impacts on water environment and aquatic resources of	- In case of material leakage from the dredged materials, the contractors will have to take all necessary measures to tidy up the areas to prevent the spread of pollution. - The construction of the bridge and as well as structures at both sides should only	Contractor	PMU, CSC IEMC	- Fund: IDA SUF - IM: Construction contract conditions

Site-specific impacts Sensitive receptors	Specific mitigation measures	Responsibility	Monitored	Budget & Implementing Mechanism (IM)
Maspero river	take place in the dry season to minimize the possibility of wash out of material into the river - Upon forecasted stormy weather, suspend all the construction activities, tidy up the sites, stabilize and protect any loose materials and construction machinery. - Before drilling, consider isolating the abutment site a coffer dam to reinforce the foundation and prevent the impact to water quality - Strictly prohibit contractors from disposing of water pumped out from excavations into the river to avoid water quality issues. - Do not store construction materials or heavy machinery and equipment near the canal (at least 50m away). - Prevent hazardous waste, waste oils or particularly oily rags from entering the river. - Limit the use of construction vehicles working in-river, as there is a risk of oil or lubricating fluids contaminating the water and also causing vibration and noise that can affect the aquatic ecosystem. - If works require restrictions to river flow, they must be evaluated for their effect on aquatic species and allowances should be made.			
Subsidence risk in pier construction phase *Maspero river bank at the construction site of Nguyen Van Linh and Ring No2 bridges*	- Detailed designs should take into consideration the stability of bridge piers, to avoid damage.	Detailed design consultant	PMU	- Fund: City/ or IDA SUF - IM: detailed design contract
	- Construction plans should seek to minimize flow interruptions to the river; restrict works in the rainy season to reduce risk to water pollution accordingly; and ensure heavy equipment and loaded vehicles are parked a safe distance from all river banks; - Ensure the constant presence of supervision consultants and contractors during construction to monitor the potential risk of erosion and landslides and if necessary take the appropriate action.	Contractor	PMU, CSC IEMC	- Fund: IDA - IM: Construction contract conditions
Impact on waterway	- The works design should evaluate the effects of restricting river flow	Detailed design	PMU	- Fund: City/ or IDA SUF- IM: detailed

Site-specific impacts Sensitive receptors	**Specific mitigation measures**	**Responsibility**	**Monitored**	**Budget & Implementing Mechanism (IM)**
transportation on Maspero River		consultant		design contract
	- Coordinate with the local authority to inform local people of the construction plan prior to construction; - Coordinate with the Department of Inland Waterway to flag the signal system on the inland waterway the transport will travel through; - Provide the workers with all appropriate PPE and ensure that life jackets are used in proximity to water. Safety staff must be available at all times for timely rescue in case of incidents. - Place warning boards along the construction route, both on land and water surface (arrange the road and waterway traffic guide).	Contractor	PMU, CSC IEMC	- Fund: IDA SUF - IM: Construction contract conditions
Impact to ground water quality during the drilling process *In ward 2, 6 for construction of Nguyen Van Linh bridge* *In ward 4, 8 for construction of Ring No2 bridge.*	- The use of drilling mud during pile driving is often necessary. Water-based drilling mud most commonly consists of bentonite clay (gel) with additives such as barium sulfate (barite), calcium carbonate (chalk) or hematite. - Drilling muds should be carefully controlled to minimize the risk of polluting the surrounding environment and groundwater: - Contractors should evaluate the use of methods to contain mud and maximize its recirculation and avoid leakages outside the direct work site.. - All contaminated soils should be collected, transported and treated as hazardous wastes.	Contractor	PMU, CSC IEMC	- Fund: IDA SUF - IM: Construction contract conditions
Impact on agriculture land *along Ring Road No. 2*	- Informing the community of the construction schedule at least one week before the construction. - Arrange drainage around the construction sites to prevent soil erosion and sedimentation into the rice fields and irrigation canals. - Regularly check the affected on-field irrigation canals to ensure they are not blocked by construction spoil or waste and if they are affected, provide alternative irrigation water from canals to the locations the local people request. - Immediately rehabilitate irrigation canals if they are damaged by construction	Contractor	PMU, CSC IEMC	- Fund: IDA SUF - IM: Construction contract conditions

Site-specific impacts Sensitive receptors	Specific mitigation measures	Responsibility	Monitored	Budget & Implementing Mechanism (IM)
	activities to ensure that water supply for the rice fields is maintained. - Closely consult with the local community to ensure that suitable solutions to problems are taken and communities' concerns related to construction activities are addressed.			
Impacts on sensitive locations - *Van Dien temple of Cao Dai religion (20 m away from the construction site of Nguyen Van Linh bridge)* - *Relocation of 16 graves by construction Ring road No.2 (subcomponent 2.3)* - *Bong Sen market (on the construction material and waste transportation route for construction of Nguyen Van Linh bridge and Dien Bien Phu – section 1)*	*For Van Dien temple of Cao Dai religion:* - The contractor shall coordinate with local authorities (leaders of local wards or communes) for agreed schedules of construction activities at sensitive times (e.g., religious festival days). Avoid construction activities during religious events every first and 15th days of the lunar month and during festival days if possible. - Inform the pagodas of the construction activities and their potential impacts such as, waste, dust, and noise, traffic, and construction schedule at least 01 month before start of the construction. - Prohibit storage of construction materials within 100m in front of the pagodas. - Pile driving activities will not be carried out before 7 am or after 6 pm, or at days and hours advised by the local authority. - Environmental training for the workers includes codes of conducts when working in public areas and sensitive receptors such as pagodas. - Spray sufficient water to suppress dust during dry and windy days at least three times a day at the area of the pagodas, or as required. - The contractor shall provide safety measures including installation of fences, barriers warning signs, lighting system to prevent traffic accidents as well as other risk to local people and pagoda visitors. - Truck drivers shall restrict the use of horns close to the pagoda area - Immediately address any issue/problem caused by the construction activities and raised by the pagodas. - The construction method shall include the measures to protect the foundation of the fence/gate, main building of the Van Dien Temple, such as using supporting pillars or steel frame to prevent the risk on infrastructure collapse/damage. - In case damages happen, the contractor should take full responsibility in	Contractor	PMU, CSC IEMC	- Fund: IDA SUF - IM: Construction contract conditions

Site-specific impacts Sensitive receptors	Specific mitigation measures	Responsibility	Monitored	Budget & Implementing Mechanism (IM)
	compensating or reconstructing the broken structures as agreed with the temple's owners. *For Bong Sen market:* - Limiting to transport materials/wastes (for constructing the items of Nguyen Van Linh bridge, Dien Bien Phu road –segment 1) when passing by Bong Sen Market at the peak hours (morning: 5-9h; noon: 11-12h; afternoon and evening: 16 - 19h) which does not create any obstacles to the travelling/business activities of the residents. - Spray sufficient water to suppress dust during dry and windy days at least two times a day along the market area. - Inform household businesses/market's management unit of the construction and transportation activities and their potential impacts such, waste, dust, and noise, traffic, and construction schedule at least 02 weeks before start of the construction.			
Upgrading of Dien Bien Phu Road (section 1 and 2, subcomponent 2.4)				
Local flooding *Residents along section 1 of Dien Bien Phu road (in ward 6)*	- PMU will ensure that detailed design will consider adequate temporary drainage to avoid potential flooding during construction	Detailed design consultant	PMU	- Fund: City/ or IDA Suf - IM: detailed design contract
	- The Contractors must apply the specific construction methods, and flood prevention and control alternatives during construction period or the flow diverson alternatives to ensure the drainage in the location. - Set up a temporary sewers to ensure drainage at the construction site. - Arranging standby pumps for rapid drainage in case of heavy rain or extreme weather events.	Contractor	PMU, CSC IEMC	- Fund: IDA SUF - IM: Construction contract conditions
Impact on existing services and infrastructure *along the section 1 of Dien Bien Phu*	*To control impacts on existing services and infrastructure works:* - The Contractor must only use vehicles of sizes and loads within permissible limits for the roads along such vehicles' route. - All construction works in the vicinity of power lines and telecommunication cables require a (height and voltage) risk based approach, safety signage and height	Contractor	PMU, CSC IEMC	- Fund: IDA SUF - IM: Construction contract conditions

Site-specific impacts Sensitive receptors	Specific mitigation measures	Responsibility	Monitored	Budget & Implementing Mechanism (IM)
road (in ward 6)	restriction controls and close safety supervision - In the event of damage, works should be halted and the damage repaired in consultation with the service provider. Contractor is responsible for financing all equipment they may damage, as approved by the Supervisor Engineer. - Reinstall the road surface and sidewalks at construction sites after the construction of sewer lines has been completed.			
Social disturbance and traffic concern *Local people at section 1 of Dien Bien Phu road;* *Impacts on the Festival (Ok Om Bok or Moon Fest) during construction phase of Dien Bien Phu road – section 2.*	*To control impacts on social disturbance and traffic concern at section 1 of Dien Bien Phu road:* - Ensure that the contract requires the contractor, before commencing work, to provides a construction plan with a detailed health, safety, environment and traffic management plan - Inform local residents in advanced (at least 07 days) about construction and work schedules, interruption of services, traffic routes. - Inform the community of the planned night construction at least 2 days in advance. Limit the contruction activities that cause great noise and vibration by nigh time. - Put and maintain bulletin boards at the construction site, containing the following information: full name and phone number of the Contractor, Site Manager, Supervision Consultants and Subproject Owner, duration and scope of work. - Contractors should provide lighting at a construction site at night; security guard staff at construction sites to moderate vehicles go out and in the construction site; - Put the road construction warning signs at the site all the time. - Avoiding the waste/material transportation during rush hours; - Inform the community of the planned night construction at least 2 days in advance. - The construction activities are only conducted in the designated boundary - Assign staff to guide the traffic during transportation, unloading, and loading. *For the Festival (Ok Om Bok or Moon Fest):* - Coordination with local activities on construction plan during for Dien Bien Phu road –section 2 during the boat racing festival (on the14th & 15th October by lunar calendar every year) in order to avoid disturbing the local people and government to	Contractor	PMU, CSC IEMC	- Fund: IDA SUF - IM: Construction contract conditions

Site-specific impacts Sensitive receptors	Specific mitigation measures	Responsibility	Monitored	Budget & Implementing Mechanism (IM)
	participate in the festival. - Collecting materials and waste sand tidy up the construction site before the Festival especially. - Limit the construction area and put the road construction warning signs at the site carefully.			
Disruption of business activities in section 1 of Dien Bien Phu road	- Inform the street household businesses of the construction activities and their potential impacts such, waste, dust, and noise, traffic, and construction schedule at least 02 weeks before start of the construction. - Set up construction and traffic warning signs at the construction site. - Provide safe and easy access to the household businesses putting clean and strong thick wood panels or steel plates over the open ditches. - Do not gather materials and wastes within 20m from household businesses and shops. - Do not use machines generating loud noise and high vibration levels near the businesses. - Spray sufficient water to suppress dust during dry and windy days at least three times a day at site. - Deploy staff to guide the traffic during construction during transportation, loading and unloading of construction materials and wastes, and to guard high risk operations. - Ensure successive supply of materials according to construction schedule, and tidy construction materials and stockpiles every working session. - Cleaning up construction areas at the end of the day, especially construction areas in front of business shops. - Providing night lighting system with luminously painted fence and night lamp. - Manage the worker force to any avoid the conflict with the local people and traders. - Compensate goods, products damaged by construction activities of the subproject. - Immediately address any issue/problem caused by the construction activities and raised by the local household traders.	Contractor	PMU, CSC IEMC	- Fund: IDA SUF - IM: Construction contract conditions

Site-specific impacts Sensitive receptors	**Specific mitigation measures**	**Responsibility**	**Monitored**	**Budget & Implementing Mechanism (IM)**
Impacts on PCRs from constructing section 1 of Dien Bien Phu road. *Long Hung pagoda (at 5 m distance),* *Ngọc Hưng pagoda (at 5m distance)*	- The contractor shall coordinate with local authorities (leaders of local wards or communes) for agreed schedules of construction activities at sensitive times (e.g., religious festival days). Avoid construction activities during religious events every first and 15th days of the lunar month and during festival days if possible. - Inform the pagodas of the construction activities and their potential impacts such, waste, dust, and noise, traffic, and construction schedule at least 01 month before start of the construction. - Prohibit gathering of construction materials within 100m in front of the pagodas. - Pile driving activities will not be carried out before 7 am or after 6 pm, or at days and hours advised by the local management. - Environmental training for the workers includes codes of conducts when working in public areas and sensitive receptors such as pagodas. - Spray sufficient water to suppress dust during dry and windy days at least three times a day at the area of the pagodas. - The contractor shall provide safety measures as installation of fences, barriers warning signs, lighting system against traffic accidents as well as other risk to local people and goers to pagoda. - Immediately address any issue/problem caused by the construction activities and raised by the pagodas. - The construction method shall include the measures to protect the foundation of the fence/gate, main building of the pagodas, such as using supporting pillars or steel frame to prevent the risk on infrastructure collapse/damage. - In case damages happen, the contractor should take full responsibility in compensating or reconstructing the broken structures as agreed with the pagodas.	Contractor	PMU, CSC IEMC	- Fund: IDA SUF - IM: Construction contract conditions
Installation of drainage system in Phu Loi and Tran Binh Trong street (Item 2.5)				
Local flooding *Residents along Phu Loi and Tran*	- During detailed design, PMU will ensure that detailed design will consider adequate temporary drainage to avoid potential flooding during construction	Detailed design consultant	PMU	- Fund: City/ or IDA - IM: detailed design contract

Site-specific impacts Sensitive receptors	**Specific mitigation measures**	**Responsibility**	**Monitored**	**Budget & Implementing Mechanism (IM)**
Binh Trong roads	- The Contractors must apply the specific construction methods, and flood prevention and control alternatives during construction period or the flow diverson alternatives to ensure the drainage in the location. - The contractors must set up temporary drainage at the construction site and ensure that they are cleared of mud and other obstructions - Arranging the standby pumps for rapid drainage in case of heavy rain or extreme weather incidents.	Contractor	PMU, CSC IEMC	- Fund: IDA - IM: Construction contract conditions
Social disturbance and traffic safety *Local people at the areas of Phu Loi and Tran Binh Trong roads*	- Ensure that the contract requires the contractor, before commencing work, to provide a construction plan with a detailed health, safety, environment and traffic management plan - Inform local residents in advanced (at least 07 days) about construction and work schedules, interruption of services, traffic routes etc. - Put and maintain bulletin boards at the construction site, containing the following information: full name and phone number of the Contractor, Site Manager, Supervision Consultants and Subproject Owner, duration and scope of work. - Construction in a successive manner, section by section in a short a period as feasible. Avoid simultaneous construction and delays that may affect large sections of the LIAs. - Contractors should provide lighting at all construction sites at night; and security guard staff at construction sites to oversee vehicles entering and exiting the construction site; - Put road construction warning signs at the site and maintain them for the duration of the work. - Avoiding transporting waste and bulk materials during rush hours; Construction by night time is not allowed - Limit the construction area to be within the site boundary - Assign staff to control traffic during transportation, loading and unloading, - Ensure that the contract requires the contractor, before commencing work, to provide a construction plan with a detailed health, safety, environment and traffic	Contractor	PMU, CSC IEMC	- Fund: IDA - IM: Construction contract conditions

Site-specific impacts Sensitive receptors	Specific mitigation measures	Responsibility	Monitored	Budget & Implementing Mechanism (IM)
	management plan Inform the community of the planned night construction at least 2 days in advance. Limit the construction activities that cause excessive noise and vibration during nighttime.			
Impact on existing utilities along Phu Loi and Tran Binh Trong roads	*To control impacts on existing services and infrastructure works:* - The Contractor must only use vehicles of sizes and loads within permissible limits for the roads along such vehicles' route. - All construction works in the vicinity of power lines and telecommunication cables require a (height and voltage) risk based approach, safety signage and height restriction controls and close safety supervision - In the event of damage, works should be halted and the damage repaired in consultation with the service provider. Contractor is responsible for financing all equipment they may damage, as approved by the Supervisor Engineer. - Reinstall the road surface and sidewalks at construction sites after the construction of sewer lines has been completed	Contractor	PMU, CSC IEMC	- Fund: IDA - IM: Construction contract conditions
Component 2: Operation				
Opration of Tra Men A and Hi Tech Canals (Subcomponent 2.1)				
Measures for the status of direct waste disposal into the Tra Men A and Hi Tech canals	- Cooperating with the local government to disseminate information on hygiene practices to the people, and prohibiting to release wastes into the canals; O&M unit and DONRE should be in collaboration to impose much more serious penalty to polluter - Properly arranging the waste baskets along the canal and launching programs of increasing awareness of the community toward environmental protection; - Carrying out periodical dredging and clearing works of the canals at least 6 months/time especially before the wet season; - Signing contracts with the responsible agencies on collecting, transporting and treating dredged sludge.	Soc Trang city PC	City	City Budget IM: City Operation and Maintenance Plan
Measures to reduce embankment subsidence risk	- City shall provide O &M Plan as well as budget source should be approved and arranged by Soc Trang City. - Ensure the city's operations and maintenance plan, and related budget, includes the	Soc Trang city PC	City	City Budget IM: City Operation and Maintenance

Site-specific impacts Sensitive receptors	Specific mitigation measures	Responsibility	Monitored	Budget & Implementing Mechanism (IM)
during operation of Hi Tech and Tra Men Canals	work and resources required to maintain the embankment periodically - Closely monitor the construction of other infrastructures within the area that potentially affect the embankment structures			Plan
For Nguyen Van Linh bridge (subcomponent 2.2); Ring No.2 bridge and road (subcomponent 2.3) and Upgrading of Dien Bien Phu Road (subcomponent 2.4):				
Road safety	- Ensure that traffic safety provisions, including signs, lights, and pavement markings that were installed during construction are permanently and effectively maintained, and renewed as necessary. - Ensure the city's operations and maintenance plan, and related budget, includes the work and resources required to maintain the road in its as-completed condition. - Ensure, with the assistance of the traffic control authority, that overloaded vehicles do not use the road. - Ensure effective road inspection for any signs of damages, soil erosion and landslide for immediate repairing actions. - Cooperating with the local government to appoint the staff for traffic regulation at peak hours.	Soc Trang city PC	City	City Budget IM: City Operation and Maintenance Plan
Mitigation measures for blockage of drainage system due to inadequate maintenance	- The management of stormwater drainage along the roads should be focused and examined regularly to detect the congested drainage sewer sections and carry out dredging. - Conduct periodic planning decentralization and dredging sewer sections and manholes in order to minimize the flow congestion (every 6 months). - Control disposal of sludge: Similar to the construction phase, those who manage the water drainage systems would have contracts with relevant authorities of sludge dredging from the sewer sections and manholes and then transport to the landfill by specialized tank trucks to avoid odor emission and spillage during transportation.	Soc Trang URENCO	City	City Budget IM: City Operation and Maintenance Plan
COMPONENT 3: RESETTLMENT SITE				
Component 3: Preparation				

Site-specific impacts Sensitive receptors	**Specific mitigation measures**	**Responsibility**	**Monitored**	**Budget & Implementing Mechanism (IM)**
UXO clearance	The same component 1	Competent Military Unit	PMU	- Counterpart fund.
Lan acquisition and resettlement	The same component 1	PMU, City People's Committee	ISMC	- Counterpart fund - IM: approved RP
Component 3: Construction				
Genericenvironmental impacts	- Applied the ECOPs (see 6.1.1)	Contractor	PMU, CSC IEMC	- Fund: IDA - IM: Construction contract conditions
Component 3: Operation				
Dusts, noise, exhaust gases and traffic safety issues	- Implementation of the mitigation measures for impacts from dusts, noise, exhaust gases and traffic safety issues as mentioned in Component 2.	Soc Trang city PC	City	City Budget IM: City Operation and Maintenance Plan
Domestic wastewater and solid waste generated from residents in the resettlement site	- The generated wastewater from resettlement site is about 23 m3/day. Households in the resettlement sites have to build toilets with septic tanks in accordance with regulations of the Government; the wastes from the toilets must be primarily treated in the septic tanks of each household before discharging into the public drainage system. The wastewater will be then connected to the wastewater collection and treatment system of Soc Trang city (funded by German KfW). - The volume of the solid waste (144 kg/day) is very few and will be collected and managed by Soc Trang URENCO.	Soc Trang URENCO	City	City Budget IM: City Operation and Maintenance Plan

6.1.3. Responsibilities for the implementation

The operating unit has responsible for implementing environmental mitigation measures during operation of the project. Responsibilities for the implementation areshown in the Table 6.3 below:

Table 6.3. Responsibilities for implementation of mitigation measures in operation phase

No	Items	Subproject owner	Representative of subproject owner	Operator
1	LIAs	Soc Trang Province Department of Construction (Soc Trang DoC)	Soc Trang PMU	Soc Trang city People's Committee
2	Tra Men A & HiTech canals			
3	Nguyen Van Linh bridge			
4	Ring road No.2 and bridge			
5	Dien Bien Phu road			
6	Sewer system on Phu Loi and Tran Binh Trong road			Soc Trang URENCO
7	Resettlement site	Soc Trang DoC	Soc Trang PMU	Soc Trang city People's Committee

6.2. ROLE AND RESPONSIBILITIES FOR ESMP IMPLEMENTATION

6.2.1. Implementation Arrangement

The tables and figures below summarize the roles and responsibilities of the key parties and their relationships regarding the implementation of the ESMP.

- 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 costsare included in the CSC service contract;
- IEMC will be responsible for overall environmental monitoring which includes support to the PMU in implementing environmentalsupervision and monitoring, and responsible for reporting on the implementation through monitoring reports.

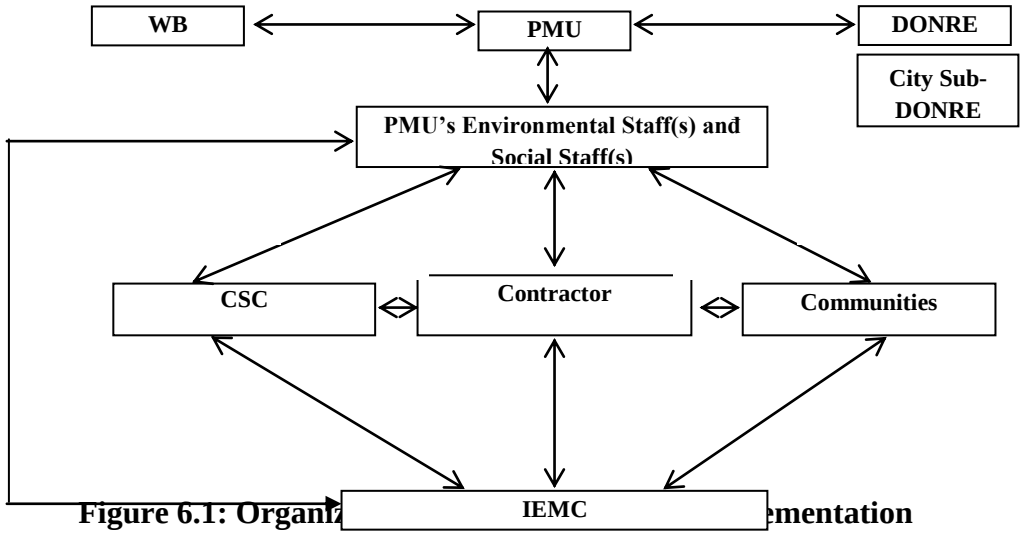


Figure 6.1: Organiz… …ementation

Table 6.4. Annotation on Roles and responsibilities

Community/Agencies	Responsibilities
PMU	- PMU will be responsible for monitoring the overall subproject implementation, including environmental compliance of the subproject. PMU will have the final responsibility for ESMP implementation and environmental performance of the subproject during the construction and operational phases. - Specifically the PMU will: (i) closely coordinate with local authorities in the participation of the community during subproject preparation and implementation; (ii) Ensure that the detailed design include all environment provisions as indicated in the ESMP; (iii) monitor and supervise ESMP implementation including incorporation of ESMP into the detailed technical designs and bidding and contractual documents; (iv) ensure that an environmental management system is set up and functions properly; (v) be in charge of reporting on ESMP implementation to the DONRE and the World Bank. - In order to be effective in the implementation process, PMU will assign Environmental Staff(s) (ES) to help with the environmental aspects of the subproject.
PMU Environmental and Social Staff(s) (ES)	- The ES is responsible for monitoring the implementation of the World Bank's environmental and social safeguard policies in all phases and process of the subproject. Specifically, ES will be responsible for: (i) helping PMU incorporate ESMP into the detailed technical designs and civil works bidding and contractual documents; (ii) helping PMU incorporate responsibilities for ESMP and RAP monitoring and supervision into the TORs, bidding and contractual documents for the Construction Supervision Consultant (CSC) and other safeguard consultant (IEMC) as needed; iii) providing relevant inputs to the consultant selection process; (iv) reviewing reports submitted by the CSC and safeguard consultants; (v) conducting periodic site checks; (vi) helping the PMU on solutions to handle social and resettlement issues of the subproject; and vii) preparing environmental and social performance section on the progress and review reports to be submitted to the DONRE and the World Bank.
Construction Supervision Consultant (CSC)	- The CSC will assgin Environmental and Social Staff(s) and will be responsible for routine supervising and monitoring all construction activities and for ensuring that Contractors comply with the requirements of the contracts and the ECOP. The CSC will engage sufficient number of qualified staff (e.g. Environmental Engineers) with adequate knowledge on environmental protection and construction subproject management to perform the required duties and to supervise the Contractor's performance. - The CSC will also assist the PMU in reporting and maintaining close coordination with the local community.
Contractor	- The contractor will assign Enviromental and Social Staff(s) to carry out Enviromental and Social mitigation measures proposed in ESIA/ESMP. - Based on the approved environmental specifications (ECOP) in the bidding and contractual documents, the Contractor is responsible for establishing a Contractor ESMP (CESMP) for each construction site area, submit the plan to PMU and CSC for review and approval before commencement of construction. In addition, it is required that the

	Contractor get all permissions for construction (traffic control and diversion, excavation, labor safety, etc. before civil works) following current regulations. - The Contractor is required to appoint a competent individual as the contractor's on-site *Safety and Environment Officer (SEO)* who will be responsible for monitoring the contractor's compliance with health and safety requirements, the CESMP requirements, and the environmental specifications (ECOP). - Take actions to mitigate all potential negative impacts in line with the objective described in the CESMP. - Actively communicate with local residents and take actions to prevent disturbance during construction. - Ensure that all staff and workers understand the procedure and their tasks in the environmental management program. - Report to the PMU and CSC on any difficulties and their solutions. - Report to local authority and PMU and CSC if environmental accidents occur and coordinate with agencies and keys stakeholders to resolve these issues.
Independent Envionmental Monitoring Consultants (IEMC)	- IEMC will, under the contract scope, provide support to PMU to establish and operate an environmental management system, offers suggestions for adjusting and building capacity for relevant agencies during subproject implementation and monitor the site-speific ESMP implementation in both construction and operation phases. IEMC will also be responsible to support PMU to prepare monitoring reports on site-speific ESMP implementation. - The IEMC will have extensive knowledge and experience in environmental monitoring and auditing to provide independent, objective and professional advice on the environmental performance of the subproject. - Carry out the periodical environmental quality monitoring during construction period.
Local community	- Community: According to Vietnamese practice, the community has the right and responsibility to routinely monitor environmental performance during construction to ensure that their rights and safety are adequately protected and that the mitigation measures are effectively implemented by contractors and the PMU. If unexpected problems occur, they will report to the CSC and PMU.
Province and City People's Committees (PPCs/DPCs), Provincial DONRE	- Oversee implementation of subprojects under recommendations of DONRE and PMU to ensure compliance of Government policy and regulations. DONRE is responsible for monitoring the compliance with the Government environmental requirements.

Evaluation of PMU's existing

Regarding project implementation experience

These project have been carried out by Soc Trang Province Department of Construction on behalf of Soc Trang Provincial People's Committee.

Soc Trang city has not implemented any projects financed by WB/ADB or other IFCs, especially urban upgrade projects like SUUP. At the same time, organizational structures and duties have no unit/agency specialized in management/implementation of projects with capital sources from donors. Therefore, experience and implementation capability is very limited in comparison with the donor's requirements.

Capability of staff:

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

Equipment

The PMU will also need to be provided, equipped and updated with new computer software to be used in financial and accounting managementas well as data analyses and consolidation, suiting the accounting standards of both the Vietnamese system and the Donor's system, so that a most suitable and optimal accounting system could be set up to handle finance-accounting management tasks.

6.2.2. Environmental Compliance Framework

(i) Environmental 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.

Prior to construction, the contractor will be required to prepare and submit a contractor's site-specific Environmental Management Plan (Contractor's SEMP) to the CSC and PMU based on the ESMP of the project and requirement in the Specification of Bidding Document. The contractor's site-specific SEMP shall demonstrate compliance with Vietnamese environmental technical regulations/ standards, the mitigation measures set down in the specifications and the World Bank Safeguard Policies. The content of the site-specific SEMP shall be in line with the subproject specific ESMP and shall be enhanced by the Contractor's works practices, implementation procedures and program. The site-specific SEMP shall be certified by the CSC with subsequent submission to the PMU for approval. No construction activity should be implemented before approval of the contractor's site-specific SEMP.

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

The duties of the Contractor include but not limiting to:

- Compliance with relevant legislative requirements governing the environment, public health and safety;
- Work within the scope of contractual requirements and other tender conditions;

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

(ii) 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.

(iii) Independent Environmental Monitoring Consultant (IEMC)

In order to minimize the environmental impacts during construction phase of the Project, the Project owner shall ensure that environmental quality monitoring requirements are established for the project. An IEMC appointed by PMU shall carry out the monitoring.

- IEMC will be responsible for carrying out environmental sampling, monitoring and marking report during subproject implementation. Environmental monitoring will be report periodically to PMU and World Bank (respectively every 03 months for PMU and every 6 months for WB in construction phase).
- IEMC will also supply specialized assistance to PMU and ES in environmental matters.

(iv) 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 subproject 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,
- Supervise site environmental management system of contractors including their performance, experience and handling of site environmental issues, and provide corrective instructions;
- Review the ESMP implementation by the contractors, verify and confirm environmental supervision procedures, parameters, monitoring locations, equipment and results;
- Report ESMP implementation status to PMU and prepare the environmental supervision statement during the construction phase; and

(v) Compliance with Legal and Contractual Requirements

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

All the works method statements submitted by the Contractor to the CSC and 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.

(vi) Environmental Claims and Penalty System

In the compliance framework, if non-compliance with environmental regulations are discovered by CSC/ES/IEMC/PMU during the site supervision, 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 performs the repairs within the grace period (confirmed by CSC/PMU), no penalty is incurred and keeping money will be pay. 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.

(vii) Reporting Arrangements

ESMP monitoring and reporting requirements are summarized in table 6.5.

Table 6.5. Regular Reporting Requirements

No.	Report Prepared by	Submitted to	Frequency of Reporting
1	Contractor to the Employer	PMU	Once before construction commences and monthly thereafter
2	Construction Supervision consultant (CSC)	PMU	Weekly and monthly
4	Community Monitoring	PMU	When the community has any complaint about the subproject safeguards implementation
5	IEMC	PMU	Every three-month
6	PMU	DONRE	Every six-month
7	PMU	WB	Every six-month

6.2.3. Estimated Costs for Each Work of Environmental Protection Measures

Table 6.6. Regular Reporting Requirements

NO.	Works	Costs (estimated)	
		VNĐ	USD
1	Renting areas for dumping mud/dredged material	100,000,000	4,480
2	Construction site fencing	100,000,000	4,480
3	Prevention and control of fire and explosion (fire extinguishers, fire hoses, emergency lights)	100,000,000	4,480
4	Watering and sprinkling	150,000,000	6,720
5	Trash bins on site	50,000,000	2,240
6	Portable toilet	60,000,000	2,688
7	Standby pump	50,000,000	2,240
8	Planting trees at the roads and canals	300,000,000	13,441
9	Demining	800,000,000	35,842
10	**Total**	**1,710,000,000**	**76,613**

6.3. ENVIRONMENT MONITORING PROGRAM

6.3.1. Monitoring Location, Parameters and Frequency

The environmental monitoring and supervision for pre-construction, construction and operation phases for the entire project is presented in the below table. Sampling locations are described in the Annex and the number of samples are made in accordance with progress of each work.

Table 6.7. Location, parameters and frequency of monitoring

No	Monitored items	Preparation and construction phase
I	**Monitoring of air quality, noise, vibration**	
	1. Monitoring parameters	Noise, TSP, CO, NO_2, SO_2, L_{eq}, vibration
	2. Monitoring frequency	Preparation phase: 01 time before construction Construction phase: measurements taken every six-months
	3. Applied Regulation	QCVN 05:2013/BTNMT, QCVN 06:2009/BTNMT; QCVN 26:2010/BTNMT; QCVN 27:2010/BTNMT
	4. Monitoring positions	140 samples (Sampling locations are presented in Appendix)
II	**Surface Water Quality Monitoring**	
	1.Monitoring parameters	pH, DO, COD, BOD, $N\text{-}NH_4^+$, $N\text{-}NO_2^-$, $N\text{-}NO_3^-$, $P\text{-}PO_4^{3-}$, oil & grease, Coliform, Cl^-, Fe, TSS
	2. Monitoring frequency	Preparation phase: 01 time before construction Construction phase: measurements taken every six-months
	3. Applied Regulation	QCVN 08-MT:2015/BTNMT
	4. Monitoring positions	78 samples (Sampling locations are presented in Appendix)
III	**Wastewater quality monitoring**	
	1.Monitoring parameters	pH, BOD_5, COD, H_2S, $N\text{-}NH_4$, $N\text{-}NO_3$, $P\text{-}PO_4$, oil & grease, Coliforms, TSS
	2.Monitoring frequency	Preparation phase: 01 time before construction Construction phase: Do not monitor
	3. Applied Regulation	QCVN 14:2008/BTNMT
	4. Position monitoring	49 samples (Sampling locations are presented in Appendix)
IV	**Soil/sediments**	
	1. Monitoring parameters	As, Cd, Cu, Pb, Zn, Cr
	2. Monitoring frequency	Preparation phase: 01 time before construction Construction phase: measurements taken every six-months
	3. Applied Regulation	QCVN 03-MT:2015/BTNMT; QCVN 43:2012/BTNMT
	4. Monitoring positions	68 samples (Sampling locations are presented in Appendix)
V	**Monitoring of erosion**	**During embankment construction**
VI	Monitoring of solid waste	Monitoring volume of waste generated and dredged materials

No	Monitored items	Preparation and construction phase
VI	Monitoring of hazardous waste	Monitoring volume at storage location

6.3.2. 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 the table below:

Table 6.8. Estimated cost for samples and analysis

No	Works	Unit	Quantity	Price (VND)	Sub-Total (1 USD = 22,320 VNĐ)	
				VND	*VND*	*USD*
I	**Pre-construction phase**					
1	*Air, noise*	sample	*20*			
	Component 1	sample	6	2,000,000	12,000,000	538
	Component 2	sample	12	2,000,000	24,000,000	1,075
	Component 3	sample	2	2,000,000	4,000,000	179
2	*Soil, sediment*	sample	*8*			-
	Component 1	sample	2	1,000,000	2,000,000	90
	Component 2	sample	6	1,000,000	6,000,000	269
	Component 3	sample	0	1,000,000	-	-
3	*Surface water*	sample	*10*			-
	Component 1	sample	3	2,500,000	7,500,000	336
	Component 2	sample	6	2,500,000	15,000,000	672
	Component 3	sample	1	2,500,000	2,500,000	112
4	*Wastewater*	sample	*7*			-
	Component 1	sample	0	2,000,000	-	-
	Component 2	sample	6	2,000,000	12,000,000	538
	Component 3	sample	1	2,000,000	2,000,000	90
5	*Preparing report*	Report	*1*	10,000,000	10,000,000	448
II	**Construction phase**	sample			-	-
1	*Air, noise*	*sample*	*120*		-	-
	Component 1	sample	36	2,000,000	72,000,000	3,226
	Component 2	sample	80	2,000,000	160,000,000	7,168
	Component 3	sample	4	2,000,000	8,000,000	358
2	*Soil, sediment*	*sample*	*60*		-	-
	Component 1	sample	12	1,000,000	12,000,000	538
	Component 2	sample	48	1,000,000	48,000,000	2,151
	Component 3	sample	0	1,000,000	-	-
3	*Surface water*	*sample*	*68*		-	-
	Component 1	sample	18	2,500,000	45,000,000	2,016
	Component 2	sample	48	2,500,000	120,000,000	5,376
	Component 3	sample	2	2,500,000	5,000,000	224
4	*Wastewater*	*sample*	*42*		-	-
	Component 1	sample	0	2,000,000	-	-
	Component 2	sample	40	2,000,000	80,000,000	3,584
	Component 3	sample	2	2,000,000	4,000,000	179
5	*Preparing report*	*Pcs.*	*16*	*5,000,000*	*80,000,000*	*3,584*
	TOTAL				**731,000,000**	**32,751**

6.4. TRAINING AND CAPACITY BUILDING

The table 6.9 below provides a typical training program on safety policies. Training programs will be developed and implemented by a team of Technical Assistance for the implementation

of safety policies for PMU. PMU / IEMC with the help of the Technical Assistance Team will provide training for contractors, CSC and other groups.

- *Trainee groups:* the PMU staff, the ESU department staff, the field engineers (FE), construction supervision consultants (CSC), the building 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 6.9. Advanced training program on environmental monitoring management capacity

I. Subjects	**PROJECT MANAGEMENT UNIT**
Training course	Environmental monitoring and reporting
Participants	Staff in charge of environmental issues;environmental managers
Training frequency	Immediately after the project becomes valid, but at least one month prior to the first bid package. The next training will be planned on demand.
Duration	Four days
Content	Project-related general environmental 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 Subproject includes: - Requirements of environmental monitoring; - Monitoring and implementation of mitigation measures; - Community involvement in environmental assessment; - Guiding and monitoring contractors, CSC and community representatives in the implementation of environmental monitoring; - Forms used in environmental monitoring processes; - Reaction and risk control; - Manner of receiving and submit forms; - Other issues to be determined.
Responsibility	With the help of the Technical Assistance Team, the Independent environmental Monitoring Consultant (IEMC) and PMUimplement safety policies.
II. Subjects	**CSC, CONTRACTORS, REPRESENTATIVESOF LOCAL AUTHORITIES (WARDS/COMMUNES), COMMUNITIES**
Training course	Implementation of mitigation measures
Participants	CSC;construction engineers, site construction field manager. staff in charge of environment issues, the contractor; representatives of local authorities; representatives of urban groups
Training frequency	Shortly after awarding contracts to the contractors with updates on demand
Duration	Three-day training for CSC and contractors, and two-day training for others
Content	- Overview of the overall environmental monitoring; - Requirements of environmental monitoring; - The roles and responsibility of the contractors and CSC; - The content and method of environmental monitoring; - Reaction and risk control;

	- Introducing monitoring forms and instructing on filling out forms and reporting incidents; - 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 implementationOther issues to be determined
Responsibility	Contractors, PMU with the assistance of IEMC

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

Table 6.10. Estimated costs for training and capacity building

Training content	Trainee	Unit	Quatity	Price	Total	
				VND	*VND*	*USD*
I. Environmental monitoring and reporting						
PMU	Staff in charge of environmental issues;environmental managers	course	5	10,000,000	50,000,000	2,240
II. Implementation of mitigation measures						
Component 1:	CSC;construction engineers, site manager	course	5	10,000,000	50,000,000	2,240
Component 2:	CSC;construction engineers, site manager	course	15	10,000,000	150,000,000	6,720
Component 3:	CSC;construction engineers, site manager	course	3	10,000,000	30,000,000	1,344
III. Safety and environmental sanitation						
Component 1:	Representatives of workers	course	3	5,000,000	15,000,000	672
Component 2:	Representatives of workers	course	5	5,000,000	25,000,000	1,120
Component 3:	Representatives of workers	course	2	5,000,000	10,000,000	448
				Total:	**330,000,000**	**14,785**

6.5. TOTAL ESTIMATED COSTS

The following table provides a cost estimate for the implementation of environmental management plan (ESMP). The cost of ESMP[10] 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. Therefore, communities partaking in monitoring the ESMP will not get paid. However, in order to encourage communityparticipation, it is necessary to allocate costs of materials and instruments for monitoring activities and some remuneration for a small number of members chosen by the public to participate in monitoring activities. As stipulated in the Prime Minister's Decision No. 80/2005/QD-TTg dated 18 April 2005 promulgating the regulations on investment supervision by the community and Joint Circular guiding the implementation of Decision 80/2005/QD-TTg, "expenses for the community' s investment monitoring in the commune/ward in are reflected in the cost estimates of the Communal Fatherland Front Committee's budget and allocated from the communal/municipal budget; support funds for the dissemination, organization of training courses, guidance, preliminary and final report on investment monitoring by the community at provincial and district levels are balanced in the cost estimates of the Fatherland Front Committee at provincial/district level and allocated from the provincial budget".

The following table provides the estimated costs for environmental quality monitoring and IEMC (in accordance with national practices) for reference purposes. However, final costs will be updated in the detailed design phase.

Table 6.11. Estimated costs of EMP implementation (USD million)

Content	Items of Soc Trang sub-project (million USD)	Funded by
(a) Mitigation during construction	As a part of the contract	WB
(b) Monitoring safety policies during construction	As a part of the cost for Construction Supervision Consulting (CSC)	WB
(c) PMU's units in charge of environmentalsafety policies	As part of the costs for the PMU	Counterpart funds
(d) Environmental quality monitoring	0.033	WB

[10]Excluding costs for RP implementation and independent monitoring the performance of RP/EMP

Content	Items of Soc Trang sub-project (million USD)	Funded by
(e) Independent environmental monitoring consulting (IEMC)	0.227	WB
(f) Capacity building programs on safeguard policies	0.015	WB

Estimated cost for IEMC is presented in the following table:

Table 6.12. Estimated costs of IEMC

(Exchange rate: 1 USD = 22,320 VND)

No	Content	Unit	Amount	Unit price (VND)	Sub-total (VND)	Sub-total (USD)
1	Experts'salary	person-month	80	40,000,000	3,200,000,000	143,369
2	Accommodation, expenses for business trip	person-day	600	500,000	300,000,000	13,441
3	Travel expenses	Trip/ person	160	6,000,000	960,000,000	43,011
4	Training course	Class	20	10,000,000	200,000,000	8,961
5	Office and communication	month	80	5,000,000	400,000,000	17,921
6	Environmental quality monitoring	Table 6.8			731,000,000	32,751
	Total				**5,791,000,000**	**259,454**

6.6. GRIEVANCE REDRESS MECHANISM (GRM)

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

Complaint procedures and resolution will be performed as follows:

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

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

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

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

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

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

The Forth level *Provincial Court*. In case a complainant brings his/her case to a provincial court and the court rules in favor of the complainant, the provincial authorities will have to increase the compensation up to such a rate as may be ruled by the court. In case the court's ruling is in favor of the PPC, the complainant will be refunded the amount of money that has been paid to the court.

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

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

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

Contractor and Construction Supervision Consultant:

During construction, the GRM will also be managed by the contractors under supervision of the CSC. The contractors will inform the affected communities and communes about the GRM availability to handle complaints and concerns about the 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.

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 PPMU within 24 hours since receipt of the complaint.

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

- The date and time of the complaint.
- The name, address and contact details of the complainant.
- A short description of the complaint.
- Actions taken to address the complaint, including contact persons and findings at each step in the complaint redress process.
- The dates and times when the complainant is contacted during the redress process.
- The final resolution of the complaint.
- The date, time and manner in which the complainant was informed thereof.
- The complainant's signature when resolution has been obtained.

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

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

Independent monitoring consultants (environmental, social and resettlement), who have enough the specialized capacity, would be selected by PMU through bidding. Independent monitoring consultants are responsible for checking the procedures and decisions on settling complaints. Independent monitoring consultants may propose additional measures to address any outstanding complaints. While checking the procedure for complaint resolution and reviewing the decision on complaint resolution, the independent monitoring agencies are required to closely coordinate with the Vietnam Fatherland Front, whose members are responsible for monitoring law enforcement of local complaints.

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

6.7. SOCIAL MONITORING PROGRAM

6.7.1. Social Action Plan

Occupational training foundation

Establishment of the occupational training foundations for the households, the members of which are unemployed is the critical demand in order to ensure that the people stay in the project areas and able to find out the appropriate job. Curriculums on skills need to be designed relevant to the households consultation on the priorities, demand and educational background. The curricula need to be focused to ensure to find out the jobs. It is necessary to coordinate with the potential employers in this matter.

The occupational training schools under MOET management in the project areas, the occupational training centers may organize the training courses on IT, textile and sewing skills, mechanics, electrical techniques, mushroom planting, animal husbandry, other agricultural technical supporting services…; organize training courses, expanding programs for the high schools pupils and even for the members of the rural households. It is necessary to train both men and women in the project areas. Moreover, it requires setting up the training courses on occupational re-training for men and women just in case they loose the jobs after completing the project. It also includes the training for the households having people with disability.

Supporting internal and external forces for the people

Around 1/3 of the interviewed people advised that they have received the supports. However, many people told that many supporting programs have taken place in the past, now only a few programs are ongoing. The main supporting sources are from the government agencies and locality, mainly from the communes' People's Committees and villages, Women's Union, Farmers Union of the communes, villages, and hamlets. Some people said that the supporting sources are from NGO, Red Cross and Vietnamese overseas.

During project implementation, it is necessary to conduct the consultation with the affected households on the programs of the government, the local unions such as Women's Union, Farmers' Union, and Youth Union. The seriously affected households should be able to access to the ongoing national programs such as National Target Program on Water Supply and Sanitation, especially for the poor.

HIV/AIDS and other sexually transmitted diseases, human trafficking

During project implementation, there will be a large amount of the labor force focusing in the construction sites. According to the experience from the previous similar construction projects, the STI rate in the labor groups will increase if there are no applied prevention measures in order to ensure that the workers are protected against the STD, which include HIV/AIDS. The public health action plan will be set up based on the previous experience of the earlier projects and the public consultation in order to ensure that the works are protected against STI.

In order to mitigate and address the HIV/AIDS related risks and human trafficking, it requires paying a special attention to women. The Project needs to conduct a good communication and dissemination on HIV/AIDS and other risks such as drug abuse and human trafficking. HIV/AIDS programs should include the awareness enhancement campaigns in the construction sites and in the community, peer education development and public monitoring in combination with understanding about safe migration which are implemented and monitored by the communities, PMU and Women's Unions of the project's communes.

Temporary impact mitigation measures

The implemented activities include:

- Increase the community awareness on safe transport and prevention of social evils during construction period;
- Incorporate in the Contracts with the Contractors the measures for transporting the materials and dredged material wastes in conformity with the regulations on the loads of the vehicles taking the materials and wastes. When there are damages in the local infrastructures due to the transportation, the contractors have to recover the affected infrastructures, reinstate the original site as before carrying out the project.

Table 6.13. Social impact mitigation measures

Negative impacts	Mitigation measures	Implementing agencies
Impacts on transport and incremental social evils	Public awareness improvement on safe transport and prevention of social evils for the local citizens	PMU should coordinate closely with the various level authorities in carry out the communication strategy. Based on the available communication system in the communes, to take necessary action on dissemination of information on Project's activities to the households.
Effects to the infrastructures	Contractors' compliance with the rules on infrastructure recovery	PMU should request the contractors to follow the regulations on loads and environment and sanitation measures in transporting materials as well as regulations stipulated for cases of creating effects on roads.

6.7.2. Social Monitoring Plan

The objectives of social monitoring program is to ensure the implementation of impact mitigation measures in order to minimize the negative effects on the living condition of the residents, social and cultural life in the project areas and maintain the sustainable community concurrence on the Project. The program contents are stated as below:

- Monitoring land acquisition and resettlement works
- Monitoring livelihood and income recovery: primary financial supports as per policies; expediting Occupational training programs
- Supervising the implementation of impacts mitigation program on community health and safety
- Supervising mitigation of conflicts of benefits and local economic effects
- Supervising mitigation of gender impacts
- Supervising information release and accountability

The detail contents are presented in Table 6.14:

Table 6.14. Proposed social monitoring program for Soc Trang city subproject

Contents	Targets/Outcomes	Proposed activities	Indicators	Implementing units
Land acquisition and resettlement works	- The affected households are able to receive compensation according to WB policy and their income will be recovered; - HHs which have no land will receive one slot in resettlement area.	- Setting up Resettlement policy framework in accordance with the GoV regulations harmonized with WB's policy - Establishing Resettlement Action Plan for land acquisition, compensation, support and implementation of resettlement works - Implementing land acquisition and resettlement works	- Resettlement policy frameworks and plans are established. - Number of the affected HHs, quantity/level of grassroots affection - Number of affected HHs on illegal land assets is clearly identified. - Number of HHs participating in livelihood recovery, occupational training, occupational change.	- PMU - Center of Municipal Land Fund Management and Development - Local authorities - Consultants
Monitoring livelihood and income recovery: primary financial supports as per policies; expediting Occupational training programs	HHs participating in livelihood/income are well assisted.	- Assistances are made following Resettlement Plan Framework - Loan programs - Occupational training	- Number of HHs are assisted as per Resettlement policy framework - Number of HHs has access to loan programs - Number of people/HHs have the occupational trainings	
Supervising the implementation of impacts mitigation program on community health and safety	Minimizing risks during construction period, social evils and traffic disturbance.	- Developing action plans on risks and emergency response during construction - Developing social evils mitigation plans during construction - Developing action plans on reducing traffic disturbance during construction	- Number of site shelters/camps fully equipped by first aid services - Number of training courses on occupational safety regulations delivered to the workers - Number of provided labor protective equipment/ total number of laborers - Number of entry restriction sign boards installed in	As the above

Contents	Targets/Outcomes	Proposed activities	Indicators	Implementing units
			the fences, barriers, warning boards. - Number of local workers (living <5km far from the sites) - Number of site visits by the grassroots health staff - Activities on traffic lane control and divergence	
Supervising mitigation of conflicts of benefits and local economic effects	Minimizing local conflicts of benefits due to free labor migration	Recruiting local labor force instead of recruiting workers from other areas.	- Number of recruited local laborers / total workers of the construction structures	As the above
Supervising mitigation of gender impacts	Assuring maximum participation of the women during the Project implementation as well as the economic role of the women in the HHs	- Mobilizing women to join in community activities of the Project - Supporting to maintain the previous occupation or change to the new ones. - Training on new occupations for women if needed	- Ratios of women participating in Project's community activities - Number of women is assisted to maintain the previous occupations. - Number of women attends in the new occupational training courses.	As the above
Supervising information release and accountability	Project information is fully, timely disclosed and easy to be accessed by the local citizens.	- Information disclose is made on wards' radio broadcast, residence information boards, cultural houses, ward People's Committee office areas… - Distribution of leaflets if necessary	- Number of communication sessions on the radio - Number of information stations/wards/work items - Number of distributed leaflets	as the above

CHAPTER 7. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

This Chapter describes the process and results of public consultations as required in the national and Bank ESIA procedure. It also summarizes responses and commitments of the subproject owner in complying with the environmental and social mitigation measures and information disclosure.

7.1. PUBLIC CONSULTATION PROCESS

Public consultation is specifically required by the World Bank's environmental and social safeguard policies. The public consultation in preparation of the subproject ESIA also must comply with the requirements in the Government's Decree No. 18/2015/ND-CP dated 14 February 2015 on environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental protection plan, and Circular No. 27/2015/TT-BTNMT dated 29 May 2015 of the Ministry of Natural Resources and Environment on strategic environmental assessment, environmental impact assessment and environmental protection plan. The objectives of public consultation for this ESIA are:

- To share all information on the items and tentative activities of the Subproject with local community and stakeholders;

- To gather opinions/comments and concerns from local authorities and the community on local particularities and environmentally sensitive matters in the subproject area, especially matters that the environmental assessment impact group has not been aware of. On such basis, the concerns of the local community may be proposed for proper settlement during the selection of subproject design options;

- To collect opinions/comments from the local community on the Subproject's tasks in the preparation of the ESIA as well as comments on the draft ESIA to adequately and precisely assess environmental impacts and propose the most effective and feasible mitigation measures for negative environmental impacts.

The public consultations were conducted during the subproject preparation to ensure that affected households and key stakeholders to participate and express their opinions about environmental and social issues. Key topics covered in the public consultations are:

i. Disseminate key information related to policies of the World Bank, the Government and the subprojects.

ii. Provide locals with subproject on resettlement, environment, gender as well as ethnic minority issues through village loudspeaker system and subproject information brochures/leaflets;

iii. Collect opinions and feedback of the local communities regarding the subproject implementation;

iv. In the community consultation, needs to introduce and public all information of subproject and WB's safeguard policies, collect opinions and comments of the residents on design and resettlement options as well as their aspirations and expectations are recorded;

v. Respond questions to local communities concerning the subproject and safeguard policies;

vi. CPCs and PMU provided answers to questions to local residents related to subproject and local policies;

vii. Local communities, representatives of the CPC's and other stakeholders' contributions

This is a Category A subproject, thus according to WB's requirements, consultation is implemented into two times during environmental and social impact assessment process.

The public consultation was carried out with local communities and authorities at project area including 6 wards (2,3,4,6,8, and 9). The first consultation was conducted from 15 to 29 July 2016 and second consultation was conducted from 6 to 9 December 2016. The first public consultation discussed about the subproject scope, investment and ESIA preparation process. The second public consultation followed up on the first consultation inputs and substance of the draft ESIA. The public consultation meetings were held at the Ward/Commune PC.

About 7 days prior to public consultation, the consultant informed the local authority about the proposed investment and cooperated with the local authority to invite the affected people and representatives of the affected HHs to attend public consultation meeting.. Attending the meeting were representatives of the People's Committee, the Veterans Association, the Vietnam Fatherland Front, Women's Union, Youth Union, administration officials, head of residential areas and affected households by the subproject. The number of participants in the first and second consultations was 147 and 157 respectively. The results of the two public consultation meetings are described in the following Table 7.1 and 7.2.

7.2. PUBLIC CONSULTATION RESULTS

7.2.1. The first consultation

The first consultation was conducted during 11 to 14 July, 2016 in the project wards. The results of the first consultation are summarized in the following table:

Table 7.1. Results of the first environmental consultation

No.	Time/ Location	Participants	Community comments	Response from investment oweners and consultants
1	Ward 2 8h – 10h30 AM 11/7/2016	• Soc Trang City People's Committee: 2 representatives • Chariman/ Vice Chairman of Ward • Representatives from Father Land Front, Women Union, Land Registration Office, Farmer Union, Youth Union: 5 people • Head of resedential clusters in the subproject area: 2 people • Affected households: 44 • Investment owner: 2 • Consultant: 3 people	• Agree to support the sub-project because they are aware of the benefits of improving traffic conditions, power supply, water supply and sanitation project that brings. • Ensure to have appropriate compensaation and resettlment for the affected households. • Must have appropriate construction methods to limit damage to the property of the people as well as public utilities (electricity, water supply) • To implement project in timely manner and according to schedule , properly manage the sites to not affecting people's living conditions	• Thanked and acknowledged comments of the communities and local authoritites. • This issue will be considered during the ESIA process • This issue will be considered and addressed in the RP. • This issue will be addressed in the ESIA report and included in the bidding documents of construction packages.
2	Ward 3 14h – 16h30' dated on 11/7/2016	• Soc Trang City People's Committee: 1 representatives • Chariman/ Vice Chairman of Ward • Representatives from Father Land Front, Women Union, Land	• Agree and support the project for the benefits it will bring. • There are many Khmer and low-income house holds in LIA3, therefore the contractor should pay attention to the impact on the cultural life and community activities of the Khmers.	• Thanked and acknowledged comments of the communities and local authoritites.. • This issue will be considered during the ESIA process • This issue will be considered and

No.	Time/ Location	Participants	Community comments	Response from investment oweners and consultants
		Registration Office, Farmer Union, Youth Union: 2 people • Head of resedential clusters in the subproject area: 2 people • Affected households: 16 • Investment owner: 2 • Consultant: 3 people	• Dredging of Hi Tech canal in ward 3 should provide associated infrastructures such as lighting system, drainage system along sides of the canal. • Provide appropriate compensation support to affected households.	addressed in the RP. • This issue will be considered and addressed in the EMDP. • This issue will be addressed in the ESIA report and included in the bidding documents of construction packages.
3	Ward 4 8h – 10h30'AM, dated on 12/7/2016	• Soc Trang City People's Committee: 1 representatives • Chariman/ Vice Chairman of Ward • Representatives from Father Land Front, Women Union, Land Registration Office, Farmer Union, Youth Union: 4 people • Head of resedential clusters in the subproject area: 2 people • Affected households: 22 • Investment owner: 2 • Consultant: 3 people	• Agreed with proposed investments as they are addressing existing problems: local flooding, polluted wastewater drainage, degraded alleys … • Investment owners have plan to connect water supply and drainage to avoid disruption to local people. • Provide appropriate compensation support to affected households. • Inform local people on the construction schedule and plan. • Have appropriate construction methods in place to avoid damages and loss to people's properties and assets and public utilities (water supply pipes, powerline)	• Thanked and acknowledged comments of the communities and local authoritites. • This issue will be considered during the ESIA process • This issue will be considered and addressed in the RP. • This issue will be addressed in the ESIA report and included in the bidding documents of construction packages.
4	Ward 6 14h – 16h30', dated on 12/7/2016	• Soc Trang City People's Committee: 1 representatives • Chariman/ Vice Chairman of Ward • Representatives from Father Land Front, Women Union, Land	• Agree and support the subproject for the benefits the project will bring to local people. • Upgrading Tra Men A canal will bring positive impacts as currently i sis severely polluted	• Thanked and acknowledged comments of the communities and local authoritites. • This issue will be considered during the ESIA process • This issue will be considered and

No.	Time/ Location	Participants	Community comments	Response from investment oweners and consultants
		Registration Office, Farmer Union, Youth Union: 5 people • Head of resedential clusters in the subproject area: 2 people • Affected households: 19 • Investment owner: 2 • Consultant: 3 people	• However, care should be taken on managing dredging materials to mitigate bad odors and avoid slurry leakage during tranportation process. • Proide labor safety measures to protect workers and local facilities. • Provide appropriate compensation and resettlement support to affected households.	addressed in the RP. • This issue will be addressed in the ESIA report and included in the bidding documents of construction packages.
5	Ward 8 14h – 16h30', dated on 13/7/2016	• Soc Trang City People's Committee: 1 representatives • Chariman/ Vice Chairman of Ward • Representatives from Father Land Front, Women Union, Land Registration Office, Farmer Union, Youth Union: 4 people • Head of resedential clusters in the subproject area: 2 people • Affected households: 21 • Investment owner: 2 • Consultant: 3 people	• Agree and support the subproject for the benefits the project will bring to local people. • There are many Khmer households in LIA 6, ward 8. Care should be taken to mitigate impacts to these households • Provide appropriate compensation and resettlement support to affected households. • The subproject should be conducted on time according to the progress schedule. Proper finish the site to avoid delaying the work disrupting the local residents.	• Thanked and acknowledged comments of the communities and local authoritites. • This issue will be considered during the ESIA process • This issue will be considered and addressed in the RP. • This issue will be considered and addressed in the EMDP. • This issue will be addressed in the ESIA report and included in the bidding documents of construction packages.
6	Ward 9 8h – 10h30'AM, dated on 14/7/2016	• Soc Trang City People's Committee: 4 representatives • Chariman/ Vice Chairman of Ward • Representatives from Father Land Front, Women Union, Land	• Agree and support the subproject for the benefits the project will bring to local people. • Upgrading Hi Tech canal in ward 9 must to attent to the dredging and embankment of the canal to avoid	• Thanked and acknowledged comments of the communities and local authoritites. • This issue will be considered during the ESIA process • This issue will be considered and

No.	Time/ Location	Participants	Community comments	Response from investment oweners and consultants
		Registration Office, Farmer Union, Youth Union: 2 people • Head of resedential clusters in the subproject area: 1 people • Affected households: 25 • Investment owner: 1 • Consultant: 3 people	damage and to provide infrastructure (trees, lighting systems sewer) along the canal. • During construction phase should be attented to minimize environmental impacts such as odors, damage of existing infrastructure as well as moving of local people. • Must be paid reasonable compensation for the affected households.	addressed in the RP. • This issue will be addressed in the ESIA report and included in the bidding documents of construction packages.

7.2.2. The results from the second consultation

The second consultation was conducted during 6 to 9 December, 2016. The second consultation was conducted with local authorities and representatives of households, enterprises in the wards/communes.

Table 7.2. Results of the second environmental consultation in the project area

No	Time and location	Participants	Comments from local community	Responses from investment owners and consultants
1	Ward 2 14h – 16h30', dated on 6/12/2016	• Soc Trang City People's Committee: 2 representatives • Chariman/ Vice Chairman of Ward • Representatives from Father Land Front, Women Union, Land Registration Office, Farmer Union, Youth Union: 2 people • Head of resedential clusters in the subproject area: 1 representative • Affected households: 28	• Agreed with proposed environmental impacts and mitigation measures of the ivestment items in ward 2. • Care should be taken to avoid local flooding to other areas while installing drainage system in Tran Binh Trong and Phu Loi roads. • Impacts on waterway navigation on Maspero River should be taken into account while construction of Nguyen Van Linh bridge is carried out.	• Thanked and acknowledged comments of the communities and local authoritites. • Design on pipe depth is already considered the existing conditions of the drainage system. • The site for pile driving operation of Nguyen Van Linh bridge will be in a 3-5m radius while the river's width is 60 thus the waterway transport on Maspero

No	Time and location	Participants	Comments from local community	Responses from investment owners and consultants
		• Investment owner: 2 • Consultant: 2 people	• Ensure not to disrupt local traffic. Inform the local community and authority about the construction plan to avoid social conflicts • Provide appropriate compensation and resettlement support to affected households. • Investment owner has to comply with environmental commitments as specified in the ESIA.	River will not be disrupted. • This issue will be considered during the ESIA process • This issue will be considered and addressed in the RP. • This issue will be addressed in the ESIA report and included in the bidding documents of construction packages.
2	Ward 3 8h – 10h30' AM dated on 7/12/2016	• Soc Trang City People's Committee: 1 representatives • Chariman/ Vice Chairman of Ward • Representatives from Father Land Front, Women Union, Land Registration Office, Farmer Union, Youth Union: 1 representative • Head of resedential clusters in the subproject area: 2 people • Affected households: 28 • Investment owner: 2 • Consultant: 3 people	• Agreed with proposed environmental impacts and mitigation measures of the ivestment items in ward 3. • LIA 3 has many poor Khmer households thus impacts on the Khmer should be taken into account to avoid disruption to on culture activities during land aquisition and resettlement and construction phase. • Dredging Hi Tech canal should have dredged materials management and treatment methods, avoding the gathering of slurry to prevent bad odor and pathogen spread. • Ensure not to disrupt local traffic. Inform the local community and authority about the construction plan to avoid social conflicts.	• Thanked and acknowledged comments of the communities and local authoritites. • Phương án nạo vét bùn kênh HiTech là nạo vét khô, sẽ hạn chế lượng nước rỉ bùn, bùn nạo vét đến đâu sẽ được vận chuyển đi ngay trong ngày, thi công cuốn chiếu, làm đến đâu, gọn đến đó. • This issue will be considered during the ESIA process • This issue will be considered and addressed in the RP. • This issue will be considered and addressed in the EMDP. • This issue will be addressed in the ESIA report and included in the bidding documents of construction packages

No	Time and location	Participants	Comments from local community	Responses from investment owners and consultants
3	Ward 4 14h – 16h30', dated on 7/12/2016	• Soc Trang City People's Committee: 1 representatives • Chariman/ Vice Chairman of Ward • Representatives from Father Land Front, Women Union, Land Registration Office, Farmer Union, Youth Union: 4 people • Head of resedential clusters in the subproject area: 2 people • Affected households: 23 • Investment owner: 2 • Consultant: 3 people	• Agreed with proposed environmental impacts and mitigation measures of the investment items in ward 4. • In LIA 1 at ward 4, investment owner should have plan to connect water supply and drainage system to avoid flooding affecting local households. • Provide full technical infrastructures at resettlement site (roads, power and water supply, drainage, waste management) and social infrastructures (school, social and culture facilities...) to the affected households.	• Thanked and acknowledged comments of the communities and local authoritites. • At LIA 4, combined sewage is considered ; wastewater collection and treatment will be conducted through the KfW project of phase 2. • Resettlement sit is provided fully with basic infrastructures • This issue will be considered during the ESIA process • This issue will be considered and addressed in the RP.
4	Ward 6 8h – 10h30', dated on 8/12/2016	• Soc Trang City People's Committee: 1 representatives • Chariman/ Vice Chairman of Ward • Representatives from Father Land Front, Women Union, Land Registration Office, Farmer Union, Youth Union: 3 people • Head of resedential clusters in the subproject area: 1 people • Affected households: 29 • Investment owner: 2 • Consultant: 3 people	• Agreed with proposed environmental impacts and mitigation measures of the investment items in ward 6. • Mitigate impacts on water runoff from the construction site • Tra Men canal dredging process needs to take care on amount of slurry to be transported , preventing bad odors and leakage during transpotation process. • Contractor should mitigate the impacts on pagodas that are close to one end of Tra Men A canal and section 1 of Dien Bien Phu road • On traffic safety, as alleys are narrow, there are concerns on motorized vehicles	• Thanked and acknowledged comments of the communities and local authoritites. • Tra Men A dredging will apply a dry method thus can limit the wet slurry and leakage. The work is implemented in a sequencing manner. • Pagodas and sensitive receptors are considred and have appropriate mitigation meausres as in ESIA. Consultation with the communities are already conducted and received their fully support.

No	Time and location	Participants	Comments from local community	Responses from investment owners and consultants
			will increase greatly. • Fire safety needs to be assessed adequately, especially on power safety usage. • Do not carry out construction work during noon or at night to limit the noise impacts. • Implement the approved resettlement plan as consultation with local people.	• This issue will be considered during the ESIA process • This issue will be considered and addressed in the RP. • This issue will be addressed in the ESIA report and included in the bidding documents of construction packages
5	Ward 8 14h – 16h30', dated on 8/12/2016	• Soc Trang City People's Committee: 1 representatives • Chariman/ Vice Chairman of Ward • Representatives from Father Land Front, Women Union, Land Registration Office, Farmer Union, Youth Union: 3 people • Head of resedential clusters in the subproject area: 2 people • Affected households: 25 • Investment owner: 2 • Consultant: 3 people	• Agreed with proposed environmental impacts and mitigation measures of the investment items in ward 8. • LIA 6 in ward 8 has many poor Khmer households thus impacts on the Khmer should be taken into account to avoid disruption to on culture activities during land aquisition and resettlement and construction phase • Mitigation measures are to be appiled for 3 days of full Moon on the 10th Month of the Lunar Calendar when the boat racing festival is taking place. • Ensure not to disrupt local traffic. Inform the local community and authority about the construction plan to avoid social conflicts. • Provide appropriate compensation and resettlement support to affected households.	• Thanked and acknowledged comments of the communities and local authoritites. • Impacts on disruption of the boat racin is considered ESIA và báo cáo EMDP. • This issue will be considered during the ESIA process • This issue will be considered and addressed in the RP. • This issue will be addressed in the ESIA report and included in the bidding documents of construction packages.

No	Time and location	Participants	Comments from local community	Responses from investment owners and consultants
			• Investment owner has to comply with environmental commitments as specified in the ESIA.	
6	Ward 9 8h – 10h30'AM, dated on 9/12/2016	• Soc Trang City People's Committee: 1 representatives • Chariman/ Vice Chairman of Ward • Representatives from Father Land Front, Women Union, Land Registration Office, Farmer Union, Youth Union: 1 representative • Head of resedential clusters in the subproject area: 2 people • Affected households: 24 • Investment owner: 2 • Consultant: 3 people	• Agreed with proposed environmental impacts and mitigation measures of the investment items in ward 9. • Provie protection fence for the construction site to avoid accidents, especially to children and local people • Investment owner has to comply with environmental commitments as specified in the ESIA. • Provide appropriate compensation and resettlement support to affected households • Implement mitigation measures for environmental impacts and dredged material management • The subproject should be conducted on time according to the progress schedule. Proper finish the site to avoid delaying the work disrupting the local residents.	• Thanked and acknowledged comments of the communities and local authoritites. • This issue will be considered during the ESIA process • This issue will be considered and addressed in the RP. • This issue will be addressed in the ESIA report and included in the bidding documents of construction packages.

7.2.3. Consultation with ward PC/Fatherland Front Committee

The Project Owner also held a consultation with 6 Ward People's Committees and Fatherland Front Committees on the environmental impacts and mitigation measures of the project on 9 November 2016.

Table 7.3. Results of the consultation with ward PC/Fatherland Front Committee

Ward	Opinions from Ward People's Committee	Opinions from Fatherland Front
2	Ward 2 People's Committee agreed with the consults on the level of impacts on soil, air, environmental ecosystem and socio-economic conditions in the project area during project's preparation, construction and operation. - In ward 2, there are Khmer households there for the project should also consider the impacts on cultural activities and spiritual life of Khmer during the land acquisition, site clearance and construction period. Extra attention should be paid on raising the drainage pipe's elevation on Phu Loi, Le Hong Phong road to avoid causing local flooding elsewhere. There is concern on waterway navigation on Maspero River during construction of Nguyen Van Linh Bridge. - PC agreed on mitigation measures for environmental incidents proposed in the report. - During the construction, the project owner must ensure not to disturb local traffic and inform Ward PC and the community in advance the construction schedule at the project site - The project should apply appropriate construction methods to limit the damages on assets of people and other public works (water, power supply, etc) in the ward. - The project owner shall arrange appropriate compensation and resettlement for affected or displaced households under the project. - The project owner shall comply with environmental protection regulations stated in the report. - The project owner shall implement environmental mitigation measures for reducing pollution of water, soil, air environment, ecosystem, and solutions for wastewater and solid waste collection and treatment, and preventive measures for fire safety as described in the report. - The project should progress as its propose timeline to avoid delay that can cause negative impacts on residents' living conditions and health.	The Fatherland Front agreed with PC's opinions.
3	- PC of Ward 3 agreed with opinions of the consultants on the assessment scale and level of impacts on soil, air and ecosystem environment and socio-economic conditions in the project area during project's preparation, construction and	Agreed with PC on environmental impacts and the proposed mitigation measures.

Ward	Opinions from Ward People's Committee	Opinions from Fatherland Front
	operation. - In ward 2, there are Khmer households there for the project should also consider the impacts on cultural activities and spiritual life of Khmer during the land acquisition, site clearance and construction period. - Regarding to Hi Tech canal, the project should pay attention to the dredging and embankment and construction of canals and associated infrastructures (tree landscaping, lighting system and drainage system) along canal banks. - During the construction, the project owner must ensure not to disturb local traffic and inform Ward PC and the community in advance the construction schedule at the project site - The project should apply appropriate construction methods to limit the damages on assets of people and other public works (water, power supply, etc) in the ward 3. - The project owner shall arrange appropriate compensation and resettlement for affected or displaced households under the project. - The project owner shall comply with environmental protection regulations stated in the report. - The project owner shall implement environmental mitigation measures for reducing pollution of water, soil, air environment, ecosystem, and solutions for wastewater and solid waste collection and treatment, and preventive measures for fire safety as described in the report. - The project should progress as its propose timeline to avoid delay that can cause negative impacts on residents' living conditions and health.	- If there are emerging issues, during the construction and operation phase, PMU and the Project Owner should offer remedy solutions.
4	- PC of Ward 3 agreed with opinions of the consultants on the assessment scale and level of impacts on soil, air and ecosystem environment and socio-economic conditions in the project area during project's preparation, construction and operation as well as the proposed mitigation measures. - In implementing component 1, the project owner should prepare a program for sewage connection to avoid system failure on local residents during the project implementation and operation. People suggested the project install an additional connection to the Nguyen Dinh Chieu drainage system to better the drainage.	- Fatherland Front Committee agreed with the assessed negative impacts of the project on soil, water, air and ecosystem environment through project's phases. - During the project construction, the contractor shall ensure the labor safety, traffic safety and inform the residential community in advance to avoid possibly social conflicts. - The project owner shall prepare an appropriate supporting policy on compensation and resettlement applicable to affected households.

Ward	Opinions from Ward People's Committee	Opinions from Fatherland Front
		- The Project Owner must ensure sanitation and environmental protection (soil, air, water and ecosystem environment) and implement measures on solid waste collection and treatment and wastewater treatment before being discharged into the environment, and preventive measures for fire safety. - The project should progress as its propose timeline to avoid delay that can cause negative impacts on residents' living conditions and health. - The project owner must comply with the current laws and regulations
6	PC of ward 6 agreed with scope presented in the Executive summary of the "environmental impact assessment report" of the project. - Additional concerns to be addressed such as (i) runoff of cement, sand, stone, wastewater that can affect the production activities of people; (ii) dredging dredged material to be transported to appropriate treatment facilities and bad odor is to be controlled; avoid leakage of dredged material during transportation process; (iii) labor safety and resident safety are to be ensured by applying appropriate construction methods for Nguyen Van Linh bridge construction as the area is densely populated. (iv) transport safety especially when material transportation trucks share the narrow streets and alleys with all other vehicles; (v) fire risk safety to be taken into account. - PC of ward 6 agreed with the negative impact mitigation measures stated in the report and recommended the following: - Use of specialized vehicles to carry materials dredged in Tra Men Canal. - Having work implemented in appropriate hours, avoiding noon and night hours to mitigate noise pollution. - The project should comply with environmental protection regulations and implement mitigation measures proposed in the project. - Comply with compensation, resettlement plan taking into account local people's opinions - In term of transport regulation, during the construction period, if there are no temporary paths in the area, the Project Owner shall inform the local authorities in	- Pay attention to environment and sanitation issues to minimize claims, especially collective claims - Facilitate the religious activities, especially the religious gathering events - When do the embankment of Tra Men canal, take good care of pagodas: Long Hưng, Ngọc Hưng, Ngọc Phước. Avoid leakages of dredged material in the vicinity of these areas, affecting the religious events - Minimize the impact of dust, noise, vibration and wastewater from the construction site - Agreed with the mitigation measures proposed in the report - When there are emerging complains, especially relating to the religious facilities, the project owner should contact immediately to the Fatherland Front Committee in order to collaborate in addressing the issues. - Once received documents of the Fatherland Front Committee of ward 6 on allowing Religious Facilities to hold event, the project owner shall be supportive and make the time for the religious events. - The project should comply with environmental protection regulations and implement mitigation measures proposed in the project - Implement and complete the work soon not to disturb much to people's life

Ward	Opinions from Ward People's Committee	Opinions from Fatherland Front
	advance and have solutions prior to the construction. - Implement and complete the work soon not to disturb much to people's life	
8	- PC of Ward 8 agreed with opinions of the consultants on the assessment scale and level of impacts on soil, air and ecosystem environment and socio-economic conditions in the project area during project's preparation, construction and operation as well as the proposed mitigation measures - In ward 8, there are Khmer households there for the project should also consider the impacts on cultural activities and spiritual life of Khmer during the land acquisition, site clearance and construction period. - For rehabilitation of drainage system in the project, it should avoid affecting other structures after rehabilitation. - PC of ward 8 agreed with measures on mitigation, prevention and responding to environmental events as described in the environmental impact assessment report. - During the construction, the project Owner must ensure not to disturb the traffic of people. - Implement mitigation measures on minimizing damages on assets of people during the construction at the residential area. - The Project Owner must implement appropriate compensation and resettlement plan for affected/displaced households. - The project owner shall implement environmental mitigation measures for reducing pollution of water, soil, air environment, ecosystem, and solutions for wastewater and solid waste collection and treatment, and preventive measures for fire safety as described in the report. - The project should progress as its propose timeline to avoid delay that can cause negative impacts on residents' living conditions and health.	- Fatherland Front of ward 8 agreed with the consultants on the assessment of the project's negative environmental impacts. During the site clearance and construction, avoid affecting households because there are many ethnic minorities. - Fatherland Front of ward 8 agreed with environmental mitigation measures of the project - The construction phase must apply necessary measures to prevent disturbances to traffic of people. - The project should provide compensation and resettlement support to affected households - The project is to be in compliant with environmental protection regulation and implement the project timely to avoid any delay.
9	- PC of ward 9 agreed with the negative impacts on socio-economic conditions and people's health. - PC of ward 9 agreed with the proposed mitigation measures for negative impacts on natural environment, socio-economic environment and people's health; Much attention should be paid on the odors of dredged material, damages on assets as well as obstruction on the traffic.	- Agreed with the assessment scope and level of impacts on soil, air and ecosystem environment and socio-economic conditions in the project area through the project phases - During the construction period, the project owner must ensure not to obstruct the local traffic, ensure traffic safety; - The Project Owner must inform the community about the

Ward	Opinions from Ward People's Committee	Opinions from Fatherland Front
	- To address safety risk to local people, especially children, the construction site must be fenced to avoid any accident. - If there is arising complain, the Project Owner should contact with the People's Board at the site or PC of ward 9 for settlement. - Comply with environmental protection commitments as stated in the report - Implement the compensation and resettlement properly and equally as regulated for households in the region. - Comply with environmental mitigation measures and measures on dredged material collection to avoid dropping while transporting. - Comply with project schedule, the contractor must return the site to its initial stage upon the project complete.	construction plan and avoid possible conflicts. - The Project Owner must have appropriate compensation and resettlement for affected/displaced households. - The Project Owner must ensure sanitation and environmental protection (soil, air, water and ecosystem environment) and have measures on solid waste collection and treatment and wastewater treatment before being discharged into the environment, and measures for fire protection - The implementation ensures the project schedule, tidiness; avoid prolonged causing impacts on living activities, people's health and life at the site. - The Project Owner must comply with the law and regulations.

7.3. INFORMATION DISCLOSURE

Draft Environmental Impacts Assessment reports and executive summary in Vietnamese werelocally disclosed at the ward on 5th January, 2017. Local people could get the subproject information and contribute their additonal opinions/comments on environmental issues to the ward offices or subproject owner.. The draft Environmental Impacts Assessment reports and executive summarywere also disclosed in the World Bank's Operations Portal on 10th January, 2017.

After disseminating the report on the above-mentioned locations, the Project Owner will collect all comments (if any) for review and adjustment of the report if necessary. The final copy shall be returned and replaced for the disseminated ones.

CONCLUSIONS, RECOMMENDATIONS AND COMMITTMENTS

CONCLUSIONS

The ***Soc Trang City subproject"*** is an urban upgrading project of which the main work includes rehabilitation of existing infrastructures, especially those of the city's low income areas and new development of secondary and primary infrastructures. Soc Trang project will help to improve the city's drainage conditions, local flooding and environmental conditions, contributing to the sustainable growth of the city.

The ESIA report complies with the current environmental impact assessment requirements stipulated by the Vietnamese Government and WB's safeguard policies. The report will be one of the key documents to be submitted to State management agencies in charge of the environment to determine the location and scope of the work as a basis for applying for an investment license. In addition, this is also an important document fpr the project appraisal and in the negotiation and signing of the loan agreement between the Government of Vietnam and the World Bank.

Environmental impacts:

The environmental impacts were assessed with support from the baseline and statistical data as well as experiences from similar projects-assisted by the World Bank. The impacts are relatively quantified as best as they can be for three stages of project's preparation, construction and operation. It will be further assessed and adjusted during the project implementation in order to mitigate the negative impacts and enhance the positive ones.

The positive impacts of the project include improvement of water supply and drainage and other basic infrastructures in LIAs, mitigation of local flooding, better connectivity within and out of the city and enhancement of climate resilience. The embankment of Tra Men A and Hi Tech canals will help to address the drainage, environmental pollution and local encroachment and will create more green spaces for the city.

Most of the impacts during the pre-construction and construction stages are temporary and short-term, taking place in areas around construction sites or on transport routes and at disposal sites. The main impacts during the site preparation relate to the acquisition of land affecting residential land, agriculture land and small areas around fences of some religious facilities and local residents. In the construction phase, impacts from dust, vibration and noise as well as issues of social security and occupational safety are much likely to arise. In addition, the transportation and disposal of dredged material will also be an area of concern. However, these can be limited or mitigated to the lowest levels by the implementation of the ESMP.

Subproject construction operations might cause a number of negative impacts on the social life of residents in the Subproject area, by bringing about changes in their living conditions and disturb their daily routines as well as production and economy. Emerging issues might include increase in air pollution and traffic accidents, land subsidence or breakdown of drainage or road system, accumulation of sediments and dredged material at manholes or canals among others. Nevertheless, these impacts are short-term and can be mitigated.

Mitigation measures:

Measures to control pollution and limit adverse impacts on environment in the construction and operation phases proposed and recommended in this report. Besides the application of appropriate managerial and technical measures, awareness raising and behavior change communication to local people should be paid attention to help maintain the good environment. All the measures are proven to be feasible and able to meet Vietnamese

environmental standards.

The environmental monitoring program will be carried out as soon as the State's approval and the license of subproject construction and operation have been obtained. Monitoring data will be stored and serve as a legal basis for compliance with the Environmental Protection Law of Vietnam as well as the environmental safeguard policies of World Bank. These data will also serve the evaluation of the effectiveness and environmental sustainability of the project.

An environmental and social management plan (ESMP) is to ensure the management, monitoring, reporting, preparation and adjustment of measures to avoid and minimize environmental pollution during project implementation. The project owner, contractors and project management unit will be responsible for implementing this ESMP in cooperation with local state management agencies and authorities.

Two rounds of participatory public consultations were conducted to share the project contents, potential environmental impacts and mitigation measures to local residents and concerned stakeholders. So far, the project has been receiving great support from the local communities and authorities.

RECOMMENDATION

This is an environmentally significant project, contributing to the sustainable growth of Soc Trang City and in particularly helping Soc Trang to achieve several key targets for becoming the class III city by 2020. Therefore, the Owner would like to propose for DONRE's appraisal and approval of the ESIA report of the project as well as WB's approval for timely and prompt deployment of the project.

During the Project implementation, the Project PMU/ Project owner would seek the participation, coordination, support and constructive comments from line departments and local authorities in carrying out the environmental protection efficiently. In particular, the Project would like DONRE to provide capacity support for PMU staff and related operational workers in the areas of environmental compliances and environmental management and awareness raising and communication on environmental protection to local people.

In order to ensure the synergy between this project and other investments of the city, PMU would like to urge the Provincial Committee to accelerate the implementation and operation of the proposed waste and wastewater treatment facilities so that the project can connect into.

COMMITMENT OF IMPLEMENTATION

During the operation of the project, the Owner commits to carrying out seriously the regulations of Vietnam's environmental protection laws, including: the Law on Environmental Protection No.55/2014/QH13 passed by the National Assembly of the Socialist Republic of Vietnam dated 23 June, 2014; Decree No.80/2014/ND-CP dated 6 August, 2014 by the Government on drainage and wastewater treatment; Decree No.19/2015/ND-CP dated 14 February, 2015 by the Government detailing the implementation of some Articles of the Law on Environmental Protection; Decree No.18/2015/ND-CP dated 01 April, 2015 by the Government on environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental protection plan; Circular No.27/2015/TT-BTNMT dated 29 May, 2015 by MONRE on strategic environmental assessment, environmental impact assessment and environmental protection plan, and other relevant documents. The Owner also commits to complying with WB's environmental safeguard policies.

In addition, the Client commits to carrying out environmental protection and mitigation measures as mentioned in Chapters 5 and 6. The Client commits to fulfilling commitments towards the communities specified in Chapter 7. The Owner also commits to make compensation and overcoming environmental pollution once environmental incidents and risks occur during the implementation of the project and taking steps of environmental recovery in accordance with to legal regulations on environmental protection when subproject operation has been completed.

APPENDIXES

APPENDIX 1: SUUP SOC TRANG DREDGED MATERIALS MANAGEMENT PLAN

1. Location of Dredging, Volume and Characteristics of Dredged Materials

Dredging area: Tra Men A and Hi Tech canals. The volume of dredged material estimated about 22,000m^3.

Several other areas such as Nguyen Van Linh bridge, Ring road and bridge No.2, Dien Bien Phu road, Phu Loi and Tran Binh Trong roads, 6 Lias and resettlement site generate about 270,000 m^3 of excavating soil.

2. Final Disposal Site

Based on analysis result of sediment/soil samples in Chapter 2, the quality of sediment/soil samples is within allowable limits accrodnig to QCVN 03-MT:2015/BTNMT – National technical regulation on allowable limits of heavy metal in soils (forestry land) and QCVN 43:2012/BTNMT – National technical regulation onsediment quality

The disposal site is away 12 ÷ 15 km from dredging areas to SocTrang city solid waste treatment plant (landfill site).

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

To supplement the work done during the feasibility study, detailed design scope will include additional analysis of chemical composition, and update the DMDP with more details information on amount and quality of dredged material, transportation, and disposal that are appropriate and cost-effective.

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:

1) The Scope of Works in the Contract package, construction method and schedule

2) Volume and quality of water quality and sediment quality in the dredging area covered by the contract

3) Water users that may be affected by the dredging and embankment lining

4) 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,

5) Schedule to inform the nearby communities about the project, disclosure of name and contact number for possible complaints.

6) Potential social and environmental impacts, including the site-specific impacts and risks

7) Mitigation measures to address the potential impacts and risks. The mitigation measures should be proposed based on ESIA/ECOP, ESMP, SEMP, the potential impacts and mitigation measures presented in Section 4 and 5 of this Plan and the

following requirements:

8) Environmental Quality Monitoring plan carried out by the contractor (particularly pH,DO, TSS, BOD, salinity (as if) etc. for water and heavy metals including pH, Hg, As, Cd, Cu, Pb, Zn and Cr, Organic Materials and Mineral Oils for sediments and soil.

9) If the content of the heavy metals in the dredged materials exceeds the national standards, the contractor need to follow Circular No. 36/2015TT-BTNMT of MONRE dated 30 June 2015 providing detailed regulations on management of hazardous wastes to dispose the dredged materials in the designated landfill with hazardous waste treatment facility.

10) For soil and sediment: The number of samples taken will follow the following guidelines

Table 1. The number of Sediment samples

Volume of dredged (m3)	*No of Sediment Samples*
Up to 25,000	3
25,000 to 100,000	4-6
100,000 to 500,000	6-10
500,000 to 2,000,000	10-20
For each 1,000,000 above 2,000,000	Additional 10

At least one water, soil and sediment sample must be taken for each contract package

- Consultation with affected community about the draft CDMP
- Excavated soils 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 CCSEP 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

Impacts and Description	Mitigation Measures
AT DREDGING and TEMPORARY LOADING AREAS	
Odour and air pollution, nuisance Decomposition of organic matters under anaerobic conditions generates strong odour-generated gases such as SO_2, H_2S, VOC etc. When the muds are disturbed and excavated, these gases are released much faster into the air.	- 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

Impacts and Description	Mitigation Measures
Exposure to odour pollution affect the health of workers, local residents and cause public nuisance	- Load the materials on-site tidily - Do not load the materials temporarily outside the construction corridor determined for each canal section - Avoid loading the dredged material in populated residential areas or near public buildings such as kindergarten. Load the dredged material as far from the houses and buildings as far as possible - Cover the temporary dredged material loads when loading near sensitive receptors or longer than 48 hours unavoidable
Dust and nuisance Temporary loading of dredged material 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	- Avoid temporary loading of dredged materials on-site - Dredged materials must be transported to the final 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	- During field survey for the preparation of CDMP, the contractor in coordination with the Environmental Officer of PMU and the

Impacts and Description	Mitigation Measures
embankments that create slopes may lead to landslide and soil subsiding at the slops 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.	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 suface runoff through disturbed ground also contain high solid contents. Muddy water entering irrigation ditch will cause sedimentation. Aquatic livest in the canal would also be affected by turbid water.	- 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
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 The health of workers may be affected due to exposure to odour and other contaminants from dredged material Risk of being drown	- 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 wore.
Others	- Other relevant measures specified in ECOP 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^o

Impacts and Description	Mitigation Measures
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	- Build/create the walls to protect slopes - Create and maintain drainage at the foot of each dump higher than 2m
Soil and Water Quality Pollution - The disposal of salty soil (as if) would not affect the existing soil quality - No risks of subsidence and landslide for residential areas around this area - No impacts on river/canal water quality.	- 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 Tra Men A and Hi Tech 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. According to the analyses, 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. This could rather 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 Soc Trang Waste Treatment facility.
- 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, and 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/canal. 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 contains 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: DUE DILIGENCE REVIEWS

1. Project name	**Soc Trang Waste Water Treatment Plant**
Description	The Soc Trang Wastewater Treatment Plant Project (WWTP) is funded through KfW Bank (6 million Euro), completed its first phase in 2013 after 5 years of construction. Under phase 1, the completed construction work include: 7,5 km inter-ceptor sewers, 160 manholes to collect wastewater along the South and the North banks of Maspero River; 16 separated sewer overflows for wastewater and storm water; 10 pumping stations with 500m pressure sewer line; 200 m siphon cross the Maspero River; upgrading 2.1 km length of existing drainage with 140 manholes to prevent flooding for 5 catchments in the city. In addition, the project has constructed and installed a mechanical wastewater treatment plant with 13,180 m3/day with the following line items: wastewater intake/receptor, coarse remover, fine remover, sand settling, primary settling pond, sludge pumps, sludge stabilizer, sludge drying ground, operating house, internal roads and effluent discharge pipe to Maspero River. The operation of the treatment plant follows: *Treatment of wastewater* Wastewater → Remover → Pump I → Sand Settling Pond → Anaerobic biological treatment pond→ Anoxic/Oxic mixing pond → Finishing pond 1 → Finishing pond 2 (Chlorine disinfection) → Finishing pond 3 → Buffering pond → discharge to Maspero River *Treatment of sludge* Sand sludge: Sand from sand settling pond → Sand drying ground → Transport away for land filling purposes Disposal sludge: Sludge from treatment tanks/ponds → Sand stabilizer → Sludge pump → Sludge drying ground → Supplements → Transport for fertilizer uses **Relationship with the SUUP project:** Wastewater from the SUUP project area of LIA1, LIA 4 and Resettlement Site will be collected and treated at KfW funded Wastewater Treatment Plant (WWTP). The drainage system in LIA 1, LIA 4 and Resettlement Site will be connected with the interceptors of the KfW project. The increase of wastewater generated from the SUUP project is within the treatment capacity of the WWTP.
Status	The plant was launched in June 2013 and has efficiently operated since then. The project will invest the 2nd phase during 2017-2018 to extend further drainage collection network, including primary, secondary and tertiary pipe, covering an additional 160 ha catchment area. There will be some tertiary drainage pipes to be constructed in SUUP project area, in LIA 1 and 4. The WWTP will also be upgraded to have a biological lagoon system with total treatment capacity of 24,000 m^3/day meeting the column

	B of the QCVN14:2008/BTNMT for discharge effluent.
Status of EIA/EMP	The WWTP phase 1 has its Environmental Impact Assessment approved by local environmental authority DONRE and reviewed by GIZ's environmental specialist. Phase 2: under EIA/EMP preparation
Contents of EMP/EIA	The plant is located in the North bank and downstream of Maspero River. The river is 50-60 m wide and thus it can further dilute the treated effluents. The plant is isolated from residential areas and industrial area by its green belt at a safe distance to prevent odor and noise impacts on local surroundings. The impacts during its construction period were localized and manageable. The impacts during the operational period can be mitigated by green belt, proper system maintenance and treatment of sludge. Local flooding and potential incidents have been considered appropriately in its environmental management plan. Periodic sampling and analysis of water (5 samples from the wastewater intake, Xang canal and upstream and downstream of the Maspero) at low tide and high tide period and air (3-5 sampling points from the plant and pumping stations) are being conducted with 3-month frequency. Results are reported to the DONRE on regular basis as requested for parameters such as pH, COD, BOD5, TSS and nitrate, amoni and coliform. The treated wastewater is to meet the acceptable standards before being discharged to the receiving Maspero River.
Due diligence	Wastewater from LIA1, LIA 4 and the Resettlement Site will be collected and transferred to the KfW funded WWTP for treatment. Installation of drainage system in LIA 1, LIA4 and Resettlement Site will make a connection with the wastewater interceptors of the KfW drainage network. The increase of wastewater generated from the SUUP project is within the treatment capacity of the WWTP. The potential environmental impacts due to the sub-project are to be assessed and mitigation measures are to be proposed. Overall, the likelihood of impacts is small and manageable. In the case the project is not implemented, wastewater collected from SUUP project will still be collected and connected to existing waswater drainage system of the city. The investments of the WWTP project are not necessary to achieve the objectives of the WB project, thus this project is not considered as a linked project.
2. Project name	**Soc Trang Waste Treatment Plant (WTP)**
Description	Being located in the areas between Dai Tam commune of My Xuyen district and Phu My commune of My Tu district, the Soc Trang WTP is financed through NORDIC, Norway development fund and Soc Trang counterpart funding. The project completed site clearance in 2010, construction of basic road infrastructures by 2011 and treatment facility during 2014-2016. Total treatment capacity is 160 tons waste per day, comprising of 3 treatment lines over 25.1 ha area: - Incineration of waste for 48 tons per day. Heat recovery is used for brick production - Biological composting 100 tons/ day

	- Sanitized landfill and biological pond for leachate treatment
Status	The facility was on 3-month trial successfully (3-6/2016) and officially operated from October 2016.
Status of EIA	The EIA was approved by DONRE and reviewed by Nordic environmental specialist. Proper mitigation measures have been proposed to eliminate the environmental impacts of leachate, dust and air quality, noise and vibration as well as bad odor during the construction and operation phases.
Contents of EIA/EMP	**Leachate treatment works**: leachate from landfill and from waste separation facility are collected into the wastewater receptor → waste remover → primary settling at anoxic tank → balancing reservoir → Aeroten tank → Reactor tank → Flocculation-settling tank → Discharge tank. The treated wastewater meet column B QCVN 40:2011/BTNMT standards. *Sludge → Sludge digester → Soc Trang solid waste treatment site.* As Soc Trang landfill is located in the South West and 15 km far from the city. The facility is at a safe distance to the closest residential areas and groundwater extraction work. Besides, the landfill is designed in accordance with technical requirements to prevent leachate from penetrating into the soil and polluting groundwater. Proper measures have been taken to ensure that Soc Trang Landfill is operated continuously, in conformity with designed processes, and with the expected efficiency of a leachate treatment system and landfill process. The operation of the landfill has not caused any pollution to the environment.
Due diligence	Soc Trang Landfill has been designed and constructed following the national standards with sufficient technical facilities for solid waste treatment. The capacity of landfill is capable to handle an increase amount of waste coming from the SUUP subproject. Environmental impacts due to the waste of the SUUP subprojects are assessed and mitigation measures are proposed adequately. Waste from the construction work and dredging materials from Hi Tech and Tra Men A canals will be transported to the site for treatment. The impacts due to an increase in waste amount will be taken into consideration and mitigation measures will be put into place. The landfill will receive the sludge and construction waste from the Soc Trang SUUP subproject. The landfill has been established since 2011 and completed site clearance in 2010. This is not considered as a linked project and Government policy is applied for land acquisition.
3. Project name	**Resettlement Site 5A on Mac Dinh Chi road in Ward 4**
Description	The resettlemnt site (RS) is located in ward 4, Soc Trang city with total area of 25.6 ha of which 10 ha is reserved for the resettlement needs of the province's projects and the remaining land is used by the site developer (private investor). The site is provided fully with technical infrastructures (housing, roads, sidewalk, power and water supplies, drainage system, waste collection, public space…) and social infrastructures (market, kindergartens, culture house, schools…). The site is close to the provincial general hospital. There are about 120 households currently living in the site

	as resulted from the land acquisition from other projects in Soc Trang. The project owner: Project Management Unit for Construction of the Resettlement Site 5A, Soc Trang City, Soc Trang Province Financed by the State Budget Total investment amount: 52.9 bilions VND **Relationship with the SUUP project:** This resettlement site has 85 available land plots that can be used to accomodate 58 affected households from Soc Trang subproject. With a complete infrastructure of power supply, water supply, traffic roads, etc. and facilities to easily approach services (health, education, etc.), the affected people will soon be settled, helping to reduce social impacts due to the implementation of the subproject.
Status	2006 – 2007 (completion time is at the end of 2007)
Status of EIA/EMP	The Environmental Impact Assessment was not required by the environmental state management agency at the time the resettlement was developed. However, the analysis of environmental impacts and the proposed mitigation measures were reflected as a chapter in the Project's Feasibility Report.
Due diligence	The subproject completion time is at the end of 2007. Therefore, there are no cumulative impacts in combination with the SUUP subproject. The land acquisition and site clearance has been completed in 2006. To date, the project has not received any claims from affected households. Survey results showed that livelihoods of affected households have been restored. The affected people have been compensated and supported in full in accordance with related law provisions.