

**THE PEOPLE'S COMMITTEE OF HO CHI MINH CITY  
INVESTMENT MANAGEMENT AUTHORITY FOR HO CHI MINH CITY  
ENVIRONMENTAL SANITATION PROJECT- PHASE 2**

**ENVIRONMENTAL AND SOCIAL MANAGEMENT  
FRAMEWORK**

**PRIORITY INVESTMENTS IN SEWERAGE  
AND STORM DRAINAGE IN DISTRICT 2,  
HO CHI MINH CITY**

**HO CHI MINH CITY, SEPTEMBER 2014**

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## **ABBREVIATIONS AND ACRONYMS**

ADB	Asian Development Bank
ADEME	The French Agency for the Environment and Energy Management
AFD	Agency Francaise de Development
AP	Affected Person
AS	Activated Sludge
ASTEE	Association Scientific et Technique pour l'Eau et l'Environnement
BME	Benefit Monitoring and Evaluate
BOD	Biochemical Oxygen Demand
BOT	Build Operate Transfer
CAS	Conventional Activated Sludge
CAPEX	Capital Expenditure
CAM	Camp Dresser and Mc Kee
CDM	Clean Development Mechanism
CFR	Carbon Financing Revenue
CHP	Combined Heat and Power
COD	Chemical Oxygen Demand
CSO	Combined Sewer Overflow
D.2	District 2
DARD	Department of Agriculture and Rural Development
DB	Design and Build
dBA	Decibel
DOC	Department of Construction
DOF	Department of Finance
DOT	Department of Transport and Public Works
DONRE	Department Of National Resources and Environment
DPA	Department of Planning and Architecture
DPI	Department of Planning and Investment
EA	Executive Agency
EBS	East Bank Shaft
EIA	Environmental Impact Assessment
EPC	Engineering Procurement Construction
FASEP	Fonds d'Aide au Secteur Privé
FIDIC	International Federation of Consulting Engineers
FCC	Flood Control Center
FS	Feasibility study
IMA	Implementing Management Agency
CESPIMA	City Environmental Sanitation Project Implementing Management Agency
GDP	Gross Domestic Product
GHG	Green House Gas
GIS	Geographic Information System
GoV	Government of Vietnam
GBT	Gravity Belt Thickener
GRP	Glass Reinforced Panels
GTT	Gravity Thickening Tank
HCMC	Ho Chi Minh City
HCMCES	Ho Chi Minh City Environmental Sanitation Project
HCMCES 2	Ho Chi Minh City Environmental Sanitation Project – Phase 2
ICB	International Competitive Bidding
JBIC	Japan Bank for International Cooperation
IFI	International Financial Institutions
JICA	Japan International Cooperation Agency
KVA	Kilo Volt Ampere
MARD	Ministry of Agriculture and Rural Development
MBR	Membrane Bioreactor
MBBR	Moving Bed Bio film Reactor

MOC	Ministry of Construction
MOET	Ministry of Education and Training
MOF	Ministry of Finance
MONRE	Ministry of Natural Resources and Environment
MOST	Ministry of Science and Technology
MP	Master Plan
NDN	Nitrification – Denitrification
NLTN	Nhieu Loc-Thi Nghe
ODA	Official Development Assistance
O&M	Operation and Maintenance
OPEX	Operational Expenditure
PC	People’s Committee
PCI	Pacific Consultant International
PE	People Equivalent
PM	Prime Minister
PPP	Public Private Partnership
PPTAF	Project Prepare Technical Assistance Facility
PSP	Private Sector Participation
PS	Pumping Station
PST	Primary Settling Tank
QCBS	Quality and Cost- Based Selection
RAP	Resettlement Action Plan
RC	Reinforced concrete
SA	Social Assessment
SAWACO	Saigon Water Company
SBR	Sequencing Batch Reactor
SCADA	Supervisory Control And Data Acquisition
SCFC	Steering Center for Urban Flood Control Programme
SOE	State Owned Enterprise
SS	Suspended Solid
TLBC	Tham Luong Ben Cat
TN	Total Nitrogen
TP	Total Phosphorus
UDC	Urban Drainage Company
UFW	Unaccounted For Water
UMRT	Urban Mass Rail Transit
USD	United States Dollar
UV	Ultra Violet
VAT	Value added tax
VND	Vietnam Dong
WB	World Bank
WEIP	Water Environment Improvement Project
WS	Water Supply
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

## **1. INTRODUCTION AND BRIEF DESCRIPTION OF PROJECT COMPONENTS**

### **1.1. Brief description about the D2 project**

#### ***1.1.1. Project objective and components***

The Ho Chi Minh City Environmental Sanitation Project-Phase 2 (HCMC ESP2) is a sequence of the HCMC ESP1 funded by World Bank which closed on June 30, 2012. Under the first project, through the construction of an interceptor and rehabilitation of the drainage system, sewage from the NLTN basin is transferred to a pumping station. The pumping station is now operational and the sewage is pumped under the Saigon River to a shaft on the East Bank in District 2 from where it is currently discharged untreated to the Saigon River. There is an overflow structure in Saigon River (Location B at 0 Project location). The structure will remain operational so that during raining season when there could be excess water coming from Location A (0 Project location) that could not be diverted to the WWTP completely it will be discharged into the Saigon River (Location B at 0 Project location). However, the excess water discharged to the Saigon River will be of low concentration (less than 50 mg/l of BOD) and will only occur a few times per year during heavy rain; therefore, it should not have any significant impact on the Saigon River water quality, especially as dilution should be higher during periods of heavy rain.

Under HCMC ESP2 the sewage will be conveyed from the East Bank shaft and District 2 to a proposed new sewage treatment plant via a 3.2m diameter and 8 km long interceptor (See 0, Appendix II). The proposed routing of the interceptor will also take into account the plans for sewerage and drainage investments necessary for the development of District 2 and the capacity of the interceptor would be sufficient to also eventually transfer the sewage from District 2 once the area develops. HCMCESP2 will also include priority sewerage and drainage investments in District 2 (D2 Project) (Figure II.3, Appendix II), which is a new development area in line with the Master Plan, part of which is proposed as new financial center.

As the interceptor crosses District 2, sewage from D.2 will be collected. As this District will be urbanized by 2035, sewage will be collected and treated which will protect the quality of the Saigon and Dong Nai Rivers. In the previous Master Plan, several WWTPs were planned for construction in District 2. As it is proposed that the sewage shall be collected and treated at a centralized WWTP, depending on the construction schedule of NLTN WWTP, the construction of these small-scale WWTPs in D.2 may not be necessary.

Based on the Decision No 2377/QĐ-TTg dated December 6, 2013 of Prime Minister on approving the list of project's "Ho Chi Minh City's Environmental Sanitation-Phase 2", World Bank (WB) Loan.

The HCMC ESP2 has five components which are summarized below:

- Component 1: Construction of Interceptor: The sewage interceptor total length of 8 km and diameter of 3.2m will be constructed to connect sewage from East Bank Shaft to the wastewater treatment plant at Thanh My Loi ward, District 2. It will convey sewage from NLTN to the Pumping Station at the entrance of the WWTP. The construction of the interceptor will prevent the discharge of untreated wastewater to the Saigon River.
- Component 2: Construction of Wastewater Treatment Plant: The WWTP will treat the wastewater collected in the NLTN basin and in the D2 area. The WWTP is being designed for a capacity of 480,000 m<sup>3</sup>/day and will be constructed through a Design Build and Operate contract where the same private company will carry out these three stages. The WWTP will be located near the confluence of the Saigon and Dong Nai rivers, and the treated wastewater will be discharged to the Dong Nai River. The site is prone to flooding and, as a result, flood protection measures are included in the project

design.

- Component 3: Construction of Sewerage Network in the District 2 area: The project will invest in drainage level 2 and level 3 in District 2. Investment objective of the drainage in District 2 is to maximize the wastewater collection to improve the environmental conditions in the project areas where untreated wastewater is discharged to water bodies. In addition, all houses in the project area will be connected, if they are not currently connected to the combined or separated system. The wastewater collected from the District 2 area will be transferred to the interceptor that also will convey wastewater to the wastewater treatment plant (being constructed under this project) from the Nhieu Loc-Thi Nghe (NLTN) area.
- Component 4: Project Implementation: The managing agency is the City People's Committee, through the City environment sanitation project investment management agency (CESPIMA). It would be important for HCMC to have the necessary resources to ensure that the investments are carried out in a proper way and that wastewater and sanitation management in the city is sustainable from environment and financial standpoints. Component 4a: Construction Supervision will support hiring of consultants to supervise construction during project implementation. Component 4b: Improving Sanitation Management and Project Implementation will provide technical assistance including implementation support and capacity building for key project entities (e.g. CESPIMA). In addition, support will be provided to the CESPIMA to enhance sanitation management in HCMC.
- Component 5: Land Acquisition and Operating Cost of Implementation Management Agency. CESPIMA coordinates with the People's Committee of District 2 to setup the general plan for the compensation assistance and resettlement. District 2 People's Committee is responsible for the establishment of a committee for the compensation assistance and resettlement as prescribed. The committee for the compensation assistance and resettlement will setup the land acquisition plan, documents and decisions for households, individuals, and organizations (if any) under the provisions and give land hand-over decision for CESPIMA. Component 5a: Resettlement and Land Acquisition will include costs (borne solely by HCMC) to compensate people that currently own the land where the WWTP would be constructed. Component 5b: Operating Cost of the Implementation Management Agency includes salaries, fees and other costs (all borne by HCMC) for the eight years of the project implementation period,

The priority area(s) will be areas of existing development currently discharging to septic tanks/small WWTPs and new areas under construction or to be completed within the lifetime of the project (i.e. before 2019) (See map in 0, Appendix II). The main components of HCMCESP2 are presented in Table 1. Cost base estimation of the HCMC ES2 .

The project's main components include the new storm drainage and sewerage, house connections in District 2 to convey to the 3.2m diameter and 8 km long interceptor and to treat in the NL-TN WWTP; machinery equipment and vehicles for the system's operation management.

The storm drainage consists of the circular culverts and box culverts as presented in 0, Appendix I. The main rainwater drainage components for District 2 are including renovation of canal drainage, road construction along the canal, construction and renovation of the bridges passing through the canals, construction of tide preventing and water regulating, construction of storm drainage culverts of level 2, elevation of the foundation of the construction land, renovation and upgrading, and construction of dikes.

The pipework collection system consists of installation of main elements such as storm drainage and pipework collection systems. The quantity of the pipework drainage culverts is presented in 0, Appendix I.



### **1.1.2. Project management and personnel:**

- Line agency/Governing Body: The People's Committee of Ho Chi Minh City.
- Project owner: Implementation Management Agency (IMA) for Ho Chi Minh City's Environmental Sanitation Project -Phase 2 (CESIMA) (Government Decision No 2377/QD-TTg dated 6 December 2013 on approving the list of project's "Ho Chi Minh City's Environmental Sanitation-Phase 2", World Bank (WB) Loan), .
- HCMC People's Committee has decided to establish the Investment Management Sanitation Project under the City Transportation Department.
- Representative: Phan Chau Thuan Position: Director
- Address: 12 Vo Van Kiet Street, Nguyen Thai Binh Ward, District 1, Ho Chi Minh City
- Tel: (08) 39142903 Fax: (08) 39142983
- E-mail: [hcmes@gmail.com](mailto:hcmes@gmail.com)

### **1.1.3. Budget and donor**

According to Decision No 2377/QD-TTg dated December 6, 2013 of Prime Minister, the total project cost will be \$ 524 million, of which:

- Bank loan is 450 million from two sources:

Loan from International Development Association (IDA): \$ 200 million;

Loan from International Bank for Reconstruction and Development (IBRD): \$ 250 million.

- Counterpart funding from Vietnam Side: 74 million, the budget allocated from Ho Chi Minh City.

The investment depends on the selection of the technology process (See table 1).

Table 1. Cost base estimation of the HCMC ES2 project

No	Item	Cost (US\$)
1	Preparation phase	
2	Implementation phase, including	
	- <i>Interceptor</i>	
	- <i>WWTP</i>	
	- <i>Priority Investments for District 2</i>	
	- <i>Support and TA activities</i>	
	- <i>MIS software</i>	
	- <i>Compensation and site clearance</i>	
3	Contingencies (10%)	
4	VAT (5%)	
	<b>Total grand cost</b>	<b>524,000,000</b>

Source: Decision No 2377/QD-TTg dated December 6, 2013 of Prime Minister

According to The Feasibility Study of the D2 Project, July, 2013, the cost for Priority Investments for District 2 is estimated about 27,810,000 USD.

## **1.2. Scope of the ESMF**

### **1.2.1. ESMF Objective**

The environmental impact assessment for construction of the 8 km interceptor and WWTP (components 1 and 2) has been prepared by project owner. However, detailed investment items of sewerage network in D2 (component 3) are not fully known by appraisal, thus an detailed assessment report could not be prepared. To ensure that the construction of D2 sewerage network will be implemented in a sustainable manner, an Environmental and Social Management Framework (ESMF) has been developed by the subproject owner. The ESMF describes the environmental requirements and process to be followed for the construction of D2 sewerage network (i.e. levels 2 and 3 sewer system) under component 3 by the project owner.

The ESMF is in accordance with the WB's safeguard policies and national environmental regulations. It covers: (i) preliminary baseline data of the project area; alternatives analysis (ii) impacts assessment and mitigation measures; (iii) safeguard document preparation and clearance/approval; (iv) safeguard implementation, supervision, monitoring and reporting; (v) institutional arrangement and budget; (vi) capacity building program and (vii) consultation and public disclosure

### **1.2.2. ESMF Contents**

- Brief description of project components including description of type of activities eligible for financing
- Operating requirements (diagnosis of legal and institutional framework, applicable safeguards)
- Environmental/social baseline at national/state level
- ESMF screening procedures (criteria, process, environmental due diligence process, EIA/EMP documentation)
- Implementation arrangements
- Public consultation and disclosure process/procedures
- Environmental mitigation measures
- Monitoring and reporting arrangements
- Training and capacity building recommendations
- Various appendices

### **1.2.3. Environmental requirements and procedures to be followed for the construction of the sewerage network in D2.**

(1). Preparation, consultation and disclosure of safeguard document (EA report) for D2 net work

The CESPIMA, or in short IMA has to prepare and submit EIA report of D2 Project to the Department of Natural Resources and Environment of Ho Chi Minh City for review and appraisal as stipulated in the Law on Environment Protection dated November 29, 2005 of the National Assembly and came into effect from July 1, 2006; Decree No. 29/2011/ND-CP dated April 18, 2011 issued by the Government on strategy environment assessment, environmental impact assessment and environment protection commitment. The cost for preparing and reviewing the EIA report is usually estimated about 0.1-0.5% of the total investment budget (budget invested in the project). In addition, the EIA shall be in line with the Bank SG policies and the Policy Public Consultation and Information Disclosure. The EIA needed to be reviewed and cleared by the WB.

The environmental requirements and procedures for the D2 project are guided in the Circular No. 26/2011/TT-BTNMT issued by MONRE on detailing some articles of Decree No.

29/2011/ND-CP dated April 18, 2011 of the Government on strategic environmental assessment, environmental impact assessment and environment protection commitment.

The content of the EIA report is guided in Appendix 2.5 of Circular 26/2011/TT-BTNMT issued by MONRE. The TOR for EIA is attached in Appendix IV of this ESMF. The TOR provides requirements on the project description, baseline data, detailed impact assessment, mitigation measures, EMP and public consultation for the EA report.

The public consultation during the preparation of EIA report for the D2 project is regulated in Article 12 of the Circular No. 26/2011/TT-BTNMT. The Report including the summary of main investment items, key environmental issues, and environmental protection solutions associated with the Project should be sent to organizations and individuals participating in the public consultation. Organizations and agencies contacted as part of the consultation process shall have 15 working days from the receipt of the documents to submit their comments.

The D2 project is classified as a Category B project according to Safeguard Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment. For this project, the EIA is required.

(2). Review and approval of the EIA for D2 project

The EIA for D2 project shall be reviewed and cleared by the Bank before it is submitted to approval by local authority.

According to Article 13 of the Circular, the dossiers should be submitted to DONRE of Ho Chi Minh City for EIA review and appraisal include one official letter from the project owner, seven copies (or more if necessary) of the EIA report, one investment report (or feasibility study report). The time limit for appraisal shall not exceed 30 working days from the date of receipt of sufficient application. In cases where the project has complicated impacts to the environment, the time limit for appraisal will be extended, not to exceed 45 working days from the date of receipt of a sufficient application (Article 20, Decree 29/2011/ND-CP).

(3). Supervision and monitoring;

Before the project is put into official operation, the project owner is responsible for construction and application of environmental protection measures and works; and compiling dossiers to request examination and certification of the implementation of environmental protection measures and works for the operation phases of projects submitted to the DONRE of Ho Chi Minh City for getting the certificate (Article 35, Circular 26/2011/TT-BTNMT).

During pre-construction, construction and operation of the project, the project owner is responsible for implementing environmental monitoring program with frequency 4 times/year for the waste sources and 2 times/year for the surrounding environment (See Appendix III Circular 26/2011/TT-BTNMT).

The actors for supervision and monitoring are described in the EMP as part of the EIA (See Table 4).

(4). Documentation and reporting:

The approved EIA and other documents, including the annual monitoring reports shall be report to relevant agencies (i.e. DONRE of Ho Chi Minh City) and WB.

## **2. BRIEF REVIEW OF LEGAL AND INSTITUTIONAL FRAMEWORK**

### **2.1. World Bank Safeguard Policies**

The environmental impact assessment study for the sanitation project is designed to evaluate

its status with respect to all applicable World Bank Safeguard Policies. According to Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment (<http://go.worldbank.org/OSARUT0MPO>), the overall project is classified as a Category A project and therefore requires the completion of full-scale EIA. This safeguard policy describes guidance on Bank's Policy and procedure for conducting environmental assessments of proposed projects.

Additional World Bank policies that were triggered through the Project's EIA process include: OP 4.04 Natural Habitats; OP 4.11 Physical Cultural Resources; and OP 4.12 Involuntary Resettlement detailed requirements on assessment methodologies and common impact associated with urban drainage and water development work were provided by World Bank's Environment assessment Sourcebook (WB Paper Number 140, Volume II- Sectorial Guidelines, Washington D.C, 1991). Besides those, the EIA study will follow the applicable International Conventions/Commissions for which Vietnam is a member (e.g. International Waters, Climate Change, etc.).

The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues (<http://www.ifc.org/ehsguidelines>). The environmental guidelines, which can be applied on EIA report are including Air Emissions and Ambient Air Quality; Sewage and ambient water quality; Hazardous Material Management, Waste Management, Noise management.

## **2.2. Vietnamese Policy and Administrative Framework on Environmental Assessment**

### ***2.2.1. Administrative framework on Environmental Assessment***

In Vietnam, the Ministry of Science, Technology and Environment (MOSTE), formed in October 1992, was the top decision-making body with overall responsibility for the environmental sector until 2002 when the Ministry of Natural Resources and Environment (MONRE) was established. Government Decree No 91/2002/ND.CP on the functions, tasks, powers and organizational structure of the MONRE was promulgated on November 11, 2002, which were amended in Government Decree No 21/2013/ND-CP on March 4, 2013.

At National Level, the Vietnam Environmental Administration (VEA) within MONRE has its function and targets to advise MONRE to develop the environmental legislation and regulations, to issue the environmental protection programs, to carry out environmental monitoring program in Vietnam. At provincial level, the Environmental Protection Administration (EPA) within Department of Natural Resources and Environment (DONRE) have its responsibilities to advise the Provincial People's Committee in management and enforcement of the environmental legislation and regulations in provinces. For the Project, the framework's relevant institutes are as follows:

- Ministry of Natural Resources and Environment (MONRE). This ministry will include vice-ministers, 21 departments, one newspaper, and one magazine. The MONRE will merge numerous departments from several national agencies. These are outlined in Decree 91/2002/ND-CP and Decree No 21/2013/ND-CP: Providing for the functions, duties, powers and organizational structure of the Ministry of Natural Resources and Environment;
- Environmental Impact Assessment and Appraisal Department. This Department is under the Vietnam Environmental Administration (VEA) within MONRE. According to Decree 91/2002/ND-CP, Decree No 21/2013/ND-CP the Department's function includes: To advise VEA to review environmental impact assessment reports of proposed projects then submit to MONRE for approval. The Environmental Impact Assessment and Appraisal Department is guided by Vietnam's regulatory framework: i.e. LEP, Decree 29/2011/ND-CP, Circular 26/2011/TT-BTNMT;
- The city's Department of Environment and Natural Resources (DONRE) was formed in late

2003. DONRE houses an Environmental Protection Administration (EPA). The EPA is responsible for ensuring environmental protection and management of provincial matters in accordance with LEP, Decree 29/2011/ND-CP, Circular 26/2011/TT-BTNMT. Hence, it is DONRE - and in particular, the EPA - that plays the key regulatory role during project preparation, construction and operation.

### **2.2.2. Legal background**

- Law on Cultural Heritage No. 28/2001/QH10 which was ratified by Vietnam National Assembly in June 29, 2001 and came into effect from January 1, 2002;
- Construction Law 16/2003 QH11 dated November 26, 2003 of Vietnam National assembly;
- Law on Land No. 13/2003 QH11 dated November 26, 2003 of Vietnam National Assembly;
- Law No.29/2004/QH11 of December 3rd, 2012 on Forest Protection and Development;
- Law on Environment Protection dated November 29, 2005 of the National Assembly and came into effect from July 1, 2006;
- Law No.20/2008/QH12 of November 13th, 2008: stipulates biodiversity conservation and sustainable development;
- Law No. 32/2009/QH12 dated June 18, 2009 on amending and supplementing some articles of Law on Cultural Heritage No. 28/2001/QH10;
- Law No. 38/2009/QH12 dated June 19, 2009 on amending and supplementing some articles of regulations related to infrastructure construction investment.
- Law No. 34/2009/QH12 dated June 18, 2009 on amending and supplementing Article 126 of Law on Housing and Article 121 of Law on Land;
- Law on water resources was issued by the National Assembly of Socialist Republic of Vietnam dated June 21, 2012 and period of validity from January 1, 2013.
- Decree No.149/2004/NĐ-CP dated July 27, 2004 on the issuance of permits for exploration, exploitation and using on water resources, discharge of sewage into water sources;
- Decree No. 197/2004/ND-CP dated December 3, 2004 of the Government on compensation, support and resettlement when the state recovers land; Decree No. 69/2009/ND-CP dated August 13, 2009 on supplementing land use plan, land price, compensation, support and resettlement;
- Decree No. 131/2006/ND-CP dated November 9, 2006 of the Government on regulations on ODA management and use;
- Decree No.88/2007/NĐ-CP dated May 28, 2007 on water drainage in urban and industrial park;
- Decree No. 12/2009/ND-CP dated February 12, 2009 of the Government on management of construction investment project and Circular No. 03/2009/TT-BXD dated March 26, 2009 of MOC on guiding Decree No. 12/2009/ND-CP implementation;
- Decree No. 59/2007/ND-CP dated April 9, 2009 of the Government on solid waste management;
- Decree No. 83/2009/ND-CP dated October 15, 2009 on amending and supplementing some articles of Decree No. 12/2009/ND-CP dated February 12, 2009 of the Government on construction work investment management;
- Decree No.117/2009/NĐ-CP dated December 31, 2009 relating violation of the law in the field of environmental protection;
- Decree No 26/2010/NĐ-CP dated March 22, 2010, amending and supplementing clause 2 article 8 of Decree No. 67/2003/NĐ-CP on environmental protection charges for waste water;
- Decree No. 29/2011/ND-CP dated April 18, 2011 on strategy environment assessment, environmental impact assessment and environment protection commitment;

- Decision No. 35/1999/QĐ-TTg dated March 05, 1999, on National orientation on drainage development in urban areas by 2020;
- Decision No.752/QĐ-TTg dated June 19, 2000 of Prime Minister on approving master plan drainage systems in Ho Chi Minh city up to the year 2020;
- Decision No 2377/QĐ-TTg dated December 6, 2013 of Prime Minister on approving the list of project's "Ho Chi Minh City's Environmental Sanitation-Phase 2", World Bank (WB) Loan
- Decision No. 3733/2002/QĐ-BYT dated October 10, 2002 of Ministry of Health on promulgating 21 standards of working sanitation, 5 principles and 7 parameters of working sanitation;
- Decision 48/2008/QĐ-TTg dated April 3, 2008 regulating the Common General Guidelines on Feasibility Study Preparation for ODA Projects funded by the Five Banks (Asian Development Bank, French Development Agency, Japan Bank for International Cooperation, German Reconstruction Bank, World Bank);
- Decision No. 04/2008/QĐ-BXD dated April 3, 2008 on promulgating national technical regulation on construction planning;
- Decision No. 04/2008/QĐ-BTNMT dated July 18, 2008 of MONRE on promulgating National Technical Regulation on Environment;
- Decision No.16/2008/QĐ-BTNMT dated December 31, 2008 of Ministry of Natural Resources and Environment issued national technical regulations on surface water quality, underground water quality, coastal water, waste water and pesticide residues in soil;
- Decision No. 1849/QĐ-TTg dated October 8, 2009 of the Prime Minister on approving list of projects calling ODA fund in 6 urban areas in Mekong River Delta;
- Decision No. 2149/QĐ-TTg dated December 17, 2009 of the Prime Minister on approving national strategy on integrated management of solid waste to 2025 with vision to 2050;
- Decision 1930/QĐ-TTg dated November 20, 2009 of Prime Minister approving orientations for development of water drainage in Vietnamese urban centre and industrial parks up to 2025 and a vision towards 2050;
- Circular No. 13/2007/TT-BXD dated December 31, 2007 of MOC on guiding implementation of some articles of Decree No. 59/2007/NĐ-CP dated April 9, 2007 on solid waste management;
- Circular No. 02/2009/TT-BTNMT dated March 19, 2009 of MONRE on assessment of sewage receiving capacity of the water source;
- Circular No.09/2009/TT-BXD in May 21, 2009 detailing some provisions of the Government's Decree No. 88/2007/NĐ-CP dated May 28, 2007 on Urban drainage and Industrial area;
- Circular No. 14/2009/TT-BTNMT dated October 1, 2009 detailing compensation, support and resettlement, and procedure for land recovery, allocation and lease;
- Circular No. 16/2009/TT-BTNMT dated October 7, 2009 of the Ministry of Natural Resources and Environment issued 02 national technical regulations on the environment: ambient air quality, toxic substances in some surrounding air;
- Circular No. 25/2009/TT-BTNMT dated November 16, 2009 of the Minister of Natural Resources and Environment issued 09 national technical standards on the environment;
- Circular No. 41/2010/TT-BTNMT dated December 28, 2010 of MONRE's Minister on National Technical Regulation on environment;
- Circular 02/2010/TT-BXD dated February 5, 2010 issued QCVN 07:2010/BXD - Vietnam Building Code Urban Engineering Infrastructures;
- Circular 39/2010/TT-BTNMT dated December 16, 2010 of Minister of Natural Resources and Environment issued provisions of national technical regulations on the environment;

- Circular No. 26/2011/TT-BTNMT on detailing some articles of Decree No. 29/2011/ND-CP dated April 18, 2011 of the Government on strategic environmental assessment, environmental impact assessment and environment protection commitment;
- Circular No. 12/2011/TT-BTNMT dated April 18, 2011 of MONRE's Minister on hazardous solid waste management.

### **2.2.3. Applicable Environmental Standards and regulations**

#### **(1). Water Quality**

- QCVN 08:2008/BTNMT - National Technical Regulations on surface water quality;
- QCVN 09:2008/BTNMT- National Technical Regulations on ground water quality;
- QCVN 14:2008/BTNMT- National Technical Regulations on domestic sewage quality;
- QCVN 40:2011/BTNMT- National Technical Regulations on industrial sewage.

#### **(2). Air Quality**

- QCVN 05:2013/BTNMT-Air Quality-National Technical Regulation on ambient air quality;
- QCVN 06:2009/BTNMT-Air Quality-Maximum allowable limit of hazardous substances in ambient air.
- QCVN 19:2009/BTNMT-National Technical Regulation on Industrial Emission of Inorganic Substances.
- QCVN 20:2009/BTNMT-National Technical Regulation on industrial emission of organic Substances.

#### **(3). Soil Quality**

- QCVN 03:2008/BTNMT – National technical regulation on allowable limit of heavy metals in soil.

#### **(4). Solid Waste Management**

- Decision No. 27/2004/QĐ - BXD dated November 9, 2004 of MOC on promulgating TCXDVN 320: 2004 "Hazardous waste disposal site – Design standard";
- TCVN 6696:2009- Solid waste – Sanitary landfill. General requirement on environment protection;
- QCVN07:2009/BTNMT- National Technical Regulation on hazardous waste threshold.
- QCVN 25:2009/BTNMT-National Technical Regulations on sewage from solid waste landfill.

#### **(5). Noise and Vibration**

- QCVN 26:2010/BTNMT – National Technical Regulation on noise.
- QCVN 27:2010/BTNMT – National Technical Regulation on vibration.

#### **(6). Working Safety and Health**

- Decision No. 3733/2002/QĐ-BYT dated October 10, 2002 on application of 21 standards on safety and health.

### **2.3. Legal base of the Ho Chi Minh City Environmental Sanitation (Phase 2)**

- Master plan on drainage sewage and storm water in Ho Chi Minh City approved by the Government in 2001;
- Decision 185/2006/QĐ-UBND dated December 29, 2006 on promulgating regulations on

the management and protection of the public drainage systems in HCM City;

- Notice No. 885/TB-VP dated November 15th 2008 of HCM City People's Committee, the conclusion of the Chairman of HCM City People's Committee Le Hoang Quan on resolving some issues related to feasibility study report on Nhieu Loc - Thi Nghe basin sewage treatment plant, Wijaya Global Berhad Group (Malaysia);

- Notice No. 874/TB-VP dated November 28, 2009 of HCM City People's Committee, the conclusion of the City People's Committee Chairman - Le Hoang Quan, The Vice Chairman of City People's Committee - Nguyen Trung Tin on the progress of pollution treatment Ba Bo Canal and the solutions to prevent flooding in Ho Chi Minh City following the request of the Steering Center For Urban Flood Control;

- Notice No. 179/TB-VP dated March 30, 2010 of HCM City People's Committee, the conclusion of the Chairman of HCM City People's Committee Le Hoang Quan on inspection of implementation progress of ODA project in Ho Chi Minh City;

- Document No. 3719/UBND-DTMT dated August 2, 2010 by Ho Chi Minh City People's Committee to approving construction site of Nhieu Loc -Thi Nghe Canal waste water treatment plant in Thanh My Loi Ward, District 2;

- Minutes of the agreement the boundary of adjacent projects No.1297/BB-TTCN dated September 23, 2010 between the Nhieu Loc-Thi Nghe Basin and District 2 Sewage Treatment Plant, the construction project of Fire Police Headquarters and the Thanh My Loi B residential project, in Thanh My Loi Ward, District 2;

- Decision No.141/QD-UBND dated January 13rd 2010 of the HCM City People's Committee on the delivery of construction plans for 2010 (phase 1) from the lottery capital, the focus budget capital and Official development assistance capital (ODA);

- Decision No.1147/QD-UBND dated March 12nd 2010 of the HCM City People's Committee on approving the Sanitation Technical Support project of HCM City -Phase 2.

- Decision 421/QD-TNMT-KH dated July 02nd 2010 of the Department of Natural Resources and Environment on approving the cost estimate for environmental impact assessment reports of the Sanitation Technical Support project of HCM City Phase 2.

- Decision 1258/QD-SGTVT dated May 16 2011 of Department of Transportation on regulations promulgated organization and operation of the Project Management Unit of Ho Chi Minh City Environmental Sanitation.

### **3. DESCRIPTION OF EXISTING ENVIRONMENTAL AND SOCIAL CONDITIONS AT THE D2 SEWERAGE SUBPROJECT AREA**

#### **3.1. Physical Environment**

##### **3.1.1. Atmospheric Conditions**

Data provided by the meteorological stations of Tan Son Hoa Station in duration of 2005-2012 years show the annual average, maximum, and minimum temperatures are 28.16°C, 34.2°C (year of 2000), 20.8°C (year of 2000), respectively. The average maximum temperature occurs in April and the minimum in January. Climate change strongly impact on Vietnam, with the trend average rate of temperature about 3°C during 100 years. By 2060, HCM City will not have temperature below 21°C and may appear extreme temperature to 44 - 45°C.

Generally, the intensity of the sun is highest in April (240.8 hours) and lowest in December (90.5 hours). Annual average sunlight time in Tan Son Hoa Station is between 1,891 and 2,074 hours. The total of average daily radiation in a year is about 110-160 Kcal/cm<sup>2</sup>.

Annual average relative humidity recorded at Tan Son Hoa Station varies from 68%



(February) to 83% (September). The average humidity is 74%, the difference between the highest wet and dry place is about 10 to 12%. Average evaporation in a month recorded in many years occurs during the dry months (February - March), may reach to 170-180 mm in the Tan Son Hoa station; the lowest evaporation is in September, October (54-58 mm).

In the project area, the rainfall is uneven, tends to increase along the Southwest – North East. In the suburban districts and northern districts, rainfall is higher than one in the rest of regions. Average annual rainfall of the city varies from 1,742.8 to 2,340.2 mm/year. The rainfall concentrates on the rainy months, accounting for 90% of annual rainfall. Thereby, heavy rains usually occur from August to October; especially, there is a little bit the amount of rainfall or no rainfall in January to March. Monitoring data indicates that the average rainfall is 2,016.2 mm in 2012.

HCM city is influenced by two main wind directions, including West - Southwest and North - Northeast. The West - Southwest wind from the Indian Ocean blows into the rainy season, from June to October, with average speed about 2.4 m/s and the strongest in August with average speed about 4.5 m/s. By while, the North - Northeast wind from the East Sea blows into the dry season, from November to February, with average speed 2.4 m/s. Besides, Trade wind is blowing from South - Southeast during March to May with average speed 3.7 m/s.

The concentrations of dust, sulfur dioxide, nitrogen dioxide, carbon monoxide and volatile organic constituents in the ambient air at all sampling points are within the Vietnamese technical environmental regulations for ambient air quality (QCVN 05:2009/BTNMT and QCVN 06:2009/BTNMT). The noise level in the project area is mostly lower than the National Technical Regulations on Noise (QCVN 26:2010/BTNMT). The air sampling points are described in 0, Appendix II.

### **3.1.2. Hydrological Conditions**

Ho Chi Minh City, located in the downstream of Dong Nai - Saigon river system, has a development rivers and canals network. Dong Nai River has many tributaries such as La Nga River, Nha Be River with average flow of 20-500 m<sup>3</sup>/s and the highest flow of 10,000m<sup>3</sup>/s during floods. Saigon River originates from the Hon Quan - Binh Phuoc Province, flows through Thu Dau Mot to the HCM city with a length about 200 km. Its length in the territory of the city is 80 kilometers. The width of Saigon River in the city ranges from 225m to 370m and its depth is 20 meters. Dong Nai River connects with Saigon River through the expansion area of the inner city by the system of Rach Chiec Canal. Nha Be River had formed from the confluence process of the Dong Nai and Saigon River, distanced the center about 5km to the South-East. It flows into the East Sea by two streams: Soai Rap River which has 59km length and average width is 2km, is a shallow river with slow flow rate. Another is Tau Bay River, flowing into Ganh Rai Bay, is 56 km length and 0.5 km width. It is a deep river and is also the major waterway for the ships coming and leaving from Sai Gon Port.

The hydrological conditions of the rivers in Ho Chi Minh City are influenced by semi-diurnal variation of tidal of the East Sea. Tides rise up and down twice a day, so they penetrate into the canals in the city, causing impact on agricultural production and limiting the water drainage in the urban areas. Monitoring results measured at Phu An station in 2010 year, shown that the highest of average tide level in the Saigon River is 1.385 m. The highest water level is November (1.55 m) and the lowest is July (-2.22 m). In dry season, the flow of the rivers is small, 0.4 ‰ salinity can enter on the Saigon River to Lai Thieu, in some years going to Thu Dau Mot and Long Dai on Dong Nai River. In rainy season, the flow of the River is much higher, so the salinity was pushed back further and diluted quite much.

The results of surface water quality analysis, implemented by the Institute of Environmental and Resources on 23-24 October 2010 showed that the Sai Gon-Dong Nai River waters at 20 sampling points are contaminated by parameters such as DO, BOD, COD, TSS, N-

$\text{NH}_4^+$ ,  $\text{N-NO}_2^-$ ,  $\text{P-PO}_4^{3-}$ ,  $\text{Cl}^-$ , As, Fe, total oil, Coliform. In particular, BOD and COD concentrations in most samples are exceeded the required regulation for surface water quality QCVN 08:2008/BTNMT-Column A2 in the high tide and low tide. The surface water sampling points are described in 0, Appendix II.

The ground water quality analysis in the project area has implemented by the Institute for Environment and Resources on 06 September 2010 at 5 locations in District 2. The ground water sampling points are described in 0, Appendix II. The results shown that As concentration of sample NN4 (at Thanh My Loi ward) was 0,0061mg/l, higher 1,22 times than regulation QCVN 09: 2008/BTNMT, that of sample NN3 (at Cat Lai Port) was approximated to the regulation. So far, there was very difficult to indicate where As come from (natural or industrial sources). Besides that,  $\text{Cl}^-$  concentrations at locations NN1, NN3, NN5 were higher than the allowable limits. Especially,  $\text{Cl}^-$  concentration at location NN5 was 965 mg/l, higher 3.86 times than the allowable limit. The water resources having high chloride concentration can corrode metal and damage crops; reducing the lifespan of concrete works.

### **3.1.3. Geological Condition**

The topography of District 2 is quite flat. However, District 2 may have problem with flooding, especially in the situation of climate change and sea level rise. Because of its low terrain, the ground level of District 2 needs to be raised from +2.5m to +3.0m above the sea level to prevent flooding. Based on the original terrain, the survey region is the type of the coastal plain, formed by the sediment originated from rivers and sea. According to geo-technical works and analysis in the laboratory from drilling samples, the geological strata of the region is divided into 6 soil layers from top to bottom.

Ten samples of the soil at the project area in District 2 have been taken and analyzed by Institute of Natural Resources and Environment on 23-24 October 2010. The soil sampling points are described in 0, Appendix II. The analysis results shown that  $\text{pH}_{\text{KCl}}$  range from 3.74 to 8.04; most collected soil samples has a humidity > 30%; soil is potassium-rich; protein concentration is quite high, but the total amount of phosphorus ( $\text{P}_2\text{O}_5$ ) in the surface soil is moderate. The heavy metal concentrations in soil are lower than the regulation for land which is used for commercial purposes. Therefore, the number of excavated soil from the drainage district 2 can be used for leveling purposes

## **3.2. Biological Environmental**

The results of analysis of the flora samples collected at 5 sampling sites within the D2 project area in the Saigon River shown that there are 72 species belonging to 4 different divisions of phytoplankton were recorded. Among the algal assemblage, diatoms (Bacillariophyta) were dominant with 43 species (gaining 59.72% of total species number), followed by green algae (Chlorophyta) with 15 species (20.83%), cyanobacteria (Cyanophyta or blue-green algae) with 11 species (15.28%) and euglenoids (Euglenophyta) with 3 species (4.17%).

The results of analysis of the zooplankton samples collected at 5 sampling sites within the D2 project area in the Sai Gon River (See 0, Appendix II) shows that there are 39 species and 4 larvae of zooplankton found. The recorded species belonged to four main groups or divisions *Arthropoda*, *Aschelminthes*, *Ciliophora* and *Sarcomastigophora*. Species of *Aschelminthes* were dominant at the sample sites in terms of the species numbers (21species, gaining 48.84% of total). The division Ciliophora contributed 7 species, Sarcomastigophora did 6 species and Arthropoda did 5 ones into the total 39 species of the found zooplankton assemblage. Additionally, four larvae of Nauplius Copepoda, Gastropoda, Bivalvia and Polychaeta were also recorded from the 5 sites.

The analysis of the macro invertebrates samples collected at 5 sampling sites within the D2 project area in Saigon River shown that there are 11 species belonging to 4 classes, Polychaeta (5 species), Oligochaeta (2 species), Bivalvia (1 species) and Crustacea (3

species), of benthic macroinvertebrates identified. Among the recorded macro invertebrates the Polychaeta group was dominant in species numbers (5 species, gaining 45.4% of total number of species).

All the mentioned above species are not rare/endangerous species.

### 3.3. Socio-cultural Environment

According to the feasibility study report, the project area of 816 ha is located in District 2 including 11 wards: An Phu, Thao Dien, An Khanh, Binh Khanh, Binh An, Thu Thiem, An Loi Dong, Binh Trung Dong, Binh Trung Tay, Thanh My Loi and Cat Lai.

The results of socio-economic survey from SW consulting group done in January 2011 shown that among 97 households in Quarter 4 of Thanh My Loi ward there are 52 households (53.6%) having an average income below 50 USD/person/month; 22 households (22.7 %) having an average income from 50 to 70 USD/person/month; 23 households (23.7 %) having an average income over 70 USD/ month. Poor support program of the Thanh My Loi ward works quite effectively. Most of the poor households are entitled to make loans from local poverty alleviation program (Vietnam Bank for Social Policies, Households Women's Fund, etc). Also, in 2011, the Ward People 's Committee gave 50 Health Insurance Cards, 40 Scholarship, 56 Tet Holiday Gift to the poor living in Area 4 and offered to some youth working in the company.

By the City urbanization program the site clearance has been nearly completed in Thu Thiem, An Loi Dong, Binh Khanh, An Khanh and Binh Trung Tay Wards, which have achieved from 95% to 100% of the impacted area. Infrastructure of resettlement areas and new residential areas are being constructed. Among those, the Diamond Island project is in completion stage. In some areas, where the interceptor passing through, there are some sensitive subjects such as temples, shrines, but those are far away from the sewer location more than 1 km.

## 4. ANALYSIS OF ALTERNATIVES TO THE PROPOSED INVESTMENT

### 4.1. The selection on the type network

There will be 3 drainage network alternatives to be proposed for the priority investments in sewerage and storm water drainage in District 2, including:

- (1). Combined sewerage
- (2). Separate sewerage
- (3). Combined sewerage with separated wells and sewage collection culverts

The full description on these three alternatives will be demonstrated in the detailed EIA on the construction of the network in later phase.

Comparison of three systems on various factors including cost, environmental, technical, feasibility of investment is presented in Table 2.

Table 2. Comparison of three drainage systems on various factors (cost, environmental, technical, feasibility of investment )

Items	Combined sewerage	Separate sewerage	Combined sewerage with separated wells and sewage collection culverts
Cost	Investment fund is lowest among 3 options.	- The initial investment is large; it is necessary to build two completely separate drainage	- The initial construction cost is not big. The cost of clearance is less.

		systems.	
<b>Technical</b>	The system can be operating in both dry and rainy seasons.	Sewer is organized science, stormwater, wastewater is separated very favorable for combating waterlogging treatment and environmental protection.	<ul style="list-style-type: none"> <li>- The sewerage from the wells to the treatment plant is needed to set at quite high depth, since the collected area is located at the end of the main sewers, therefore, it should also need to build transition pumping stations.</li> <li>- The outlet must install the shutters that open automatically to prevent water flowing into the drains during the dry season, when there is no rain.</li> </ul>
<b>Feasibility</b>	<ul style="list-style-type: none"> <li>- Simple management</li> <li>- If the waste water and storm water would be collected and treated, the capacity of the treatment plant would be very huge, which needs very high budget to build; therefore, it is not effective and not feasible.</li> <li>- Operational regime of sewer network is not stable, in the dry season due to amount of waste water is small, water velocity is less, the sedimentation, clogging drains occurs. It should be regularly dredged, widened.</li> </ul>	<ul style="list-style-type: none"> <li>- In dry season, storm drainage network is not operating, which causes wasteful.</li> <li>- Small sewage flow (0.5 l/s.ha), small diameter of drainage culverts, slope of drains placed is large; depth of sewer is high, need of multiple transition pumping stations.</li> <li>- The rainwater in the first time (5-10 minutes of rain) cannot be collected.</li> <li>- Since there are two drainage networks, therefore, management is complicated</li> </ul>	<ul style="list-style-type: none"> <li>- Regarding to the existing zones (i.e. central area), the current drainage situation is reminding thus the cost of new investment is reduced.</li> <li>- Limiting the amount of soil digging in the center</li> <li>- It is very suitable for the urban, where drainage network is needed for renovation and upgrade. It is especially suitable for conditions of low initial investment capital and high environmental requirement</li> <li>- The existing storm water drainage system can be used.</li> <li>- It is very suitable for the urban, where drainage network is needed for renovation and upgrade. It is especially suitable for conditions of low initial investment capital and high environmental requirement;</li> <li>- The existing storm water drainage system can be used.</li> </ul>
<b>Environment</b>	During dry weather, the combined sewer system and wastewater treatment plants have the capacity to transport and treat all the sanitary sewage entering the system. However, when flow in the	Although the separate sewer system does not pose immediately apparent environmental hazards and safety concerns (as in the case of the combined sewer system), there is a potential to discharge polluted waters from runoff of buildings and streets (e.g. metals, debris, animal waste,	<ul style="list-style-type: none"> <li>- The environment is not polluted due to soil excavation work caused.</li> <li>- In terms of sanitation, it is relatively good because of all the waste water is cleaned (dry season and the low rain) or it is diluted with rain water (when it is raining) before being discharged into the rivers and streams.</li> <li>- Limiting the amount of soil digging in the center.</li> </ul>

	<p>sewer increases as a result of rainfall, the sewer pipes or treatment plants may reach their capacity. When this happens, as it does with other cities with combined sewer systems, to discharge excess wastewater into nearby waterbodies to prevent health and human safety issues that may result from localized flooding in neighborhoods and in treatment plants.</p> <p>The unfortunate side effect of preventing flooding by allowing CSOs to discharge water is the contamination and erosion of our waterways. As stormwater travels over impervious surfaces, it picks up pollutants, and this polluted water mixes with raw sewage in the combined sewer. When there are overflows, these contaminants end up in our rivers and creeks, causing the waterbodies to be unsafe to recreate in for about 24 hours. The large rush of excess wastewater also scours river and creek beds. The pollution and</p>	<p>etc.). This concern arises because the water from the stormwater sewer inlets and pipes is not treated before discharging into waterways.</p> <p>Defective Laterals</p> <p>Due to problems generally attributed to improper installation or lack of oversight during construction, sanitary wastewater from some properties can be transported into the storm sewers and, from there, to the streams and rivers. This intrusion of sanitary wastewater causes pollution of the streams and rivers that are the source of city's water supply. The polluted streams and rivers also endanger the physical health and safety of residents and users of the streams.</p> <p>To ensure the best hygiene. Sewage is collected and thoroughly treated to bring clean environment for District 2- Drainage system is scientifically held; storm water and sewage are separated, that is very favorable for flooding control, waste treatment and environmental protection.</p>	<p>- The environment is not polluted due to soil excavation work caused.</p>
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	scouring make it difficult for native plant and animal species to survive, giving way to invasive species and a degraded landscape.		
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Based on these factors: (i) The advantages and disadvantages of each option above, (ii) Status of the drainage system, (iii) ability to make capital and specially for (iv) previous small projects, which has been done before applying this kind of drainage system, the FS2 consultant recommends to select the combined sewerage for the existing residential areas and separate sewerages for the D2 project.

For wastewater collection network, this system will be expanded on the basis of design separate sewerage, waste water will be collected in a wastewater collection system separately, not collectively with rainwater. All wastewater in the area will be expanded into the collection system piping wastewater collection expanded, connected to the main transmission pipeline to WWTP before discharge to the source. For sewerage system expansion, households, offices, commercial premises will be connected directly into the sewerage system, not through the treatment works and letting go on the spot. The direct connection will facilitate collection and treatment. Rainwater will be collected in a piping system to the nearest source.

The choice of separate sewerage schemes not only direction for the design storm water but also orientation for the sewerage component design.

#### **4.2. The selection on possible different materials to be used for pipes**

Three different pipe materials including Reinforced Concrete (RC), Glass Reinforced Plastic (GRP) and Polymer Concrete (PC) may be considered for the sewer in District 2. In the cost estimate, reinforced concrete pipes have been retained as they represent the cheapest option. However, this point may be left open even up to bidding to allow contractors to propose what they see to be the most suitable material. GRP may be especially advantageous as it would facilitate pipe transportation to the construction site, reduce pipe roughness (and eventually inner pipe diameter), and limit corrosion and possibly infiltration. PC presents very good physical and chemical characteristics but would be very expensive (estimated as twice the material price of reinforced concrete pipes) and hence does not seem feasible as a material choice for the sewer in District 2.

### **5. POTENTIAL IMPACTS**

The potential adverse impacts and relative measures in the pre-construction, construction, operation phases are summarized in the EMP attached in Appendix V.

#### **5.1. Identification of Potential impacts**

##### **5.1.1. Identification of Potential Positive Impacts**

The project for the priority investments of the storm drainage and pipework system will contribute to improve the capacity of drainage system, collection and treatment of sewage, improve the sanitation conditions on order to ensure the health of people, contribute to the improvement and development of infrastructure, and contributing to the general development of District 2 of Ho Chi Minh city.

##### **5.1.2. Identification of Potential Negative Impacts**

### (1). Type and Scale of Project Impacts

The potential negative impacts on the physical, biological, and socio-economic environment caused by the project will be identified. Table 3 (see below) summarizes the potential impacts and the level of impacts caused by the D2 project.

In general, the project activities to be carried out under Storm water drainage and sewerage system and will involve small and/or medium scale civil works, for which most of the potential negative impacts are reversible, temporary, and localized, and could be mitigated through the application of good engineering and construction management practices and with close supervision and monitoring of contractor performance and consultation with local communities.

### (2). Socio-economic Impacts

When storm drainage and pipework system are installed in the area of An Phu, Thao Dien, An Khanh, Binh Khanh, Binh An, Thu Thiem, An Loi Dong, Binh Trung Dong, Binh Trung Tay, Thanh My Loi and Cat Lai of district 2, land acquisition is likely to take place. However, given the nature of the works, most of the civil works will be underground and linear, which does not involve land acquisition, or very minor, if any. Efforts will be made with regards to technical design to avoid land acquisition/resettlement. When avoidance is not possible, compensation/resettlement will be implemented as per Project's Resettlement Policy Framework.

It is expected that no indigenous peoples would be affected since they are not present in District 2 project area.

Other potential social impacts on local communities will be those relating to transportation, road safety or public safety, or disruptions of communities during site clearance, construction, and operation, which could be managed as suggested in this ESMF.

### (3). Potential Impacts on Physical Cultural Resources (PCR)

As the detailed location of the proposed sewerage network has not yet been known, therefore the impacts on PCR could not be evaluated. These impacts will be assessed and mitigated during EIA implementation phase.

In addition, during the excavation activities, it is likely that archaeological artifacts could be found. The EMP of the EIA will include one chance-finds procedure to ensure that this potential impact will be covered.

### (4). Potential Impacts on Natural Habitats

All the project areas are located in urban or rural land. There will be no impacts on natural habitats.

### (5). Cumulative Impacts

The cumulative negative impacts might have occurred in the case of a subproject activity causing significant negative impacts that add in a measurable and significant way to those that are being caused by nearby projects or by projects that take place in the same area, either before or after in time. Besides the linkage with the HCMC ESP 2, including NL-TN interceptor and NL-TN WWTP, the D2 project will be cumulatively impacted by other socio-economic development projects in District 2 in the future.

The cumulative impacts will be further analyzed once the location of the networks will be

known.



Table 3. The potential impacts by the D2 project

Table 6: The potential impacts by the DZ project												
Components	Physical			Biological		Socio				Others		Remarks
	Air, noise, vibration	Land, soil, water	Solid waste, Sludge	Forest, natural habitats	Fish, aquatic life	Land acquisition, resettlement	Indigenous peoples	Physical cultural resources	Livelihood, community disturbance	Local flood, traffic, safety	Off-site impacts	
<b>Component: Storm drainage and Sewerage System</b>												
Pre-const.	H	M	H	N	N	L	N	N	M	M	M	--issues are populated areas with limited road access; involve dredging local flood; possible contamination of dredge materials; off-site impacts disturbance to residents.
Construction	H	M	H	N	N	L	N	N	H	M	M	
Operation	L	M	M	N	N	N	N	N	N	M	M	
Notes:  (1) The following criteria are used for the assessment of level of impacts: None (N) –no impact; Low (L) – Small works, minor impacts, localized, reversible, temporary; Medium (M) –Small works in urban/sensitive areas, medium scale works with moderate impacts of which most are reversible, reducible and manageable, localized, temporary; High (H) –Medium scale works in small urban /sensitive area, large scale works with significant impacts (socially and/or environmentally) of which many are irreversible and require compensation; Both M and H need monitoring and implementation of the mitigation measures as well as adequate institutional capacity on safeguard.  (2) Small and medium scale works, most impacts are localized, temporary, and can be mitigated through the application of good engineering and construction management practices and with close supervision and monitoring and close consultation with local communities												

## **5.2. Details Assessment of Environmental Impacts**

Construction of the storm drainage and sewerage collection system will involve (a). Installation of the storm drainage pipework (10,870 m long of circular culvert, D1,000-D1,500 and 97,170 m long of box culvert (1.000x1.000)-(2.500x2.000) mm) and b). Installation of the branch culverts (34,550 m long, D300-D600, h>3m) and main culverts (8,548 m long, D800-D1,500, h>3m and 7,700 m long, D3,200, h>17m).

The project area is located in 11 wards and communes of District 2: An Phu, Thao Dien, An Khanh, Binh Khanh, Binh An, Thu Thiem, An Loi Dong, Binh Trung Dong, Binh Trung Tay, Thanh My Loi and Cat Lai. Key impacts during pre-construction, construction and operation are discussed below.

### **5.2.1. Impacts during pre-construction and construction phase**

#### **(1). Air, Noise, Vibration**

Air quality will be affected during the construction of new storm drainage and sewerage systems by dust, exhaust gases and noises from construction means. However, those impacts do not retain for a long time and continuously; most of them are temporary.

#### **(2). Land, soil and water**

- Land, soil pollution: During the construction process, the soil may be affected by leakage of oil, gasoline, chemicals and discharge of untreated sewages and solid wastes to land. The impact level is medium.

- Water quality will be affected by worker's domestic sewage, containing SS, BOD, COD, ammonia, total N, total P, E.Coli. Besides that, construction sewage is arisen from washing machines, transportation means and concrete mixing. It causes pollution in the local area with suspended solids and oil. Without appropriate mitigation measures, it will cause turbidity in the receiving water sources and block the flow of water. In the raining season, storm water running through construction areas will be contaminated by oil and grease, sand, grit, cement, and open dumpsite. It will pollute surface water, soil and groundwater in the area. However, with use/application of the pipe jacking technology, the pollution caused by storm water can be reduced significantly.

#### **(2). Solid Waste and Sludge**

- Construction waste: Solid wastes including biomass from land clearance, spoil obtained from excavation, debris from discarded old sewers etc. will be generated during pre-construction and construction phases. Besides those, a big amount of sludge will be generated from dredging and trenching. Solid wastes and sludge may cause dust and odor pollution in the project area.

- Also soil pollution may be occurred if sludge disposal is not carried out appropriately.

- Domestic solid waste: Adverse impacts due to solid waste from field project offices will be insignificant. Since no labor camp will be allowed on construction sites since there is no space. Therefore, quantity of worker's domestic refuse is low.

- Hazardous waste: On average, oil replacement for vehicles is carried out quarterly with 16 liters/vehicle. There are about 10 vehicles on the site. The amount of discharged oil should be 640 L/year, equivalent to 2.2 L/day, which will be collected and handled according to the regulation.

#### **(3). Land acquisition and resettlement**

The project area is located in 11 wards and communes of District 2, including An Phu, Thao

Dien, An Khanh, Binh Khanh, Binh An, Thu Thiem, An Loi Dong, Binh Trung Dong, Binh Trung Tay, Thanh My Loi and Cat Lai. Some land may have to be acquired and resettled for construction of storm drainage and sewer collection system. Detailed information regarding the nature and scale of the impacts will be provided in the "Resettlement Plan" (RP) report which will be prepared separately. The impact level is expected to be medium.

#### (4). Potential Impacts on Physical Cultural Resources (PCR)

The D2 project do not impact on PCR.

#### (5). Livelihood, community disturbance

The excavation of soil and trenching may cause the limitation of road access, traffic jams, disturbance of business operations, accidental damages to other utilities: telephone cables, TV cables, power lines, water pipes, which adversely impact on livelihood and community. The impact level is high as the network could be built in the small local road.

#### (6). Local flood, traffic and safety

- Local flood: The construction of sewers and drainage system in the neighborhood will disrupt the existing drainage causing temporary flow of waste/rainwater into the channel causing local flooding and/or water pollution. Damage to partly completed works by flood is also possible. The impact level is medium. It is necessary to ensure that the contract requires the contractor, before he commences work, to provide a construction plan that sets out how he will maintain the flow in the channel and protect the works from flooding during construction.

- Traffic and site safety: Traffic disruption and site safety issues will be more considerable given that installation of the storm pipework will involve ground leveling and trenching for installation of the pipework. The impact level is medium. It is necessary to ensure that the contractor's plan for the works includes the deep trenching that will be required for the road crossings, specifically for traffic control and safety of workers and the general public during the trenching activity. Construction activities can contribute to the traffic jams during peak time. It is necessary for the contractor to arrange reasonable time and transportation routes before undertaking the activities.

#### (7). Off-site impacts

Transport of construction materials could be an issue, both from the viewpoints of tonnage (cumbersome transport means) and contamination (inadequate cover to prevent dust, and spills of construction materials onto roads and into waterways). Nevertheless, with a number of truck trips a day transporting construction material, the adverse impacts would be manageable.

Soil, sludge and solid wastes generated from the earth works will be transported and disposed in Da Phuoc sanitary landfill. Transport of the materials can spill out and scatter on streets, which cause dust and odor pollution. The impact level is medium. The impact level is medium. To avoid impacts due to dust and odor, close tank trucks will be used for transportation.

### **5.2.2. Impacts during operation**

#### (1). Air pollution

Aerosols and odors ( $H_2S$ ,  $NH_3$ , amino acid and mercaptan) from manholes and the interceptor line will be released when the dredging and repair are carried out. It can cause discomfort to local residents living in the radius of 10m, but is expected to cause little harm to public health. The gas only affects to the workers, who dredge manholes without preventive

measures.

(2). Land, soil and water

- The sewer pipework may be blocked or broken down, which will affect surface water, ground water and contaminate soil.
- Water quality: Once the D2 project is finished and the storm drainage and sewerage system are properly operated sewage from the D2 area which is densely populated will not be discharged directly into the Sai Gon and Dong Nai Rivers but collected and treated in the NL-TN WWTP to meet the regulation QCVN 14:2008/BTNMT, column A, before discharging into the Dong Nai River. The water quality of Sai Gon and Dong Nai Rivers will therefore be significantly improved.

(3). Solid waste and sludge

The maintenance of the storm drainage and sewers requires special equipment (the “pig”) for cleansing. The material removed from manhole and storm drainage/sewer cleansing consists of organic solid particles as well as pieces of debris sand and gravel washed down from the streets, which may cause the odor pollution to the environment and negatively impact on the public health.

(4). Local flood, traffic, safety

- Local floods: Construction of the storm drainage system will reduced the flooding situation in District 2. However, there will be some risks associated with local flooding in the case of heavy rains and drainage pipework blocked with solid wastes, which may create water pollution in the flooding areas.
- Traffic: Maintenance of the storm drainage and sewer collection system may cause limitation of road access and traffic jams.
- Safety: Workers who dredge sludge or repair pipes often face with toxic gases, which can be poisoned if they do not strictly follow the safety regulations.

(5). Off-site impacts

The solid waste and sludge generated from the manhole and storm drainage/sewer cleansing will be disposed in Da Phuoc landfill. Spills during transport may cause dust and odor pollution, which could be expected to be an issue as proper control measures are seldom implemented for trucks and barges. The impact level is medium.

The potential adverse impacts and relative measures in the pre-construction, construction, operation phases are summarized in the EMP attached in Appendix V.

## **6. ENVIRONMENTAL MITIGATION MEASURES**

The link between the adverse impacts and relative measures in the pre-construction, construction, operation phases are presented in the EMP attached in Appendix V.

### **6.1. Mitigation Measures in Pre-construction and Construction Phases**

#### **6.1.1. Air, Noise, Vibration Pollution Control**

- Dust pollution control: Fugitive dust emitted from material handling could be mitigated by minimization of the distance between the stock piles and site boundary; minimization of the heights from which excavated materials are dropped; enclose or cover of all stockpiles of aggregate or soil to reduce wind erosion. Fugitive dust emitted from vehicle movement could be controlled by effective water sprays on unpaved area; limitation of travelling speeds of haul trucks; a wheel wash basin will be used to minimize the water usage or wash water

generated from direct hosing. The basin shall be refilled as required and the wash water from the basin either being reused for road watering or pumped to the on-site settling tanks for treatment.

- Odor pollution control : Odor emitted from the dredging, excavating and construction of household connections could be minimized by cover of sludge transportation means; immediate removal of sludge from the sites and river banks; using of Odor masking agents; deodorizing agents

- Noise and vibration control: Use of purpose-built noise barriers (fixed and mobile), good equipment maintenance; switching off unused units; silencing of noisy equipment, particularly diesel-engine equipment; Efficient management of the construction program and crews to ensure that periods of noisy activities are minimized, or not grouped together in the same site area; Setting up of liaison and communication channels with the affected communities to receive complaints and feedback, with a view to minimize the noise impacts.

### **6.1.2. Land, soil and water pollution control**

- Land, soil pollution control: During the construction process, the soil will be affected. To mitigate impacts, the investor will apply the following measures: Minimizing dig and disturbance soil; Restricting pollutants such as oil, gasoline leakage or seep into the ground; prohibiting discharge of sewage and solid waste to land; equipping with portable toilets in construction site.

- Domestic pollution control: Provide sufficient portable chemical toilets at all work sites, to ban discharge of pipework into the canal or street drains, all chemical toilets to be regularly serviced by a specialized contractor.

- Construction sewage pollution control: Equipment cleaning sewage e.g. vehicle or parking areas, equipment refueling areas is likely to be contaminated with oil or fuel will be directed to an oil separator prior to entering the general site drainage stream.

- Storm water pollution control: The “clean” runoff will be directed to the storm drainage, which discharges directly to the canal. The runoff from potentially contaminated areas would be diverted to the on-site treatment system for treatment prior to discharge. Surface channels will be built in advance to collect and direct the surface runoff to silt removal facilities. Perimeter channels would also be provided to prevent rainwater runoff from washing across the site. The drainage channels will be connected to sand or silt traps and sediment basins. Sedimentation basins would be configured so as to provide sufficient time for the suspended solids to settle out. Baffles will be provided in the basins to reduce water velocity, promote settling and prolong the residence time of the runoff. The “cleaned” water will be pumped back for further on site dust suppression and vehicle washing as far as practicable. These facilities would be regularly desisted to maintain their effectiveness. Excess water, following treatment, would be discharged to the storm water drainage system. Stockpiles of construction materials on site will be covered with tarpaulins or similar fabric to prevent surface erosion. Minimization of stockpiling in the wet season will reduce the chance of silt laden surface runoff from entering the canal.

### **6.1.3. Solid Waste and Sludge disposal**

- Solid Waste Management Program: Construction wastes and domestic solid wastes should be controlled by the following measures: no burning of waste within site; no dumping of solid waste into waterways; adopting an appropriate solid waste transportation schedule to minimize traffic congestion; adequate cover of transportation vehicles to prevent dust emission, spillage of materials and risk of accident; having contract with competent agencies to collect waste/sludge.

- Sludge Management: Compliance with ambient noise and occupational health protection standards; Proper methods of exploiting construction materials; Proper disposal activities according to procedures; Train workers on proper operational procedures according to standard engineering practices

- Hazardous waste: Wasted oil will be collected and handled according to the regulation.

#### **6.1.4. Land acquisition and resettlement**

- The land compensation issue and resettlement will be addressed in the Resettlement Plan.
- Residential land without house will be compensated 100% by cash for the persons having legal land-use right and supported by cash equal to invested values in land or 50% of relocating cost for persons without the legal land-use right.
- Residential land with house will be compensated on the principle of "land exchange land" with same quality. If there is no any investment on the land, compensating price is corresponding to 100% relocating cost for those who have legal land-use right and a half for persons invested in land without legal land-use right.

Detailed information regarding the land acquisition and resettlement will be provided in the "Compensation and Resettlement Plan" which will be prepared separately.

#### **6.1.5. Livelihood, community disturbance mitigation**

The measures could be applied to mitigate the impact on livelihood and communities including Outlining of the length and separation of trench openings ; Specifying that trenches should be reinstated as soon as work is completed; Specifying that temporary plating of open trenches to be provided during non-working periods at all road crossings and entrances to properties and business premises; Specifying the length and duration of lane closures; Aiming to conduct road opening in off peak periods; Designating alternative routes; and Proposing and executing a Public Information Program to inform the public of the proposed lane closures and road diversion schemes.

The city will need to provide connections to TV cables, telephone cables, electrical and water utilities in the case of accidental damages.

#### **6.1.6. Local flood, traffic and safety management**

- Local flood control: It is necessary to ensure that the contract requires the contractor, before he commences work, to provide a construction plan that sets out how he will maintain the flow in the channel and protect the works from flooding during construction; Dykes or embankments for flood protection will be positioned around critical earthwork areas.
- Traffic Management Measures: A detailed Traffic Management Plan with the aim of minimizing traffic impacts should be prepared by the construction contractor to suit its working method. The Traffic Management Plan should be submitted for approval by relevant agencies and the traffic police prior to implementation.
- Site safety measures: The following initiatives should be considered by the project owner, and included in the bidding and contractual documents: Complying with all applicable Vietnamese regulations and standards in occupational health; Conducting safety training course for construction workers; Adopting standard engineering practices to prevent preventable accidents; Engaging experts (e.g., an agency in occupational health) to provide technical support in occupational safeguard; Providing insurance for worker; Mandate use of personal protective equipment (PPE): hard hats, hard boots, ear-mugs, etc; Periodic occupational health check-ups for vulnerable workers (e.g., those exposed to pipework, exceeding noise, etc.); Maintain records of incidents/accidents and work losses. Besides those, importance in the Occupational Health and Safety Management Program is an Accident Contingency Plan, to deal with various scenarios of emergency: fire, explosion, spills of fuels and chemicals, traffic accident, waterway navigation accident and drowning. It is recommended that contractors should set-up and put into action an in-house Accident Contingency Plan as one of the qualifications for bidding. The Accident Contingency Plan should consist of, but is not limited to Organization and Responsibility Resources: manpower as well as budget, material and equipment; Training and Competence; Operational

Procedures; Reporting; Checking and Corrective Action. Chemicals and fuel would be stored in locked, bonded areas, which have a retention volume of 110% of the storage capacity of the largest tank. The bonded areas will be sealed to prevent any infiltration of precipitation, be constructed of a material that is compatible with the chemical/fuel being stored and will not be equipped with drains to eliminate the possibility of accidental discharges. A spill response and management plan will also be formulated and implemented so that site staff is appropriately trained to minimize the environmental impacts of any emergency spill situations. Prohibited and toxic substances will be avoided on site.

### **6.1.7. Off-site impacts mitigation**

All vehicles transporting soil, sludge and solid wastes generated during construction to Da Phuoc sanitary landfill must be properly and continuously covered as stipulated by regulations, and must wash before leaving the construction site to minimize spilling out and scattering the materials on streets. To avoid impacts due to dust and odor, close tank trucks will be used for transportation.

It is proposed to incorporate the above mitigation measures into a site environmental management plan to be prepared by the construction contractor. These nominated mitigation measures will be refined, modified (if appropriate), and finalized by the construction contractor, taking into account of the actual construction methods.

Specific procedures are to be applied in case of archeological artifact finds. The diagram below identifies steps to be taken. The IMA will be responsible for the overall coordination and reporting. The chance find procedures will be included in all construction contracts and key staff and contractors will be trained on how to implement them (See figure 1).

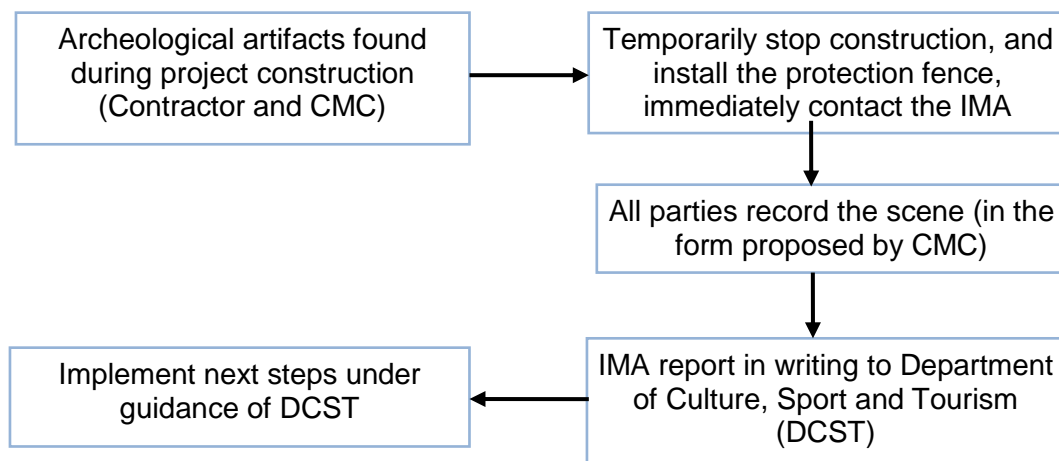


Figure 1. Chance-finds procedure to follow in case of archeological artifacts found during the project construction

## **6.2. Mitigation Measures in Operation Phases**

### **6.2.1. Air pollution control**

The following measures will be adopted to minimize the generation of odors from manholes and storm drainage and sewer pipework: Maintaining adequate dissolved oxygen in gravity sewers by ensuring steep enough grades to produce sufficient velocities, and by the provision of natural ventilation; Providing turbulence in upstream areas of catchment but eliminate turbulence in the lower reaches where the pipework may contain hydrogen sulphide; Minimizing detention time in pumping stations and rising mains; Design rising mains which have the smallest diameter and shortest practical length to minimize detention and slime development; and if necessary the addition of facilities to control hydrogen

sulphide generation in longer rising mains.

#### **6.2.2. Land, soil and water pollution control**

- Measures for the blocked or broken sewage collection system mitigation: Installation of controlling valves of discharge rate and flow meter along water pipes to detect blocked, filled and broken water pipe; regular monitoring and testing water sample at connecting points to ensure if source of sewage discharged into the drainage system, timely treating and preventing effects of waste water treatment system.

- Water quality management: The waste water from District 2 will be conveyed to the NL-TN WWTP. The outfall design from WWTP will mitigate water quality impacts on the Dong Nai River. Design of the outfall will minimize the area of the sewage plume that exceeds the standard for Category A for BOD in the immediate vicinity of the outfall. Design will achieve the Category A regulations at the shore of the riverbank. According to Circular 26/2011/BTNMT issued by MONRE, the environmental monitoring program should be handled during the operation phase, among that, the water quality of the Dong Nai River near the outfall will be quarterly monitored. The costs for such monitoring plan will be estimated in detail during preparation of EIA report.

#### **6.2.3. Solid waste and sludge disposal**

Solid wastes and sludge generated from operation and maintenance of storm drainage and sewer collection systems will be periodically collected and transported to Da Phuoc sanitary landfill to dispose. A sludge management plan will be developed to ensure that the sludge are appropriate collected, treated and disposed.

#### **6.2.4. Local flood, traffic, safety management**

- Measures for flooding control: Creating drainage slope in the project area to avoid local flooding in rainy season, using synchronous filling solution; dredging and clearing Ngon Ngay canal in early rainy season; prohibiting construction of facilities, which may stop the flow and causing flooding; operating the pumping station.

- Traffic Management: A detailed Traffic Management Plan with the aim of minimizing traffic impacts should be prepared before repairing or maintaining the pipework. The Traffic Management Plan should be submitted for approval by relevant agencies and the traffic police prior to implementation.

- Safety: training workers to respond to unexpected situations while working in the hazardous environments; providing protective clothing, masks; arranging at least two persons working in enclosed environment together, so they can support each other in case of incidents.

#### **6.2.5. Off-site impacts mitigation**

All vehicles transporting solid waste and sludge generated from the manhole and storm drainage/sewer cleansing to Da Phuoc sanitary landfill must be properly and continuously covered as stipulated by regulations to minimize spilling out and scattering the materials on streets. To avoid impacts due to dust and odor, close tank trucks will be used for transportation.

The potential adverse impacts and relative measures in the pre-construction, construction, operation phases are summarized in the EMP attached in Appendix V.

A Revegetation and Restoration Management Plan will be developed and implemented by contractor to mitigate the impacts on land deterioration and restore landscape.



## 7. ESMF IMPLEMENTATION AND MANAGEMENT

### 7.1. Implementation Arrangements

The structure of environmental management organization is presented in Figure 2.

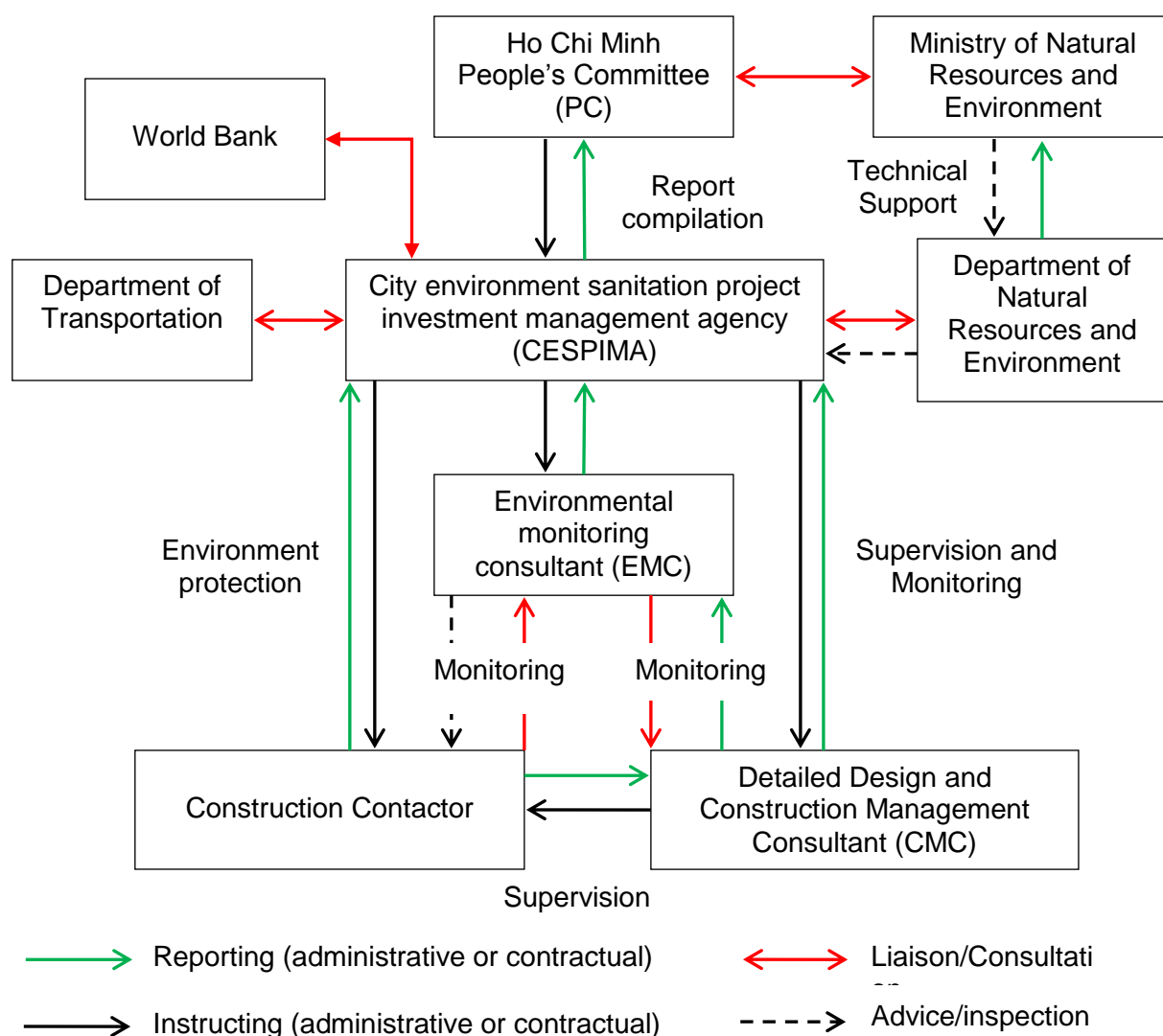


Figure 2. The structure of environmental management organization

The responsibilities of agencies, departments in the construction phase are shown in table 4.

Table 4. Responsibilities of agencies, departments in the construction phase

No.	Organization	Responsibility
1.	Ho Chi Minh City People's Committee (PC)	<ul style="list-style-type: none"> <li>– Approve the contents of the project,</li> <li>– Play the key role in public environmental management</li> <li>– Make decision that allows the implementation of project</li> </ul>
2	Department of	<ul style="list-style-type: none"> <li>– Approve environmental impact assessment report of the</li> </ul>

	Natural Resources and Environment (DONRE)	<p>project and the EIA for the D2 network; responsible for receiving and investigating the environmental monitoring reports from IMA</p> <ul style="list-style-type: none"> <li>– Inspect the compliance with the environmental regulations during the project's construction and operation</li> <li>– Certify the completion of environmental protection measures and facilities before going into official operation.</li> <li>– Make recommendations for project owners on the environmental improvement measures</li> </ul>
3.	) City Environment Sanitation Project Investment Management Agency (CESPIMA/IMA)	<ul style="list-style-type: none"> <li>– Prepare and submit the EIA for D2 network for the Bank's review and clearance before submitting it to DONRE for approval.</li> <li>– Submit the EIA for D2 network for DONRE appraisal and approval.</li> <li>– IMA has the overall responsibility for implementing the project in accordance with current regulations and the project documents including the EMP during the detailed design and construction stages. EMP implementation during operation stage is the responsibility of the facilities operators. IMA will set up an Environmental and Social Unit (ESU) to ensure timely and effective implementation of the EMP, including preparation of periodical reports on safeguard compliance as required by Government and WB.</li> <li>– IMA responsible for ensuring that the related sections in the Contract Documents on the bidding packages for construction items of the project are in compliance with the EMP.</li> <li>– Responsible for coordinating with other organizations in the implementation of EMP including local and national departments especially local DONRE, and the concerned wards/communes, local communities during planning, monitoring, operation, and management.</li> <li>– IMA will coordinate closely with relevant enterprises on water supply, environmental sanitation, and solid waste collection and to monitor operation and maintenance during project implementation.</li> <li>– Directly participate into research and resolve the related problems and reduce the loss when there are problems</li> <li>– To ensure effective monitoring and timely implementation of the EMP, IMA will hire CMC and environmental monitoring consultant (EMC) to assist in carrying out and monitoring the EMP implementation.</li> </ul>
4.	Detail Design Consultant	<ul style="list-style-type: none"> <li>-Consultancy by designing and offer optimal solutions to mitigate potential environmental impacts during the operation and construction.</li> </ul>
5	Construction Management Consultant	<ul style="list-style-type: none"> <li>– Ensure that the construction process is in accordance with current regulations, the approved EMP, relevant indicators and standardized operation in documents for environmental impact mitigation and monitoring.</li> <li>– Monitoring the process and procedure of basic</li> </ul>

		<p>constructions, technological standards and construction rate of contractors</p> <ul style="list-style-type: none"> <li>– Monitoring the implementation of environmental mitigation measures by contractors on the daily basis</li> <li>– approve the construction method and the site-specific EMP prepared by contractors.</li> <li>– Supervision of construction work including safeguard implementation by contractors on daily basis.</li> <li>– Recommend IMA to suspend partially or completely construction work if labor safety and environmental protection requirements of the contract are not complied with;</li> <li>– Make action plans/urgent solutions to cope with environmental problems, urgent situation and damages happening in construction;</li> <li>– Preparing report on environmental supervision and monitoring as a part of CMC reports. Generally, CMC reports are required monthly;</li> <li>– responsible for monitoring environmental quality during the construction phase</li> </ul>
6.	Construction Contractors	<ul style="list-style-type: none"> <li>– Before construction, the construction contractors are responsible for development of the site EMP (also called site-specific EMP or contractor EMP) as part of their method statement and submit to CMC and IMA for reviewing and approval;</li> <li>– The contractor has to submit a monthly report on safeguard issues, mitigation, and results throughout the construction period. In case of unexpected problem, the contractor will consult CMC/IMA;</li> <li>– Ensure that the construction work will comply with the approved EIA/EMP and the site EMP;</li> <li>– Control and minimize environmental impacts;</li> <li>– Ensure all the construction activities having sufficient documents from the related organization;</li> <li>– Implement all the mitigation measures to prevent adverse impacts and protect the environment;</li> <li>– Ensure that all staff and workers understand the procedure and their tasks in the environmental management program;</li> <li>– Report to the IMA about difficulties and their solutions;</li> <li>– Report to stakeholders as having environmental accidents and coordinate to resolve these issues;</li> <li>– Ensure environmental hygiene.</li> </ul>
7.	Environmental Monitoring Consultant	<ul style="list-style-type: none"> <li>– Provide qualified members as their environmental staff and environmental supervisors.</li> <li>– Quarterly supervise the implementation of mitigation measures by the contractors;</li> <li>– Monitor the project progress indicators related to</li> </ul>

		<p>environmental issues;</p> <ul style="list-style-type: none"> <li>– Closely work with the Districts and Wards Environmental Officials in the environmental management;</li> <li>– Consultation, assessment and prediction of environmental problems occur during project implementation and propose solutions, monitoring program;</li> <li>– Reporting periodically (every 3 months) to the IMA on the actual EMP performance of the project</li> <li>– Assess the effectiveness of IMA, CMC, and contractors in implementing EMP requirements; providing proposals and recommendations to the IMA on necessary improvement and supplementation to meet the safeguard requirements;</li> <li>– Assisting the IMA's environmental staff to review and check the related sections in the Contract Documents on the bidding packages for construction items of the project to ensure compliance with environmental protection policies and impact mitigation and monitoring requirements;</li> <li>– Via IMA, discussing with relevant enterprises (if necessary) to find suitable solutions for unexpected risks relating to environmental sanitation;</li> <li>– Responsible for guiding and training on safety and environmental issues for employees and stakeholders.</li> </ul>
8.	Public representatives	<ul style="list-style-type: none"> <li>– Given the requirements during project implementation, proposals for the project owner.</li> </ul>
9.	World Bank	<ul style="list-style-type: none"> <li>– Review and clear the EIA for D2 network prepared by IMA before it is approved by</li> <li>– Supervise the project implementation and provide implementation support as necessary</li> </ul>

## 7.2. Environmental Monitoring Program

Before the project is put into official operation, IMA will be responsible for construction and application of environmental protection measures and works; and compiling dossiers to request examination and certification of the implementation of environmental protection measures and works for the operation phases of projects submitted to the DONRE of Ho Chi Minh City for getting the certificate (Article 35, Circular 26/2011/TT-BTNMT).

During the project pre-construction, construction phases, IMA will be responsible for implementation of EMP as a part of the EIA report.

The monitoring implementation plan shown in table 5 describes the monitoring tasks to be performed and indicates the anticipated duration, frequency and timing. As regulating in the Circular 26/2011/TT-BTNMT, monitoring frequency for waste sources is 4 times/year and twice /year for the surrounding environment. \

Table 5. Preliminary environmental monitoring program

Activity	Key Effects/Impacts	Monitoring	Responsibility
<b>PRE-CONSTRUCTION PHASE</b>			
1. Land resumption for construction of pumping station	- Dislocation of residents on the pumping station site	- Provided for by Resettlement Action Plan	- IMA; - Social and environment consultation.
<b>CONSTRUCTION PHASE</b>			
1. Interceptor sewer, Combined Sewer Overflows and Pumping Station	- Construction noise - Construction dust - Water quality impact - Terrestrial ecology - Worker safety	- Noise monitoring - Dust monitoring - Water quality monitoring - Terrestrial ecology - Worker safety monitoring	- IMA - CMC - EMC - The construction contractors
2. River Outfall	- Water quality impact on Saigon-Dong Nai River - Waterway navigation and traffic	- Water quality monitoring  - Waterway navigation and traffic monitoring	- IMA; - CMC - EMC - The construction contractor.
3. Drainage improvement works, including replacement and new drainage pipes and culverts	- Construction noise - Construction dust - Road Traffic - Worker safety - Public safety - Damage to utilities  - Indirect impact on businesses - Indirect impacts on tourism, recreational, historical, cultural and public facilities	- Noise monitoring - Dust monitoring - Road traffic monitoring - Worker safety monitoring - Public safety monitoring - Damage to utilities monitoring - Monitoring to be provided by compensation report - Indirect impact monitoring	- IMA; - CMC - EMC - The construction contractor.
4. Canal improvement (dredging) works	- Water quality impact during dredging - Odor impact during dredging - Increased truck/barge traffic to transport dredged material offsite	- Water quality monitoring  - Odor monitoring  - Traffic monitoring	- IMA; - CMC - Environmental Auditor; - The construction contractor.
<b>OPERATION AND MAINTENANCE PHASE</b>			

1.Sewer/drainage network operation & maintenance	<ul style="list-style-type: none"> <li>- Reduced flooding in District 2 (<i>Beneficial effect</i>)</li> <li>- Worker safety during maintenance works</li> <li>- Odor emission</li> </ul>	<ul style="list-style-type: none"> <li>- Flooding monitoring</li> <li>- Safety monitoring</li> <li>- Odor monitoring</li> </ul>	The agency responsible for operation of these facility will carry out these monitoring
2.Operation/maintenance of interceptor and NLTN canal flushing	<ul style="list-style-type: none"> <li>- Improved canal water quality and aquatic ecology (<i>Beneficial effect</i>)</li> <li>- Improved public health (<i>Beneficial effect</i>)</li> <li>- Public safety</li> </ul>	<ul style="list-style-type: none"> <li>- Water quality monitoring</li> <li>- Public health monitoring</li> <li>- Public safety monitoring</li> </ul>	The agency responsible for operation of these facility will carry out these monitoring
3.Pumping station operation & maintenance	<ul style="list-style-type: none"> <li>- Odor emission</li> <li>- Noise emission</li> <li>- Aesthetics</li> <li>- Oil, Grease and Scum Removal (<i>Beneficial effect</i>)</li> <li>- Accidental spill containment (<i>Beneficial effect</i>)</li> </ul>	<ul style="list-style-type: none"> <li>- Odor monitoring</li> <li>- Noise monitoring</li> <li>- Aesthetics monitoring</li> <li>- Oil and grease monitoring</li> <li>- Oil and grease monitoring</li> </ul>	The agency responsible for operation of these facility will carry out these monitoring
4.Operation/maintenance of river outfall	<ul style="list-style-type: none"> <li>- Impact on ecology of Saigon -Dong Nai River</li> <li>- Impact on water quality of Saigon-Dong Nai River</li> <li>- Commercial fisheries</li> <li>- Health hazards</li> </ul>	<ul style="list-style-type: none"> <li>- Water quality monitoring</li> <li>- Water quality monitoring</li> <li>- Fisheries monitoring</li> <li>- Health hazards monitoring</li> </ul>	The agency responsible for operation of these facility will carry out these monitoring

The quarterly monitoring reports should be submitted by IMA to DONRE of Ho Chi Minh City and WB.

The IMA, assisted by EMC and CMC will be responsible for managing the environmental performance of contractors during the construction phase and the facility operator during the 1<sup>st</sup> year of operation. The environmental monitoring carried out by CMC will be conducted on daily basis while the environmental monitoring by EMC will be carried out periodically at interval of every 3 months.

### 7.3. Training and Capacity Building Recommendations

#### 7.3.1. Environmental education and training program in the construction phase

The training will be conducted by EMC for stakeholders participated in project implementation

##### (1). Objective

Educating knowledge on environmental protection for workers and related to stakeholders (Contractors, IMA staff, local communities) to protect the environment during construction and preventing incidents.

(2). Contents

- Construction contractors, community representatives: courses on implementation of mitigation measures including provisions of collection and disposal of solid waste, pipework, oil pollution and regulations on labor safety and fire prevention shall be disseminated, etc.
- Environmental supervision, monitoring and reporting for IMA staff

(3). Implementation methods

- The training materials and courses should be delivered by EMC for IMA to ensure that the contractor understand Bank's safeguard policies, requirements, and environmental protection measures;
- IMA represented by Support Project Management Unit of the project HCMC ESP2 will require the contractor doing these contents by the provisions in bidding documents. Besides, the winning bidder is required to commit to make this program and integrate it into safety programs;
- Disseminating general regulations for construction workers, including provisions of collection and disposal of solid waste, pipework, oil pollution, and regulations on labor safety and fire prevention.

***7.3.2. Environmental education and training program for workers in the operation stage***

Contractor is responsible for training, training content as follows:

(1). Objectives

- Enhancing knowledge about environmental and health protection for workers and communities related the project management, in compliance with Environmental Protection Act and the regulations;
- Training workers to operate sewage treatment system exactly.

(2). Implementation contents

- Disseminating about regulations on environmental protection, collection system of sludge, solid waste, hazardous waste, and regulations of safe working;
- Providing skills of operating sewage treatment system for each department and officials;
- Creating operational Log for system of sewage and sludge treatment.

(3). Implementation methods

- Training employees and officials working directly for the project, especially operation team of the project.
- Combining with consulting units to make project items for environmental protection and requesting consulting unit of technology transfer and training of operating workers of the project.
- Encourage officers to attend training courses of environmental agencies.
- Applying reasonable policies of rewarding or warning/sanction for the activities of environmental protection, prevention and response to risks of incidents related to the plant operation.

The EMP is presented in the attached appendix V.

**8. PUBLIC CONSULTATION AND DISCLOSURE PROCESS/PROCEDURES**

## **8.1. Public Consultation and Information Disclosure**

There are two levels of public consultation:

- (1). Public consultation of this ESMF, which will be carried out by Meinhardt to meet overall project appraisal conditions. The public consultation of ESMF is described in Appendix IV.
- (2). Public consultation of EIA, which will be carried out during later phase when the EIA is prepared (once the technical details are available).

Before the public consultation of the EIA is taken place, disclosure of relevant information on project to the potential affected people and relevant stakeholders should be conducted in line with the Bank's requirements.

The public consultation during the process of formulating EIA report for the D2 project is regulated in Article 12 of the Circular 26/2011/TT-BTNMT. The document with the summary of main investment items, key environmental issues, and environmental protection solutions associated with the project should be sent to organizations and individuals participating in the public consultation. Organizations and agencies contacted as part of the consultation process shall have 15 working days from the receipt of the documents to submit their comments. In addition, the public consultation during the EIA process should be followed the Bank policy on public consultation.

The requirement for public consultation during EIA preparation should be provided in the World Bank Operational Procedure as indicated above.

The public consultation plan is presented in Appendix IV of the report.

## **8.2. Public information Program and Community Relation**

A Public Information Program should be carried out before the construction started .

Public, and especially media, reaction has been excessively and increasingly concerned towards infrastructure projects meant for public services. This is because public agencies in Vietnam are generally not well acquainted with implementing large-scale urban infrastructure projects. While lessons have been learned and progress made, there is still much improvement to be made, particularly in the strengthening of public relations mechanism.

Considering its scale and nature, particularly the potential impacts that the Project could cause to the public in urban areas during construction, a Public Information Program (PIP) is proposed during the construction stage to:

- Inform the public about the project's objective, targets and forthcoming activities (e.g., in road closure, traffic diversion, service interruption, etc);
- Appeal for cooperation and understanding from the public;
- Entice better public cooperation and support so as to avoid or reduce damage to project properties (equipment vandalism, material theft, hindrance to work); and
- Assure the public that adverse impacts to the environment are minimized through stringent management and control.

It is proposed that the PIP should be a sustained effort in the IMA, possibly handled by professionals engaged specifically for this purpose. Target audiences would include:

- Elected officials and heads of departments and agencies;
- Technical specialists within city/district departments;
- Business leaders, factory managers, trade associations;



- Construction managers and developers;
- Neighborhood groups;
- Schools and other youth activities; and
- Media: newspapers, radio.

The following activities might be considered:

- Prepare and distribute pamphlets during construction of drainage improvements (when the public is particularly aware of the efforts to improve the canal);
- Prepare press releases;
- Hold workshops for people in the construction trades;
- Prepare and distribute posters and billboards;
- Make presentations at public events (fairs, trade shows, etc.).
- Organize tours of facilities when they are completed.

### **8.3. Reporting Arrangements**

The Project Environmental Performance Reporting System (PEPRS) Manual will be prepared by the EMC before starting the construction works that will guide the contractors, CMC, IMA to report the DONRE of Ho Chi Minh City and World Bank.

The reporting system includes:

- During the construction, CMC will supervise construction work including safeguard implementation by contractors on daily basis. Thus, the CMC should prepare report on environmental supervision and monitoring as a part of CMC reports. Generally, CMC reports are required monthly. The CMC report on environmental safeguard implementation will also include the environmental quality monitoring results.
- EMC will carry out quarterly environmental monitoring and prepare reports on the effectiveness of EMP implementation to send to CESPIMA. Based on that, the EMC will assist the CESPIMA to prepare the biannual environmental monitoring report for submission to the local DONRE and the World Bank prior to the Bank's implementation support mission. The report will cover monitoring results from EMC; results of environmental quality monitoring and supervision by the CMC; and the EMC's assessment on safeguard compliance and on the effectiveness of CESPIMA, detailed design consultant, CMC, and contractors in implementing EMP.

A Final Report at the end of the construction phase will summarize the environmental auditing completed and provides recommendations for continued auditing in operation phase.

## **9. COST ESTIMATION FOR ENVIRONMENTAL MANAGEMENT PROGRAM AND MONITORING**

A summary of the budgets for recommended environmental management, mitigation and monitoring measures presented for each of the following key EMP implementation activities:

- Implement mitigation measures;
- Environmental training;
- Environmental monitoring cost during construction and operation cost of project.

Estimated Budget for EMP Implementation (in USD) is presented in Table 6

Table 6. Estimated Budget for EMP Implementation

No.	Description	Cost (USD)	Source of Budget
1	Implementation of Mitigation Measures (per year)	Part of construction contracts and contract for detailed design consultancy	WB
2	Environmental Training (per year)	20,000	WB
	Environmental Safeguard Unit (ESU) of CESPIMA	8.000	Counterpart fund
	Environmental Monitoring Consultant (EMC)	12.000	WB
3	Supervision of safeguard during construction	Part of CMC cost	WB
4	Environmental quality monitoring during construction	Part of CMC cost	WB
5	Environmental quality monitoring during operation NLTN WWTP (per year)	10,000	Operation cost
6	Cost for preparation of EIA of D2 sewerage network	12,500	Counterpart fund

The budget for safeguard implementation includes budget for resettlement, budget EIA preparation, budget source for, IMA, CMC, environmental auditor, contractor etc. for carry out environmental monitoring and supervision, which is a part of the project's investment budget.

## APPENDIX I

### TABLES

Quantity of the rainwater drainage system

No	Components	Unit	Quantity	Note
1	Circular culvert Ø1000	m	4,860	Centrifugal reinforced concrete pipe
2	Circular culvert Ø1200	m	3,460	Centrifugal reinforced concrete pipe
3	Circular culvert Ø1500	m	2,550	Centrifugal reinforced concrete pipe
4	Box culvert BxH=1x1	m	74,840	Precast reinforced concrete
5	Box culvert BxH=1.6x1.2	m	11,440	Precast reinforced concrete
6	Box culvert BxH=2x1.5	piece	10.160	Precast reinforced concrete
7	Box culvert BxH=2.5x2	piece	730	Precast reinforced concrete

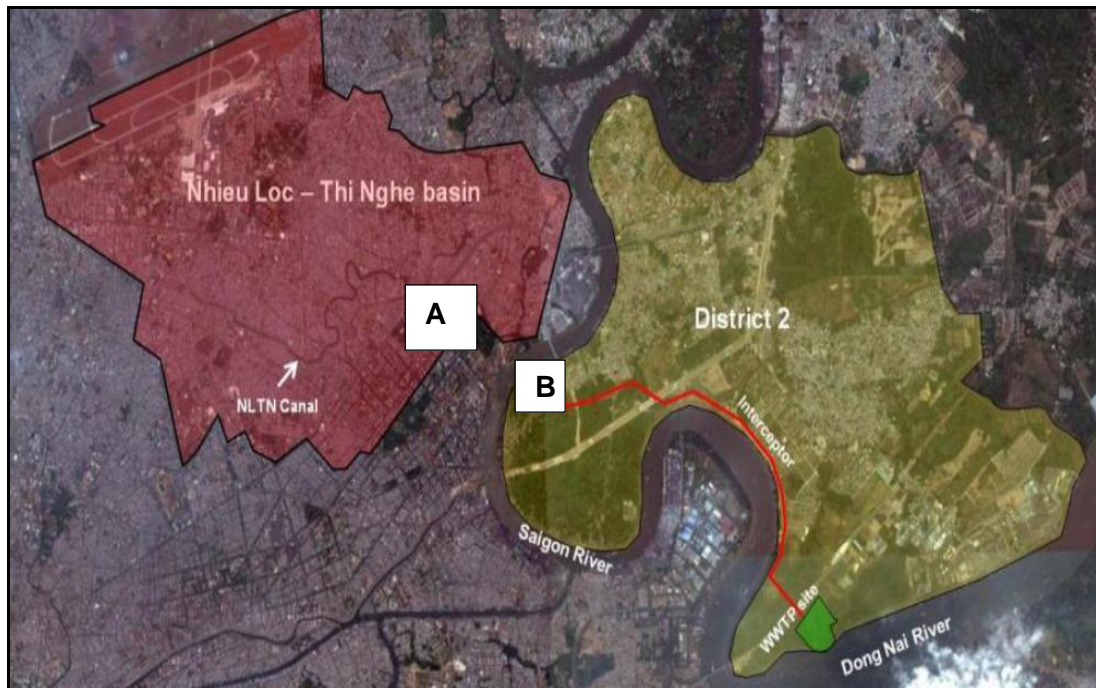
Source: FS of the D2 Project, 2013

Quantity of the sewage collection system

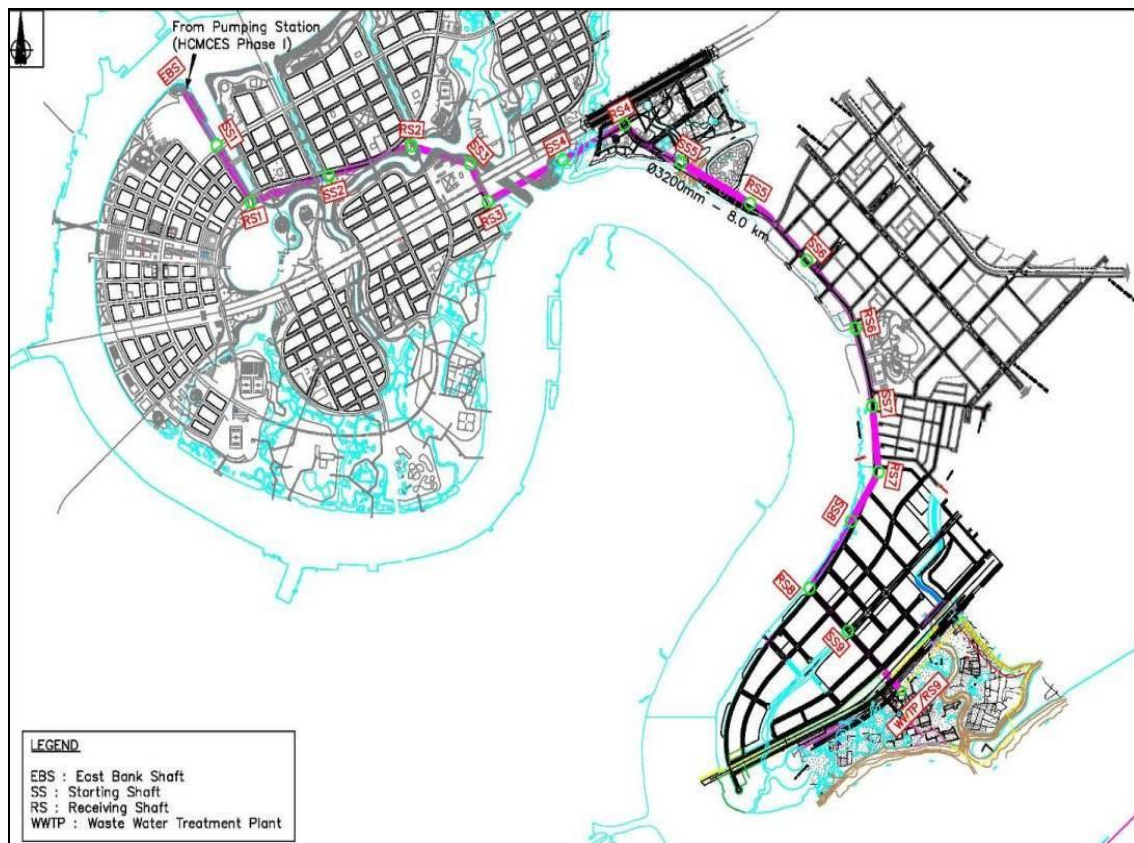
No	Component	Unit	Year of 2020
<b>I</b>	<b>Branch culverts</b>	<b>m</b>	
1	D300, h>3m	m	2,670
2	D 400 h >3m	m	11,800
3	D 500 h >3m	m	9,685
4	D 600 h >3m	m	10,395
<b>II</b>	<b>Main culverts</b>	<b>m</b>	
5	D 800 h >3m	m	5,610
6	D 1000 h >3m	m	2,780
7	D 1500 h >3m	m	158
8	D 3200 h >17m	m	7,700

## APPENDIX II

### MAPS

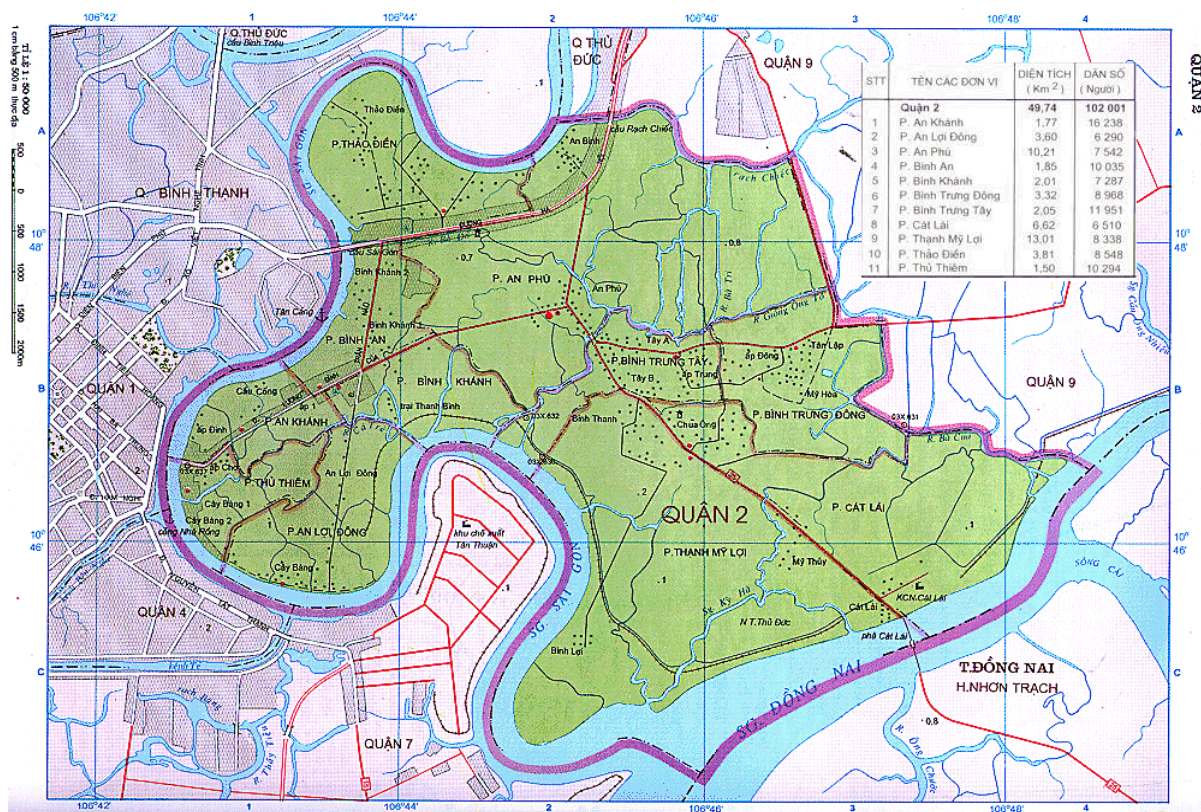


Project location: Interceptor, Nhieu Loc-Thi Nghe basin, WWTP and District 2

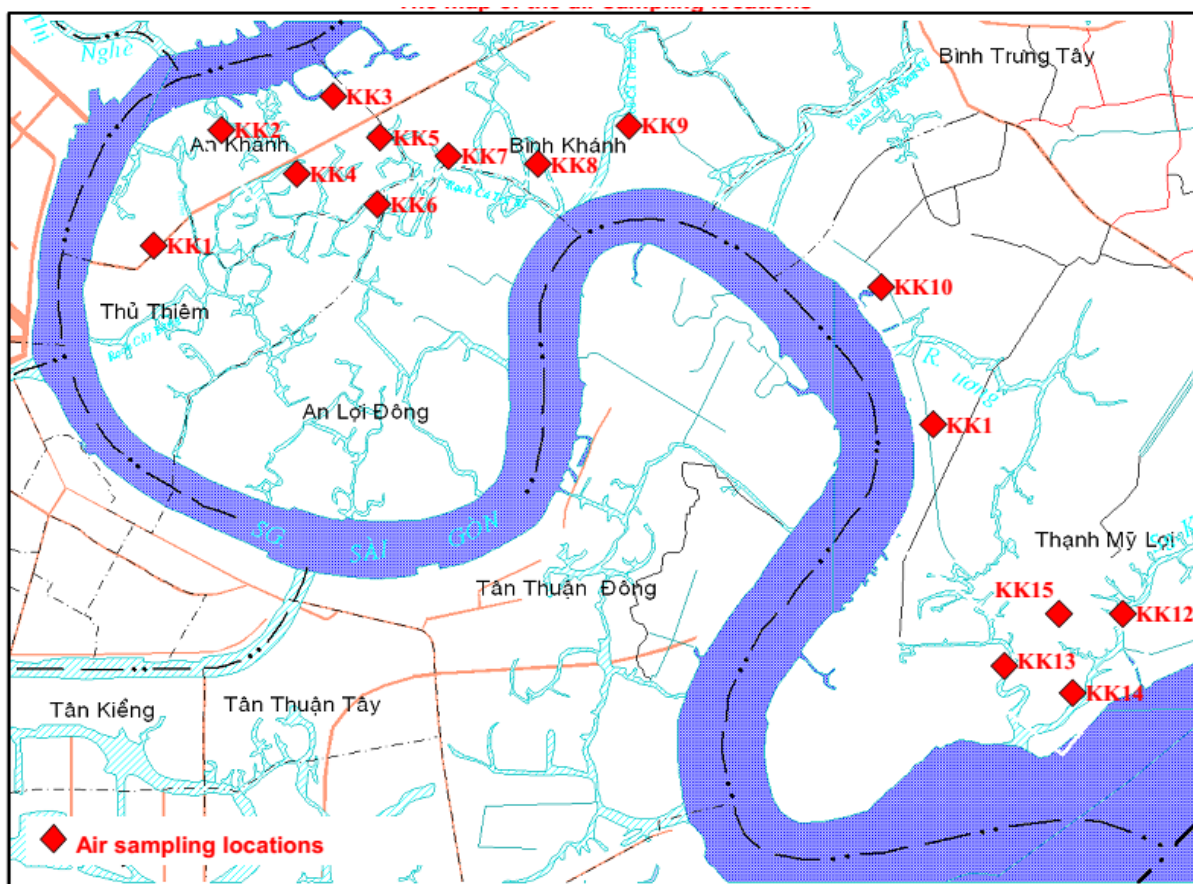


Interceptor route



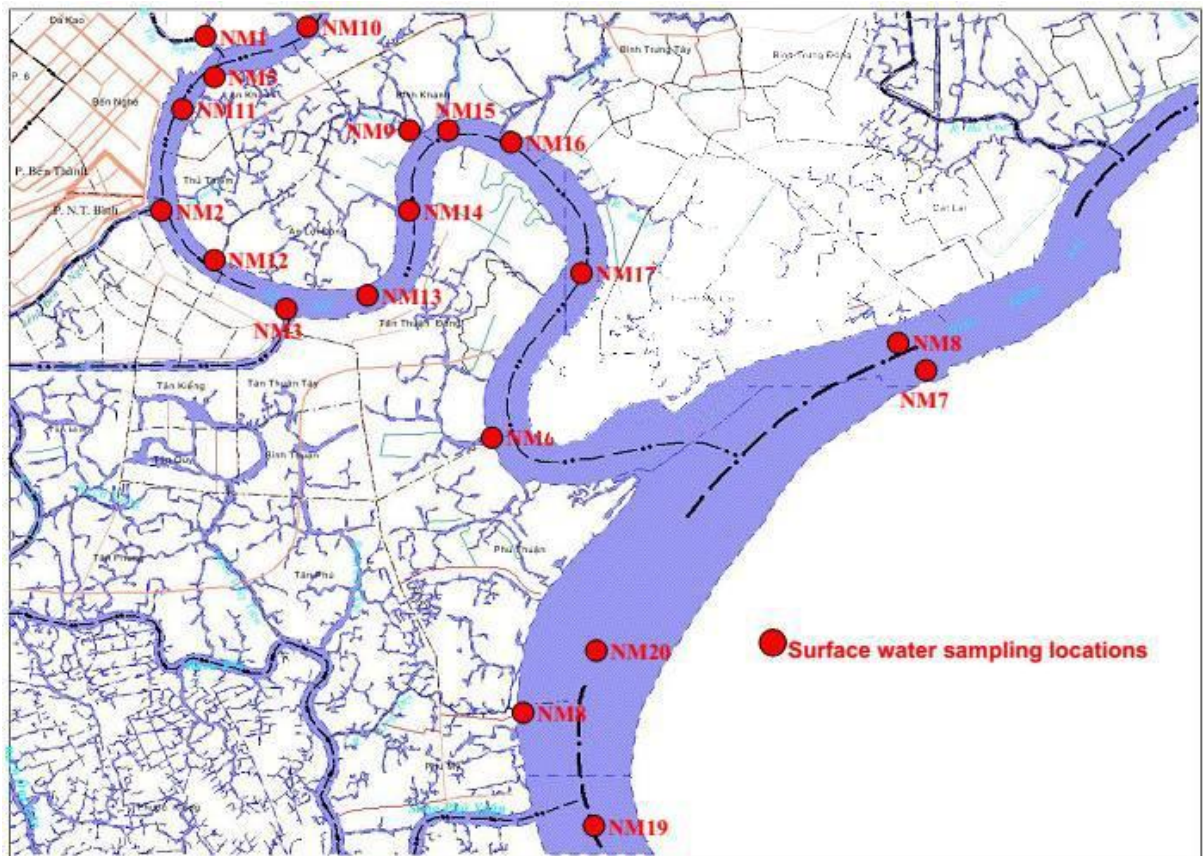


Map of D2 Project Area

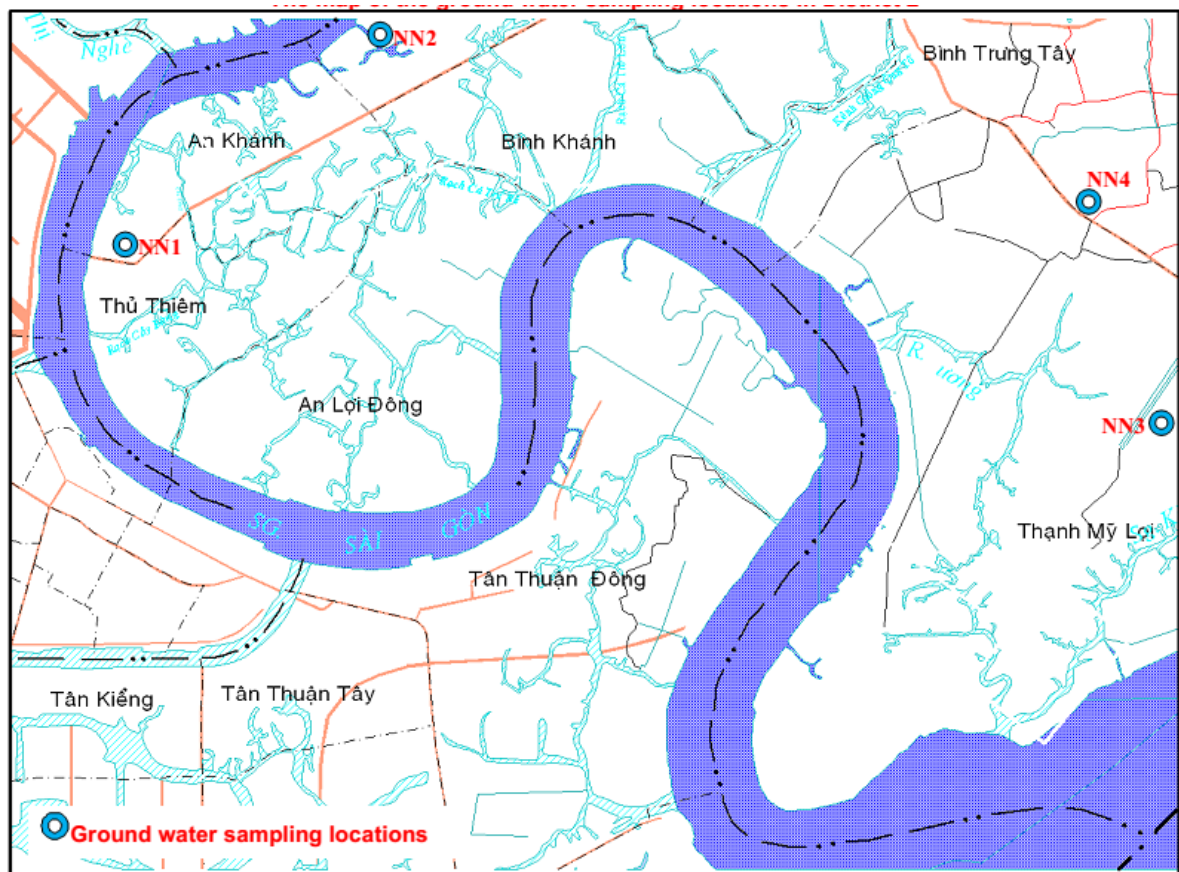


Map of ambient air sampling locations



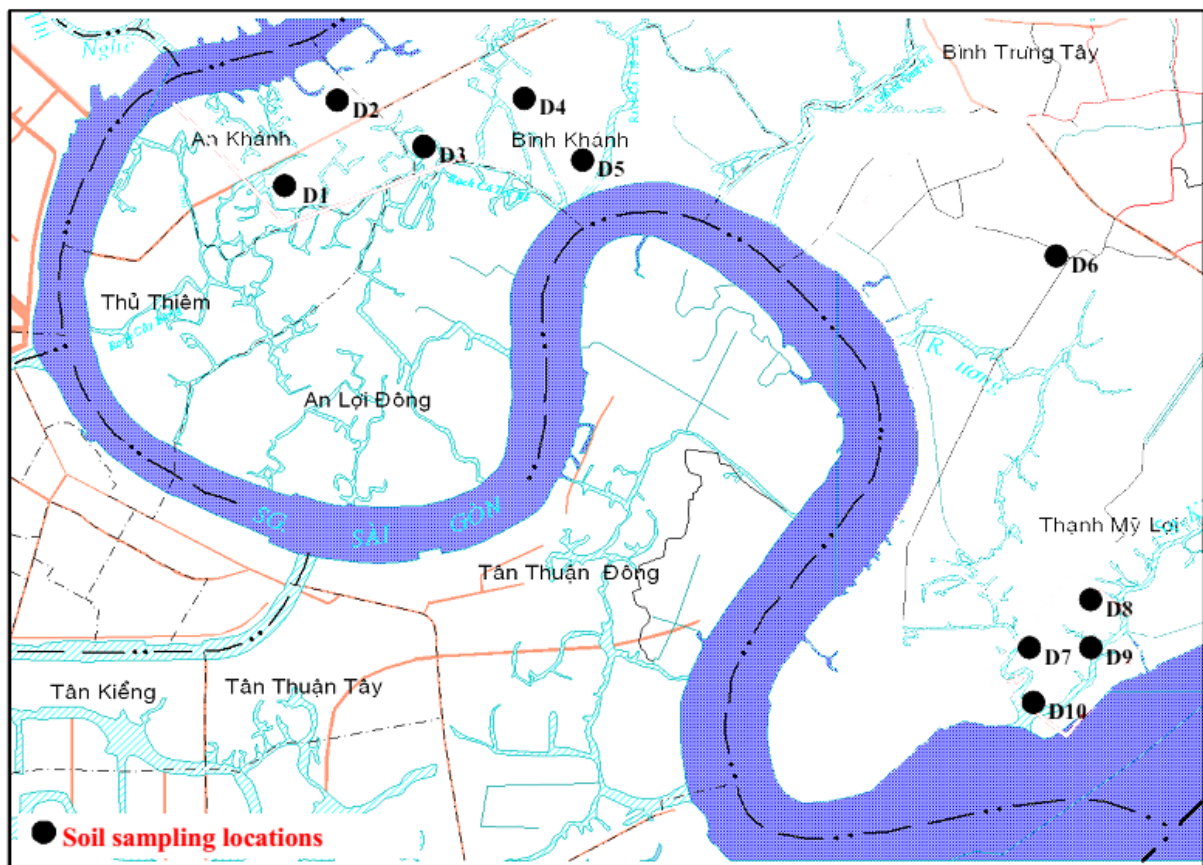


Map of the Sai Gon-Dong Nai river water sampling locations

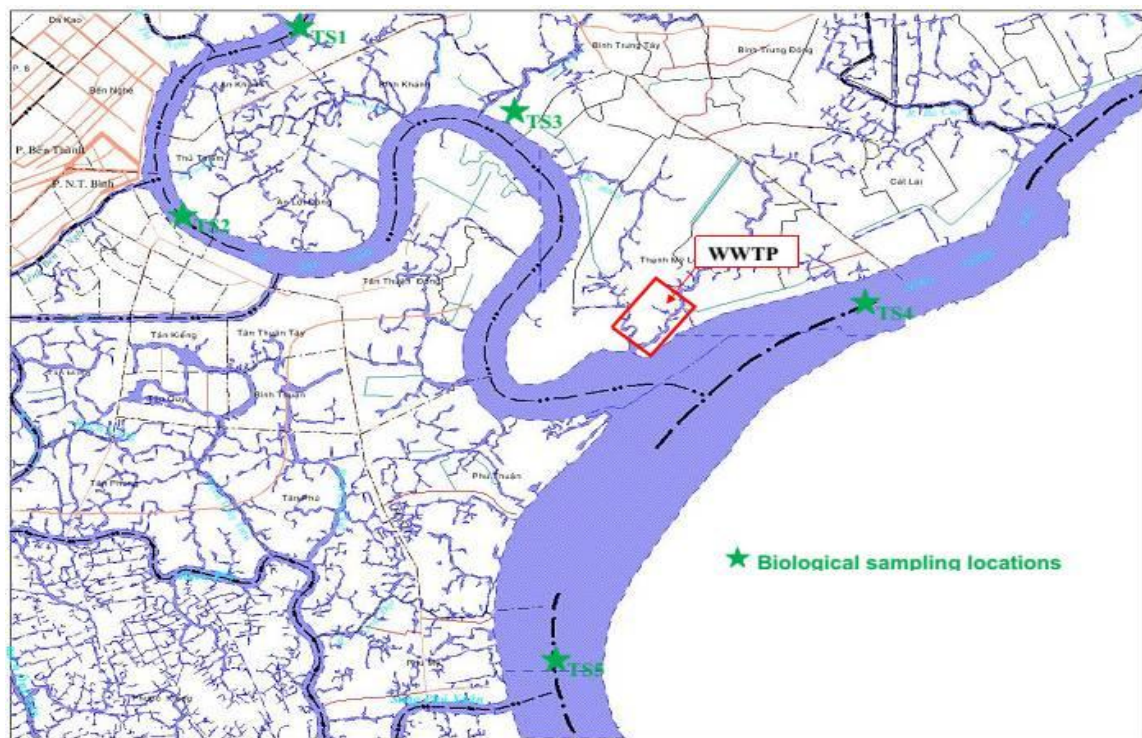


Map of the ground water sampling locations





Map of the soil sampling locations



Map of the biological sampling locations

## APPENDIX III

### TERM OF REFERENCES FOR EIA

*(Issued together with Circular No. 26/2011/TT-BTNMT dated 18 July 2011 of the Ministry of Natural Resources and Environment to provide detailed guidelines for some articles of Decree No. 29/2011/ND-CP dated 18 April 2011 of the government, providing regulations on strategic environmental assessment, environmental impact assessment, and environmental protection commitments)*

#### **TABLE OF CONTENTS**

#### **LIST OF ABBREVIATIONS**

#### **LIST OF TABLES**

#### **LIST OF FIGURES**

### **SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT REPORT**

This should clearly state the main contents of the project, the impacts on the natural and socioeconomic environments, and any measures to be undertaken to minimize negative impacts on the environment, as well as any environmental management programs to be put in place. The summary should be concise, the presentation style easy to understand, and the content not too heavy on technical information. The length of the summary should not exceed 10% of the total number of pages of the environmental impact assessment (EIA) report.

### **INTRODUCTION**

#### **1. Origin of the project**

**1.1.** A summary of the project background and original context (for example, a perceived need for investment project). This summary should also indicate the type of project, whether new, additional, expanded, upgraded, or another type of project.

*Note:*

- *In case of reformulation of a previous EIA report, the reason for the reformulation must be stated clearly and the code number, date of issuance, and agency-issued decisions approving the environmental impact assessment report of the previous project should all be included in this section.*

- *For a project to renovate, expand, upgrade, or increase capacity, state clearly (a) the written decision approving the previous environmental impact assessment report or (b) the certification and registration information of the environmental protection commitment or (c) the decision of approval and/or registration of the environmental protection plan for production, business, and service establishments that are currently operating.*

**1.2.** The name of the competent authorized organization or agency responsible for approval of the investment project, feasibility study report, or equivalent document of the project.

**1.3.** Details of the relation of the project to development plans that have been appraised and approved by competent state management agencies. Also clearly specify the current status of relevant development plans where these are in the process of development prior to being submitted to the competent agency for appraisal and approval. If plans have been already appraised and approved, please supply the full title of the approval decision.

**1.4.** In cases where the project is located inside an economic zone, high-technology park, industrial park, export processing zone, or concentrated production area, clearly state the full name of the area, and attach copies of the following documents as annexes to the EIA report:

- Approval decisions (if any) by the competent agency of the EIA report on the investment project for developing the economic zone, high-technology park, industrial park, export processing zone, or other concentrated production, trade, or service area;

- Where the EIA report is for an investment project for developing an industrial park, export processing zone, high-technology park, or other concentrated production, trade, or service area that was or is to be put into operation after 01 July 2006, there is an additional requirement to submit any documents from the competent agency, certifying completion of,



and the requirements of, any approval decision regarding the EIA report by that agency.

## **2. Legal and technical basis for the environmental impact assessment (EIA)**

**2.1.** List of legal and technical documents (indicating fully and accurately codes, names, issuing date, and issuing agencies for each document), which are used as the basis for implementation of the EIA and the EIA report.

**2.2.** List of applied standards and norms (including Viet Nam National Standards, Viet Nam National Norms, sector standards and norms, international standards and norms, and others) used in preparation of the EIA report.

**2.3.** List and describe sources of materials and data created by or supplied by the project owner, which are used in the EIA process.

## **3. Methodology applied in the EIA process**

List and describe all methodologies applied during the EIA process and in the EIA report, classified into two groups:

- EIA methodologies;
- other methodologies (survey, investigation, studies, measurements, and environmental analysis).

## **4. Organization of EIA implementation**

**4.1.** Summary of EIA implementation conducted and EIA reports prepared by the project owners. State whether a consultancy contract for an EIA report was used. If a consultancy contract was used, provide the name of the consultancy, name of the principal consultant, and the address and other contact details of the consultancy service provider.

**4.2.** List of people that directly participated in preparing the project's EIA report (including project owners and members of the consulting agency, specifying degrees and the specialization of each member).

# **CHAPTER 1**

## **BRIEF DESCRIPTION OF THE PROJECT**

### **1.1. Name of the project**

The project name supplied must be the same as the name indicated in the investment report, feasibility studies report, or equivalent document of project.

### **1.2. Project owner**

Details provided must specify fully and accurately the project owner, addresses, and contact information and the full names and titles of authorized representatives of the project owner.

### **1.3. Geographic location of project**

Provide a detailed description of the geographic location of the project (including coordinates and boundaries) in relation to

- natural features (road network; system of rivers, streams, ponds, lakes and other water areas; systems of mountains and hills; protected areas);
- social and economic factors (residential areas; urban areas; production, business, service activities; cultural and religious structures; and historical relics);
- other features of the project location, especially any objects likely to be affected by the project; and
- a detailed description of current land use status and management of the area for the project, including any possible variants for siting of the project (if any), and the selected variant.

*Information in this section must be illustrated with a map (if applicable, the project owner must provide an administrative map of the area surrounding the project or satellite pictures) with details of the area and including clear explanations of the system of topography and symbols used.*

### **1.4. Main description of the project**

#### **1.4.1. Description of project objectives**

#### **1.4.2. Volume and scale of construction components of the project**

Provide a full list of details, describing the scale and scope (spatial and temporal) of all construction components, which may have impacts on the environment during the project's implementation. A sketch or map should also be included, locating and identifying each component. Components are classified into the two following types:

- Main components: These serve the main objectives of project, and include production, business, or services;

- Auxiliary components: These support and supplement the main components, and include infrastructure for transportation, telecommunication, power supply, water supply, rain water drainage, and waste water drainage; land clearance and resettlement; green coverage for environmental protection; waste water treatment stations; solid waste collection points or treatment stations (if any); works to protect forests and fisheries resources; works to prevent salinization, the spread of alum, hydrological changes, erosion and sedimentation; works to respond to oil spills, fire, or environmental incidents (if any); and other works (depending on the type of project).

#### **1.4.3. Description of the volume of construction work for the project**

#### **1.4.4. Technology for operation and production**

In detail, describe the production and operation technologies to be used in the project and specifically any individual components of the project that are likely to affect the environment. Illustrated diagrams of these should be attached. In these diagrams, there must be a clear indication of environmental issues that could occur as a result of this technology. Such issues may include but are not limited to sources of waste and also specifics such as changes in water balance, sedimentation, erosion, vibration, and noise and the invasion of natural ecological zones. Socioeconomic factors such as intrusion into residential quarters, historical monuments, works of religious culture, or other production or business facilities should also be considered and mentioned here.

#### **1.4.5. List of machinery and equipment**

**This section will contain a full list of the main machinery and equipment needed for the project. If old machinery and equipment will be used, it is necessary to state how much of the total machinery and equipment will be new.**

#### **1.4.6. Materials, fuels, input (raw materials) and output products of the project**

**List in full and describe the nature of materials, fuels, input substances, and output products of the project along with information relating to any trademarked materials and chemical formulas that will be used.**

#### **1.4.7. Timeline and description of implementation**

A detailed description of the project's construction from commencement to completion should be supplied, along with details of the project's official operation, which can be illustrated in form of sketch.

#### **1.4.8. Total investment for the project**

Total investment and funding sources for the project should be supplied and must include details of the sum to be spent on environmental protection aspects of the project.

#### **1.4.9. Organization of project management and implementation**

- *For projects as defined at Point b, Clause 1, Article 10 of this circular, the content of section 1.4 must include information about establishments that are already under operation, especially the works, equipment, items, and technology that will continue to be used in any additional projects, expansion projects, or upgraded projects. Information should also be provided about works, equipment, items, and technologies that will be changed, adjusted, and/or supplemented.*

- *For projects that are reformulated environmental impact assessment reports as described in Clause 1 of Article 11 of this circular, the content of Section 1.4 must clarify the construction status of the previously approved project and provide detailed information about changes or adjustments to that project.*

## **CHAPTER 2**

## **NATURAL ENVIRONMENT, ECONOMIC, AND SOCIAL CONDITIONS IN THE PROJECT AREA**

### **2.1. Natural environment**

#### **2.1.1. Geographic and geologic conditions**

Only provide descriptions of objects, phenomena, and processes likely to be impacted by the project. For projects that affect geographic factors and landscapes, such as mining and other projects that involve underground constructions, this description needs to be more detailed. Indicate which data sources and documents were used or referred to in preparing this description.

#### **2.1.2. Meteorological conditions**

Only provide descriptions of meteorological characteristics relevant to the project and/or calculations related to the EIA (air temperature, humidity, wind speed, direction and frequency of wind, sun and radiation, the amount of rainfall, storm, and other abnormal meteorological conditions). Indicate the length of data chains as well as which data sources and documents were used or referred to.

#### **2.1.3. Hydrographic and marine conditions**

Only provide descriptions of hydrographic and marine characteristics relevant to the project and/or calculations related to the EIA (the level of water, volume of water flow, water speed, and other hydrographic and marine conditions). Indicate the length of data chains, as well as which data sources and documents were used or referred to.

#### **2.1.4. Current state of natural environment**

Only provide indications and descriptions of environmental factors likely to be directly impacted by the project, such as the atmosphere, which may directly receive air waste emission from the project (attention should be paid to areas located near the project in the main wind direction), as well as water sources that may receive waste water directly from the project, and land, sediment, and biological systems that will be directly impacted by wastes or other factors of the project.

For air, water, land, and sediment impacts, it is necessary to note that

- measuring, sampling and analyzing shall comply with the procedures and regulations of environmental monitoring and analysis and that the results shall be accomplished and confirmed by functional bodies under the law;
- clear instructions for collecting and analyzing data as part of the EIA should be supplied (location of measurements and samples must be coded, showing time and location; data must be presented in tables and charts, and also illustrated with diagrams of sampling locations); and
- remarks on the pollution level of air, water, soil, and sediment in comparison to environmental technical standards and norms should be included. Remarks on causes and sources of pollution should be made. If an environmental database is available, it should be used for preliminary assessments of the carrying capacity of the project site in accordance with environmental technical standards and norms.

#### **2.1.5 Current state of biological resources**

Supply current data about the ecosystem based on field surveys done by the project owner or by commissioned consultants along with references from other sources.

To supply data and information on land-based ecosystems, that may be affected by the project, including habitats, ecologically sensitive areas (wetlands, national parks, protected areas, and natural reserves in and around the project area), and the distance from the project to the nearest ecologically sensitive areas. Information should be included on areas and types of forest (if any) that may be affected. A list of biological species that are prioritized for protection and endemic species in the region that could be affected by the project should also be included.

Supply data and information on aquatic ecosystems which may be affected by the project, including the characteristics of the aquatic ecosystems and a list of plankton, bottom dwelling species, fish, and other aquatic resources.

##### **Requirements:**

- *The most recent data available on natural environmental conditions must be submitted, based on actual surveys done by the investor or the consulting firm. If the data provided is from other sources, the source and date of the study should be indicated.*
- *For projects as defined at Point b, Clause 1, Article 10 of this circular, the content of this section must include additional information about the changes in the natural environment since the approval of the previous project EIA report. Where there is a change, the causes of such change should be explained.*

## **2.2. Economic and social conditions**

### **2.2.1. Economic conditions**

Provide information about economic activities (industry, agriculture, transportation, mining, tourism, trade, services, and others), careers, and household incomes that could be affected by the project at the project site and in neighboring areas. Source information should be provided if any outside data sources and documents are used.

### **2.2.2. Social conditions**

Describe the local populations, and include characteristics of ethnic groups that may be affected by the project. Include information on cultural, social, and religious characteristics, as well as historical relics, residential areas, urban living quarters, and other related constructions in the project area and neighboring areas. Consider potential impacts on healthcare, culture, education, living standards, and poverty rates in the areas that may be affected by the project.

**Requirements:**

*Data on economy and society must be up-to-date at the time of the EIA on the basis of work done by the project owner or the consulting unit. Where additional outside data has been used, provide lists of data sources and documents that were used.*

*For planning projects as defined at Point b, Clause 1, Article 10 of this circular, for projects as defined in Article 11 of this circular, the contents of section 2.2 should be compared with economic and social conditions at the time of the previously approved EIA report and the causes of any changes analyzed.*

## **CHAPTER 3**

### **ASSESSMENT OF ENVIRONMENTAL IMPACTS**

**General principle:** *The assessment of impacts of the project on the natural and socio-economic environment shall be carried out in phases. The following stages should be considered separately: preparation, construction, operation, and other phases such as dismantling, closure, and environmental rehabilitation (where applicable). Specific activities that are likely to have environmental impacts must be identified for each source of impact, and each affected object listed. Each impact should be considered on a specific, detailed level. The scale of space and time of the impact should be taken into consideration and the impacts assessed both from a qualitative and a quantitative perspective. The specific methodology or modeling chosen to quantify the impact should be justified and finally the expected impacts should be compared to, and checked with, environmental standards, norms, and regulations.*

#### **3.1. Assessment of impacts**

##### **3.1.1. Assessment of impacts during the preparation period of the project**

An impact assessment must be made for activities during the preparation period of the project and must include the following:

- Analysis and evaluation of the advantages and disadvantages (if any) of each planned location of the project to the environment.
- Analysis and evaluation of impacts due to land clearance and resettlement of populations (if any). Where there are multiple stages of land clearance or population resettlement, these should continue to be fully evaluated in later phases of the project as well.
- Analysis and evaluation of impacts due to leveling the ground for the project (if any).

##### **3.1.2. Assessment of impacts during the construction period of the project**

##### **3.1.3. Assessment of impacts during the operation period of the project**

##### **3.1.4. Assessment of impacts during other periods of the project (dismantling, closure, environmental rehabilitation, and other activities which are likely to affect the environment).**

**Requirements:**

*During the construction phase, the operation phase, and other phases (if any) of the project (sections 3.1.2, 3.1.3, and 3.1.4 above), it is necessary to clarify the activities of the project, and on that basis to assess the environmental impact of the activities of the project. Assessment of each source of impact should include the following: object affected, scope of impact, level of impact, probability of impacts occurring, and resilience of affected objects.*

*Note of clarification:*

- Where discussion is of sources of impact related to waste, the volume (load) and concentrations of all typical waste parameters specific to the project along with applicable standards and current technical regulations should be included. Specific details of waste generation should be included.
- Sources of impact that are not related to waste include the following: noise, vibration, erosion, landslides, subsidence of land erosion, sedimentation of bodies of water, changes to surface water or groundwater, intrusion of salt water, intrusion of alum,

*deforestation, loss of wild vegetation and animals, impacts on sensitive ecosystems, degradation of physical and biological components of the environment, changes in biodiversity, climate change, and other impacts not related to effects of wastes.*

### **3.1.5. Risk assessment**

Provide a risk assessment of the investment project (a feasibility study report or equivalent document). Consider possible environmental incidents that may occur during the implementation of the project.

Give details about the area and time during which is possible for risks and environmental incidents to happen. Indicate the level, space, and time that the risk may occur.

### **3.2. Remarks on the level of detail and reliability of assessments**

Objective remarks should be made regarding the level of detail and reliability of both (a) assessments of environmental impacts and (b) risks of environmental incidents likely occur in project implementation. Where reliability is considered insufficient, state both objective and subjective reasons (such as shortage of information, data, or material; obsolete data; inaccurate data; limited reliability of assessment methodology; or limited capacity of EIA staff).

## **CHAPTER 4**

### **MEASURES TO PREVENT OR MITIGATE NEGATIVE ENVIRONMENTAL IMPACTS AND TO PREVENT AND COPE WITH ENVIRONMENTAL INCIDENTS**

#### **4.1. Measures for the prevention and minimization of the project's negative impacts on environment**

##### **4.1.1. During the preparation period**

##### **4.1.2. During the construction period**

##### **4.1.3. During the operation period**

##### **4.1.4. During other periods (if any)**

#### **4.2. Measures for prevention and response to environmental risks and incidents**

##### **4.2.1. During the preparation period**

##### **4.2.2. During the construction period**

##### **4.2.3. During the operation period**

##### **4.2.4. During other periods (if any)**

#### **Requirements:**

*For each stage specified in sections 4.1 and 4.2, proposed measures must follow these principles:*

- Each potential negative impact on the natural and socioeconomic environment that was identified in Chapter 3 requires a relevant measure to minimize it, with clear explanations of the relative strength, weakness, feasibility, efficiency, and effectiveness of the solutions. If mitigation solutions involving different agencies or organizations are provided, list the names of those agencies or organizations and describe the cooperative solutions. If there is no feasible solution yet provided for a potential impact listed in Chapter 3, please provide reasons for this and propose a strategy for developing solutions in the future.*
- After the risk mitigation measures have been applied, it is necessary to show to what extent the negative impacts are minimized. This can be accomplished through comparisons with standard environmental criteria, norms, and regulations. In the event of force majeure, it should be clearly indicated and recommended in detail to relating agencies for consideration and decisions.*
- Concrete information on the feasibility of each measure should be provided, as well as information on its potential effectiveness over space and time.*
- For projects as defined at Point b, Clause 1, Article 10 of this circular, the contents of sections 4.1.3 and 4.2.3 should clearly explain measures adopted to minimize negative environmental impacts and to prevent and respond to environmental emergencies. Results of these and any other environmental protection measures should be analyzed.*

## **CHAPTER 5**

### **ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAM**

#### **5.1. Environmental management program**

A program must be developed to manage environmental protection issues during the preparation and construction of the project, and then again during project operation and later

periods such as dismantling, closure, and environmental rehabilitation. Program development should be based on the information from Chapters 1, 3, and 4 as shown in the table:

Project stage	Project activities	Environmental impacts	Measures to mitigate negative impacts	Budget for implementation of environmental protection measures	Time limits for implementation and completion	Responsible for implementation	Responsible for monitoring
Preparation							
Construction							
Operation							
Other period (if any)							

## 5.2. Environmental monitoring program

A monitoring program should be put in place to monitor environmental impacts due to both waste generation and non-waste-related factors during project preparation, construction, operation, and other phases such as dismantlement, closure, and environmental rehabilitation.

**Monitoring waste** Monitoring of waste should include both the flow and the total volume of waste, as well as monitoring the pollution parameters specific to the waste of the project in accordance with current Viet Nam national standards and norms. It should be conducted with a minimum frequency of one time per month. Monitoring points must be mapped with specific legends and coordinates according to current standards (note however that this mapping is not compulsory for solid wastes).

Continuous and automatic monitoring of wastes generated by the project shall be carried out in accordance with current standards, norms, and regulations. If there are no such legal normative documents to provide regulations for this activity, the agency responsible for approval of environmental impact assessment report will provide an appropriate type and schedule for such monitoring.

**Monitoring the surrounding environment** If state agencies have no monitoring points or stations in the project area, waste disposal will be monitored in the surrounding environment at least once every 6 months, according to current standards, norms, and regulation of Viet Nam. Monitoring points or stations must be mapped with clear legends and coordinates following existing norms.

**Other monitoring (if any, depending upon specific project)** Monitoring of the following factors must be established: erosion, landslides, collapsed or sunken land; erosion of the banks of rivers, streams, lakes and sea banks; sedimentation of rivers, streams, lakes and sea bed; changes in surface water level and underground water; salt water intrusion; alum water intrusion; and any other impacts on the natural, economic, and social environment. Monitoring must take place with appropriate frequency in order to adequately track spatial and temporal changes in these factors. Monitoring points (if any) must be mapped with clear legends and coordinates following existing norms.

Monitoring population changes of rare animals and plants in the project area and the negative impacts caused by the project must occur at least once a year.

## CHAPTER 6

### COMMUNITY CONSULTATION AND INFORMATION DISCLOSURE

Provide a brief discussion of the process of community consultation and a summary of community opinions in the following sections:

**6.1. comments of communal level people's committees;**

**6.2. comments of representative of community (if any);**

**6.3 comments of organizations that are directly affected by the project (if any);**

**6.4. comments of the organization that approved the environmental impact assessment report for the project of construction of infrastructure of concentration areas for production, trade, service (if any); and**

**6.5. response from project owner to opinions, recommendations, and requests listed above, including commitments to address specific concerns.**

### CONCLUSIONS, RECOMMENDATIONS, AND COMMITMENTS

#### 1. Conclusions

Conclusions must be made in the following areas: whether environmental impacts are fully recognized and assessed or not; whether any impacts remain that cannot be accurately predicted; overall assessment of the scale and size of potential impacts; evaluation of the feasibility of measures suggested to minimize impacts and prevent environmental incidents and risks; and an assessment of which negative impacts cannot be minimized or have no solutions within the project owner's capacity.

#### 2. Recommendations

Recommendations should be made to relevant authorities and agencies, asking for assistance in solving problems that exceed the project owner's capacity.

#### 3. Commitments

The project owner commits to implement the environmental management and monitoring programs described in Chapter 5 (including the environmental standards and norms which the project must comply with); to implement commitments to the community as stated in section 6.5 of Chapter 6; and to comply with general regulations on environmental protection in all project stages, including:

- commitments to environmental protection measures which are implemented and completed in stages of preparation and construction prior to the project's official operation;
- commitments to environmental protection measures which are carried out during the operation stage from commencement to finalization of the project;
- commitments to compensation and rehabilitation for environmental pollution where environmental incidents occur, and more generally from any risks associated with the project; and
- commitments to aiding environmental recovery in compliance with relevant laws on environmental protection after project termination.

### REFERENCE MATERIALS AND DATA

List all resources and reference data (not created by the project owner) used in the process of the environmental impact assessment (name, origin, time, author, and place of issuance of documents, data).

**Requirements:** *The references should have relevance to and close links with key areas or explanations within the EIA report.*

### ANNEXES

The following documents must be attached to the EIA report:

- copies of legal documents relevant to project, excluding general state legislation;
- diagrams (drawings, maps) relevant to project which are presented in the EIA report;
- analysis papers relating to the result of environmental parameters (air, noise, water, soil, sediment, bio-resources) bearing the signature, name, and title of the head of the analysis

agency and stamp of that agency where relevant;

- copies of documents relating to community consultation and sociology questionnaires (if any);
- pictures of project site (if any); and
- other relevant documents (if any).

**Requirements:** *These documents should have relevance to and close links with key areas or explanations within the EIA report.*



## **APPENDIX IV**

### **PUBLIC CONSULTATION PLAN**

#### **1. PURPOSE**

- To layout and to disclose the EIA, ESMF and ES reports to allow public awareness of the selected project investments and the envisaged related environmental impacts;
- Sharing all information about items and expected Project activities with the community living in the project site and stakeholders;
- Understanding opinions and public care for the Project, especially those who are directly impacted by the Project construction and operation. Based on this, public cares can reasonably be settled during the course of setting up the Project, and selection of designing solutions;
- Attentively listening to public opinions and their caring toward the Project, in which direct impacts given to daily life of the community will be specifically taken care of;
- To collect the public inputs likely as to be considerable and possibly contradictory regarding to the resettlement and compensation, environmental impacts, mitigation measures...

#### **2. OBJECTIVES**

- To inform the Public and stakeholders about the Project;
- Offer educational information to the public and stakeholders regarding sewage treatment and management;
- To collect the public inputs at key decision maker points;
- Meet the public consultation requirements of the environmental assessment process.

#### **3. PRINCIPLE**

- Information dissemination: Information about the efficiency of the project should be communicated to the local community and affected groups under several suitable approach forms. Needing to conduct communications from early stage so that the people have time to consider problems related the EIA process and form their views. Provided information need clearly to define the affected area, both the advantages and disadvantages of proposed activity;
- Gathering information: It is necessary to discuss and exchange with the concerned competent authorities of the Government and community representatives (People's Committee, Council, Investment Supervisory Board and community's organization); the local may be affected by the project and other groups enjoy benefits (like non- governmental organization in the local) to know their views and their contributions for the projects and the works of EIA;
- Integrating in the evaluation process: the views and concerns of the community and stakeholders should be considered when: (1) identify key issues need consider in evaluation; (2) assessment and predict the effects and risks directly / indirectly may happen from the project; (3) assess the impact and risk level; (4) develop monitoring, management and mitigation programs appropriately. ideally, the consultation processes should be started from the stage of determining the scope of EIA;
- Coordination: The public consultation activities should be coordinated authorities related in the region and being affected by the project and they should be notified soon about any proposed changes in the operation of the project;
- Connecting people in a dialogue: Needing to use the suitable tradition method in the process of public consultation to bring people into dialogue, focusing on the sources of

information and two-dimensional ideals between the project and stakeholders.

#### **4. SCOPE**

- The components of Project:

The Interceptor: of 8 km crossing the above wards: Thu Thiem, Binh Khanh, An Khanh, An Loi Dong, Binh Hung Tay and Thanh My Loi;

Wastewater Treatment Plant (WWTP): 40,6 ha at the Thanh My Loi;

Sewerage and drainage system District 2 in wards: An Khanh, An Loi Dong, An Phu, Binh An, Binh Khanh, Binh Trung Dong, Binh Trung Tay, Cat Lai, Thanh My Loi, Thao Dien, Thu Thiem.

- Direct affected entities:

By the interceptor: Owners of 10 Projects: Thu Thien New Urban Area, Urban Transportation PMU, Public Service District 2 Ltd. (Service building), Phu Nhuan Construction and Housing Trading Ltd., 21 Century International Development – Binh Trung Tay, Thu Thiem Investment JSCo, Huy Hoang JSCo, Binh Thien An JSCo (Diamond Island), Ham Long Artiste JSCo., Young Volunteer Construction Investment JSCo (CINCO) (Thanh My Loi B Building).

WWTP: 43 private owners having properties within the Project Area to be recovered for the Project purpose;

Local Stockholders within the Project Area (An Khanh, An Loi Dong, An Phu, Binh An, Binh Khanh, Binh Trung Dong, Binh Trung Tay, Cat Lai, Thanh My Loi, Thao Dien, Thu Thiem)

- NGOs:

Hochiminh City Natural and Environmental Protection Association;

Water & Environmental Association;

Vietnam Environmental Impact Appraisal Association;

Hochiminh City Center for Technology and Science Information.

#### **5. CONTENT**

- To lay out the content and component of the Project;
- To describe the environmental impact of the Project;
- To introduce mitigation measures caused by the Project;
- Commitment of the Owner on the mitigation of the negative impacts caused by the Project.

#### **6. TIME - LOCATION**

- The public consultation (1 day) will be conducted when the draft EIA is prepared Location: District 2 PC Conference Room or one of the Ward PC within the Project Area.

#### **7. METHOD**

- The PMU arrange the location and time (as Para 6) and invite the participants as in the Paragraph 4;
- The public meeting will be announced in mass-media at least two weeks ahead of the meeting;
- The draft documents will be made publicly accessible by posting it on the website of the relevant institution in the Republic of Vietnam in local languages before the date of the public meeting;
- At the public meeting:

Provide Project documents and Survey Sheet for the direct affected entities (as Annex Questionnaire Form);

The Owner present consultation contents (Para 3) to the public;

Discuss and recognize the public issues from the related entities of the meeting;

Collect the Questionnaires and produce Meeting Minutes (with signature of the participants).

## **8. SCHEDULE**

- 10 days after EIA Draft Report and Summary Report cleared by WB; Submit the Public Consultation Plan;

- 15 days after EIA Draft Report and Summary Report has been approved; Announce and sending invitation with the Project documents; Public announcement of the Project

- 25 days after EIA Draft Report and Summary Report has been approved; Public consultation meeting (1 day).

**FORM 1: QUESTIONNAIRE TO AFFECTED HOUSEHOLDS  
THE OWNER (1)  
QUESTIONNAIRE ON THE ENVIRONMENTAL ISSUE (2)**

**I. Consulting household**

Name:	Age:
Hamlet:	Commune, ward:
District:	City:
No of Household Working age:	Under working age:
members:	

**II. Land use status:**

Total (m <sup>2</sup> ):	Living (m <sup>2</sup> ):
Garden (m <sup>2</sup> ):	Other (m <sup>2</sup> ):

**III. Income status:**

Rice field (ha):	Yield (T/ha):
Crops (ha):	Yield (T/ha):
Other:	Income (month):
Use electricity, water for living:	

**IV. Request and opinion of the household representative**

1. On land recovery: .....
2. On compensation for land, houses, crops: .....
3. On land clearance: .....
4. On relocation and resettlement: .....
5. On livelihood securities: .....
6. On environmental related to the Project activities: .....
7. Other requests: .....

Date.....  
Participant  
Sign & name

**Notes:**

(1) Name of the Project Owner  
(2) Name of the Project;

## FORM 2: QUESTIONNAIRE TO AFFECTED ENTERPRISE

### THE OWNER (1)

### QUESTIONNAIRE ON THE ENVIRONMENTAL ISSUE (2)

#### I. Enterprise

Name:

Address:

Tel:

Rep:

Fax:

Designation:

#### II. Land use status:

Total land (m<sup>2</sup>):

Land usage:

Land compensation (Complete/not complete):

#### III. Request and opinion of the enterprise

1. On land recovery: .....

.....

2. On compensation for land, houses, crops: .....

.....

3. On land clearance: .....

.....

4. On environmental related to the Project activities: .....

.....

5. Other requests: .....

.....

Date.....  
Participant  
Sign & name

#### **Notes:**

(1) Name of the Project Owner

(2) Name of the Project;

FORM 3: MINUTES OF PUBLIC CONSULTATION

(1)  
-----

**SOCIALIST REPUBLIC OF VIET NAM**  
Independence - Freedom - Happiness

-----  
Hochiminh City, date.....

**MINUTES OF MEETING  
PUBLIC CONSULTATION  
(AFFECTED COMMUNITIES)**

Today, ..... at..... organizes public consultation regarding to the Project (2).

**I. Participant**

1/.....  
2/.....  
3/.....

Chairman:.....  
Secretary:.....

**II. Content**

Mr/Ms..... speech to open the meeting  
Mr/Ms ..... the Owner Rep of the Project (2) present the project information.

**III. Discussion and public opinion**

**3.1. Public opinion**

1. Mr/Ms .....  
.....
2. Mr/Ms .....  
.....
3. Mr/Ms .....  
.....

**3.2. Owner opinions**

.....  
.....  
.....  
.....

**3.3. Conclusion**

- Agreed issues:

.....  
.....  
.....  
.....  
.....

- Contradictory issues:

.....  
.....  
.....  
.....  
.....

This Public Consultation of the Project (2) finished on (3). The content of the MOM has been read out for the participants and agreeing for the issue.

**Secretary**  
(Sign & name)

(4)  
(Sign & name )

**LIST OF PARTICIPANTS (5)**

No	Name	Signature
1		
2		
3		
4		
5		
...		

**Note:**

- (1) Public Consultation Organizer  
(2) Complete Project Name;  
(3) Finish Time of the Public Meeting  
(4) Organizer Rep  
(5) Signature and clear name of the participant

## APPENDIX V

### ENVIRONMENTAL MANAGEMENT PLAN

#### PRIORITY INVESTMENTS IN SEWERAGE AND STORM DRAINAGE IN DISTRICT 2, HO CHI MINH CITY

No	Components	Potential Impacts	Mitigation Measures	Schedule of Implementation and Cost Estimation	Implementation and Monitoring/ Reporting responsibility
<b>A</b>	<b>Pre-construction and construction Phase</b>				
01	Air, Noise, Vibration	<ul style="list-style-type: none"> <li>- Fugitive dust pollution</li> <li>- Motor vehicle exhaust gases</li> <li>- Noises from construction means</li> </ul>	<ul style="list-style-type: none"> <li>- Dust pollution control: minimization of the distance between the stock piles and site boundary; minimization of the heights from which excavated materials are dropped; enclose or cover of all stockpiles of aggregate or soil to reduce wind erosion; effective water sprays; limitation of travelling speeds ; a wheel wash basin.</li> <li>- Odor pollution control: covering the temporary stored sludge; cover of sludge transportation means; immediate removal of sludge; use of high powered fans for air dilution; using of Odor masking agents; deodorizing agents</li> <li>- Noise and vibration control: Use of purpose-built noise barriers; good equipment maintenance; switching off unused units; silencing of noisy equipment; Efficient management of the construction program; liaison and communication channels with the affected communities.</li> </ul>	<ul style="list-style-type: none"> <li>- During construction phase</li> <li>- Cost will be estimated in the EIA preparation</li> </ul>	IMA, Contractors
02	Land, soil and water	- Land, soil will be seriously affected by leakage of oil, gasoline, chemicals and discharge of untreated	- Land, soil pollution control: Reducing dig and disturbance soil; Restricting pollutants; prohibiting discharge of sewage and solid waste to land; equipping with portable toilets .	- During pre-construction and construction phases	IMA, Contractors



		sewages and solid wastes to land. - Water quality will be affected by worker's domestic sewage, construction sewage, storm water.	- Domestic sewage pollution control: sufficient portable chemical toilets; Ban discharge of pipework into the canal or street drains. - Construction sewage pollution control: oil separator prior. - Storm pollution control: collection of the "clean" storm water runoff; the on-site treatment system; sand or silt traps and sediment basins; . Sedimentation basins;	- Cost will be estimated in the EIA preparation	
03	Solid Waste and Sludge	- Construction solid waste including biomass from land clearance, spoil obtained from excavation, debris from discarded old sewers etc. - Domestic solid waste generated from field project offices and worker's domestic refuse. - Oil hazardous waste due to oil replacement for vehicles	- No burning of waste within site; no dumping of solid waste into waterways; adopting an appropriate solid waste transportation. - Sludge Management: Compliance with ambient noise and occupational health protection standards; Proper methods of exploiting construction materials; Proper disposal activities; Train workers - Collection of wasted oil according to the regulation.	- During construction phase - Cost will be estimated in the EIA preparation	IMA, Contractors
04	Land acquisition and resettlement	Some land may have to be acquired and resettled for construction of storm drainage and sewer collection system.	- Compensation of agricultural land; Residential land without house and with house. - Preparation and implementation of Compensation and Resettlement Plan	- During pre-construction and construction phases - Cost will be estimated in the EIA preparation	IMA, Contractors
05	Livelihood, community disturbance	- The limitation of road access, traffic jams, - Disturbance of business operations, accidental damages to other utilities.	- Outlining of the length and separation of trench openings ; trenches reinstating; temporary plating of open trenches; lane closures; road opening in off peak periods; designating alternative routes; Public Information Program .	- During construction phase - Cost will be estimated in the EIA preparation	IMA, Contractors

			- Providing connections to TV cables, telephone cables, electrical and water utilities in the case of accidental damages.		
06	Local flood, and traffic safety	<ul style="list-style-type: none"> <li>- Local flood and/or water pollution.</li> <li>- Traffic disruption, to the traffic jams during peak time</li> <li>- Site safety issues</li> </ul>	<ul style="list-style-type: none"> <li>- Providing a construction plan; Dykes or embankments for flood protection.</li> <li>- The detailed Traffic Management Plan with the aim of minimizing traffic impacts should be prepared by the construction;</li> <li>- The Occupational Health and Safety Management Program; the Accident Contingency Plan.</li> </ul>	<ul style="list-style-type: none"> <li>- During construction phase</li> <li>- Cost will be estimated in the EIA preparation</li> </ul>	IMA, Contractors
07	Off-site impacts	Transport of the materials can spill out and scatter on streets, which cause dust and odor pollution.	- Covering all vehicles transporting soil, sludge and solid wastes; using close tank trucks for transportation.	<ul style="list-style-type: none"> <li>- During construction phase</li> <li>- Cost will be estimated in the EIA preparation</li> </ul>	IMA, Contractors
<b>B Operation Phase</b>					
01	Air pollution	<ul style="list-style-type: none"> <li>- Aerosols and odors (H<sub>2</sub>S, NH<sub>3</sub>, amino acid and mercaptan) from manholes and the pipework will be released when the dredging and repair are carried out, which affects to the workers</li> <li>- Those cause little harm to public health .</li> </ul>	Maintaining adequate dissolved oxygen in gravity sewers; Providing turbulence in upstream areas; Minimizing detention time; Design rising mains; the addition of facilities to control hydrogen sulphide generation.	<ul style="list-style-type: none"> <li>- During operation phase</li> <li>- Cost will be estimated in the EIA preparation</li> </ul>	IMA
02	Land, soil and water	<ul style="list-style-type: none"> <li>- The sewer pipework may be blocked or broken down, which will affect surface water, ground water and contaminate soil.</li> <li>- The water quality of Sai Gon and Dong Nai Rivers will therefore be improved</li> </ul>	<ul style="list-style-type: none"> <li>- Installation of controlling valves of discharge rate and flow meter along water pipes to detect blocked, filled and broken water pipe; regular monitoring and testing water sample;</li> <li>- Regular monitoring the water quality of the Dong Nai River near the outfall</li> </ul>	<ul style="list-style-type: none"> <li>- During operation phase</li> <li>- Cost will be estimated in the EIA preparation</li> </ul>	IMA

		significantly .			
<b>03</b>	Solid waste and sludge	The material removed from manhole and storm drainage/sewer cleansing may cause the Odor pollution to the environment and negatively impact on the public health.	Solid wastes and sludge will be periodically collected and transported to Da Phuoc sanitary landfill to dispose.	<ul style="list-style-type: none"> <li>- During operation phase</li> <li>- Cost will be estimated in the EIA preparation</li> </ul>	IMA
<b>04</b>	Local flood, traffic, safety	<ul style="list-style-type: none"> <li>- Local floods in the case of heavy rains and drainage pipework blocked with solid wastes, which may create water pollution in the flooding areas.</li> <li>- Maintenance of the storm drainage and sewer collection system may cause limitation of road access and traffic jams.</li> <li>- Workers who dredge sludge or repair pipes often face with toxic gases, which can be poisoned.</li> </ul>	<ul style="list-style-type: none"> <li>- Creating drainage slope, using synchronous filling solution; dredging and clearing Ngon Ngay canal; prohibiting construction of facilities, which may stop the flow and causing flooding; operating the pumping station.</li> <li>- Preparation and implementation of a detailed Traffic Management Plan.</li> <li>- Training workers; providing protective clothing, masks;</li> </ul>	<ul style="list-style-type: none"> <li>- During operation phase</li> <li>- Cost will be estimated in the EIA preparation</li> </ul>	IMA
<b>05</b>	Off-site impacts	Spills during transport may cause dust and odor pollution	Covering all vehicles transporting solid waste and sludge; using close tank trucks for transportation.	<ul style="list-style-type: none"> <li>- During pre-construction and construction phases</li> <li>- Cost will be estimated in the EIA preparation</li> </ul>	IMA