EXECUTIVE SUMMARY
ENVIRONMENTAL ASSESSMENT REPORT

DANANG PRIORITY INFRASTRUCTURE INVESTMENT PROJECT
Phase 2

PREPARED BY: INFRA- TL JSC

Da Nang, March 2012
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ENVIRONMENTAL ASSESSMENT REPORT

DANANG PRIORITY INFRASTRUCTURE INVESTMENT PROJECT
Phase 2

CLIENT
DANANG PRIORITY INFRASTRUCTURE INVESTMENT PROJECT MANAGEMENT UNIT

CONSULTANT
THANG LONG INFRASTRUCTURE DEVELOPMENT JSC.

[Signatures]
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ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>CMC</td>
<td>Construction monitoring consultant</td>
</tr>
<tr>
<td>CSC</td>
<td>Construction supervision Consultant</td>
</tr>
<tr>
<td>DCIT</td>
<td>Department of Culture, Information and Tourism</td>
</tr>
<tr>
<td>DONRE</td>
<td>Department of Natural Resources and Environment</td>
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<tr>
<td>DN-PIIP</td>
<td>Da Nang Priority Infrastructure Investment Project</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic products</td>
</tr>
<tr>
<td>ECOP</td>
<td>Environmental code of Practice</td>
</tr>
<tr>
<td>EMC</td>
<td>Environmental Management Consultant</td>
</tr>
<tr>
<td>IEMC</td>
<td>Independent Environmental Monitoring Consultant</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
</tr>
<tr>
<td>LIA</td>
<td>Low Income Area</td>
</tr>
<tr>
<td>PCR</td>
<td>Physical Culture Resources</td>
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<tr>
<td>PFS</td>
<td>Pre - Feasible Study</td>
</tr>
<tr>
<td>PMU</td>
<td>Project Management Unit</td>
</tr>
<tr>
<td>RP</td>
<td>Resettlement Plan</td>
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<tr>
<td>SEDP</td>
<td>Socio- Economic Development Plan</td>
</tr>
<tr>
<td>TOR</td>
<td>Term of Reference</td>
</tr>
<tr>
<td>URENCO</td>
<td>Urban Environmental Company</td>
</tr>
<tr>
<td>WB</td>
<td>World Bank</td>
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<tr>
<td>WWTP</td>
<td>Wastewater Treatment Plant</td>
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</table>
1. INTRODUCTION

1.1 Project Background

With a population of 890,470 people, a natural area of 1,283.42 km² (Statistical Yearbook in 2009) and located in the central region of Vietnam, Da Nang is considered as an important gateway to the sea, to the central highlands and countries such as Laos, Cambodia and Thailand.

The Socio-economic Development Plan (Phase 2006-2010) had set targeted annual GDP growth rate of about 14-15%. This intense growth has an environmental cost; the old and degraded infrastructure system affects public health, environmental quality, and economic development.

Under these circumstances, in 2004, the Government of Vietnam requested FDI support for the development project Priority Infrastructure Investment Project in Da Nang. The project as described in the investment report (IR/PFS) of the Da Nang People's Committee was adopted by Decision No. 2456/QD-UBND issued April 4, 2007. The credit agreement was signed between the World Bank and the State Bank of Vietnam on 28/08/2008 and the project became effective on 26/11/2008.

Priority Infrastructure Investment Project-Da Nang, an active investment in infrastructure sector, has contributed to completing City Development Plan (2006-2013) and Socio-economic Development Strategy 2020.

1.2. Project Objectives

- Urban poverty alleviation through upgrading of technical infrastructure, environmental condition and improvement in living condition of the urban poor;
- Improvement of environmental condition in polluted areas relating to waste water, sewerage issues;
- Enhancement of economic growth through investment in development of strategic infrastructure, implementation of improvements and technical assistance to create an attractive investment climate;
- Gradual adaptation to urban development planning;
- Socialization in process of planning, programming and implementing investment in urban infrastructure upgrading through participatory technical solutions, human resources and fund contribution;
- Promotion in participatory project preparation, implementation and management in order to satisfactorily meet people’s demand;
- Provision of support to institution and enhancement in management capacity to City’s administration authorities.

The project is divided into two phases: Phase 1: 2008 – 2010; Phase 2: 2009 – 2013. The EIA of phase 1 was completed in 2008 and the full EIA has been completed and approved and its executive summary (ES) was already submitted to the Board of the
World Bank. The remaining investments of Phase 2, considered together to be equivalent to a Category A project, were considered in a separate EIA which has also been completed and approved by the Government of Vietnam and the World Bank (dislosed at the Infoshop on 01 August 2011). This ES summarizes that second EIA, covering the investments under Phase 2. In the remainder of this ES, "the Project" refers to Phase 2 of the PIIP project.

1.3 Basis of law, legislation and regulation

The project is required to comply with the prevailing environmental laws in Vietnam, which include the Law on environmental protection No. 52/2005/QH11 dated 29/11/2005, Decrees, Circulars, Decisions, standards and regulations of Vietnam on Environment; Circular No. 05/2008/TT-BTNMT dated 08/12/2008 of the Minister of Natural Resources and Environment on guidelines for preparation of strategic EIA reports; and Vietnamese standards and regulations. The project must also comply with the safeguard policies of the World Bank (Table 1.1 below includes information on the policies triggered by the project).

Table 1-1 WB's operational policies, triggered by the project

<table>
<thead>
<tr>
<th>Operational Policy</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP/BP 4.01</td>
<td>Environmental Assessment</td>
</tr>
<tr>
<td></td>
<td>- Ensure that projects proposed for financing are environmentally &amp; socially appropriate;</td>
</tr>
<tr>
<td></td>
<td>- Inform decision makers the nature of environmental and social risks involved in the Project;</td>
</tr>
<tr>
<td></td>
<td>- Increase the transparency and participation of all project-affected people in the decision-making process</td>
</tr>
<tr>
<td>OP/BP 4.11</td>
<td>Physical Cultural Resources</td>
</tr>
<tr>
<td></td>
<td>- Ensure that the physical cultural heritages are identified and protected when implementing projects;</td>
</tr>
<tr>
<td></td>
<td>- Ensure the compliance with the laws on protection of physical cultural properties.</td>
</tr>
<tr>
<td>OP/BP 4.12</td>
<td>Involuntary Resettlement</td>
</tr>
<tr>
<td></td>
<td>- Ensure that the displacement is fully assessed and minimized;</td>
</tr>
<tr>
<td></td>
<td>- Ensure the compliance with the Gov. laws and OP 4.12 on involuntary resettlement;</td>
</tr>
<tr>
<td></td>
<td>- Ensure proper compensation and resettlement assistance to ensure the affected people can improve or at least restore the living standards as pre-project level;</td>
</tr>
</tbody>
</table>

2. PROJECT DESCRIPTION

Da Nang PIIP is a multi-sector project with four main components, including:
• Component A: Urban upgrading (Infrastructure upgrading for low income areas) – This component will help upgrading tertiary infrastructure for low-income areas, provide resettlement housing and a micro-finance for housing improvements.

• Component B: Environmental Management – This component will invest in improving environmental condition, including flood control, construction of drainage trunks, wastewater collection as well as wastewater treatment works.

• Component C: Roads and bridges for economic development – This component will provide new roads to enhance economic growth.

• Component D: Institutional development – This component assists in enhancing the performance efficiency of the City’s departments and sectors in the implementation of the Socio-Economic Development Plan, period 2006 – 2010 and improving quality of infrastructure services.

As noted above, the project is divided into two phases. Table 1-2 summarized the investments covered under Phase 2 (divided into A and B as described in the table). See also the map in Annex 1 that shows the locations of the proposed investments.

Table 1-2 Scope of Phase 2

<table>
<thead>
<tr>
<th>No</th>
<th>Invested items</th>
<th>Phase</th>
<th>Packages</th>
<th>Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Component A: urban management – upgrading LIAs</td>
<td>2B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Binh Hien ward, Binh Thuan ward – Hai Chau</td>
<td></td>
<td>A40</td>
<td>986,537</td>
</tr>
<tr>
<td></td>
<td>Tam Thuan, Thanh Khe and LIA N0 2, Nguyen Tri Phuog</td>
<td></td>
<td>A41</td>
<td>2,002,531</td>
</tr>
<tr>
<td></td>
<td>Hoa Hiep Bac (Thuy Tu)- Lien Chieu</td>
<td></td>
<td>A42</td>
<td>2,527,248</td>
</tr>
<tr>
<td></td>
<td>Hoa Tho Dong – Cam Le</td>
<td></td>
<td>A43</td>
<td>2,686,389</td>
</tr>
<tr>
<td></td>
<td>An Hai Dong – Son Tra</td>
<td></td>
<td>A44</td>
<td>1,601,702</td>
</tr>
<tr>
<td></td>
<td>An Hai Bac – Son Tra</td>
<td></td>
<td>A45</td>
<td>1,336,253</td>
</tr>
<tr>
<td></td>
<td>Tho Quang – Son Tra</td>
<td></td>
<td>A46</td>
<td>2,059,380</td>
</tr>
<tr>
<td>2</td>
<td>Component B: Environmental management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Construction of drainage system in Lien Chieu, The north of Son Tra, Thanh Khe – Hai Chau Districts</td>
<td>2A</td>
<td>B14</td>
<td>8,342,028</td>
</tr>
<tr>
<td></td>
<td>Box culvert on Hoang Hoa Tham – Ham Nghi road</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Box culvert from Tran Quy Cap to Han River</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Box culvert from residential area of Hoa Minh – Hoa Khanh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Open canal from new railway station to Hoa Minh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drainage ditch from the West Lake to Phu Loc River</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Box culvert from Tho Quang ward to South China Sea culvert</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Box culvert from Tho Quang – Man Thai ward to South China Sea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>Extension of the sewerage system in Lien Chieu and Son Tra districts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Wastewater collection system and two pumping stations along Nguyen Tat Thanh road</td>
<td>2A</td>
<td>B15a</td>
<td>6,942,392</td>
<td></td>
</tr>
<tr>
<td>• Wastewater collection system and two pumping stations from Hoa Minh canal to Dang Dinh Tri road</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.3</th>
<th>Extension of the sewerage system in Cam Le district</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Wastewater collection system and one pumping station from Tran Hung Dao to Tho Quang dock</td>
<td>2A</td>
</tr>
<tr>
<td>• Wastewater collection system along Son Tra - Dien Ngoc road</td>
<td></td>
</tr>
<tr>
<td>• The wastewater system surrounding Hoa Cuong Lake</td>
<td></td>
</tr>
<tr>
<td>• Wastewater collection system along Han River, Vinh Dien River</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.4</th>
<th>Extension and supplementation of the drainage system in Son Tra and Ngu Hanh Son districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Box culvert from the Polytechnic University to Ton Duc Thang road - Hoa Phu lake – Package B14</td>
<td>2B</td>
</tr>
<tr>
<td>• Construct and upgrade Trung Nghia lake</td>
<td></td>
</tr>
<tr>
<td>• Box culvert from Le Tan Trung road to the Eastern Sea - B14</td>
<td></td>
</tr>
<tr>
<td>• Box culvert from University Village, Dong Tra resettlement area to Co Co River</td>
<td></td>
</tr>
<tr>
<td>• Section 1: From the Southern Ring Road Junction to the Northern road in the middle of Dong Tra Resettlement Area (Point A to B)</td>
<td></td>
</tr>
<tr>
<td>• Section 2: From point B running along the Northern road in the middle of Dong Tra Resettlement Area to point C</td>
<td></td>
</tr>
<tr>
<td>• Section 3: Connects Section 2 and directs to Co Co River</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.5</th>
<th>Extension, supplementation and replacement of the sewerage system in the North of Lien Chieu, Son Tra and Cam Le districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>• From the Polytechnic University - Ton Duc Thang Street to Phu Loc WWTP</td>
<td>2B</td>
</tr>
<tr>
<td>• From Trung Nghia Lake to Phu Loc WWTP</td>
<td></td>
</tr>
<tr>
<td>• From Nguyen Phan Vinh to Tho Quang</td>
<td></td>
</tr>
<tr>
<td>• From University Village - Co Co River to Hoa Xuan WWTP</td>
<td></td>
</tr>
<tr>
<td>• From Nguyen Tri Phuong road to Hoa Xuan WWTP</td>
<td></td>
</tr>
</tbody>
</table>
2.6 Construction of new WWTP and upgrading the existing WWTPs

- Construction of technical infrastructure and by-works at Hoa Xuan WWTP  
  B54a  5,590,323
- Install chain of technology for Hoa Xuan WWTP  
  B54b  11,250,084
- Upgrading Phu Loc, Ngu Hanh Son, Hoa Cuong WWTPs  
  B55a  1,247,814
- New construction of Lien Chieu WWTP  
- Upgrading a half of Son Tra WWTP capacity as a pilot of aerobic processing  
  B55b  1,990,967

3. Component C: Roads and Bridges

- Nguyen Tri Phuong bridge  
  2A  C11  22,170,718
- Khue Dong Bridge  
  C12  17,809,529
- Nguyen Tri Phuong road (km1 + 055,58 – km3 +640,00)  
  C13a  5,907,080
- Nguyen Tri Phuong road (km 3 + 640 – km 6+830,34)  
  C13b  5,407,301
- Hoa Phuoc and Co Co bridges  
  2B  C57  25,319,277
- Southern Ring Road  
  C58  15,742,767

3. ANALYSIS OF ALTERNATIVES

3.1 Component A: Urban upgrading

Component A is for upgrading roads/alleys, sewerage system, water supply, lighting and community works such as childcare and meeting halls for the LIAs. The options were focused on upgrading roads/alleys and the third sewerage system based on the participatory approach. The rests that were in line with the master plan of communities or regulations of the city, were not considered.

Upgrading the road / alley has two options the width of roads/alleys (1) was kept as the status from 2-5 -3.5 m, (2) expanded to from 3.5 m - 4.5 m. As a result, the people chose the option 1 because the expansion of road greater than 3.5m will only help fire trucks reach the fire incident, but the people have chosen to build docks fighting in residential areas to fight fire when it occurs. Thus, the expansion is not necessary. In addition, the expansion of roads will raise the costs of construction and relocation compensation.

Upgrade the drainage system has three options (1) box culvert with concreted cover, (2) circular reinforced concreted culvert, (3) box culvert built by brick and covered by reinforced concrete. The community chose option 1 because box culvert in place and covered with concreted cover is firm and easier to be regularly maintained and more convenient for household connecting their wastewater pipes into the city sewerage system.

3.2 Component B: Environmental Management

Component B consists of expanding the sewerage and drainage system, constructing new Hoa Xuan WWTP and Lien Chieu WWTP and upgrading Son Tra WWTP, one of the existing
WWTPs in the city, as pilot. Regarding alternatives, expanding the sewerage and drainage system and the positions for constructing Hoa Xuan WWTP and Lien Chieu WWTP were in line with the city wastewater management strategy to 2040. The alternatives were only focused on analyzing the wastewater treatment technology of the WWTPs. Three options identified were the second treatment technology, odor control and disinfection.

**The second treatment technology**

Because of the narrow buffer zone based on QCVN 07/2010/BXD (40m), some treatment technologies such as biological lagoons or disinfection by UV light are not considered. Sequencing Biological Reactor (SBR) and Extended Aeration (EA) were two options identified for providing secondary treatment at the Hoa Xuan and Lien Chieu WWTPs. The technology of extended aeration oxidation ditch (Lass-EA) is evaluated more advantageously than the batching biological reaction technology (SBR) in term of the wastewater treatment efficiency and environment pollution thank to its less smell and sludge formation.

**Odor control**

Three methods are proposed deodorizers to control odor in option (i) by activated carbon absorption, (ii) the biological filter and (iii) by chemical treatment. Based on the advantages and disadvantages of each option, the biological filter method is proposed because of simple application, does not generate by-products of environmental pollution and lower operating cost.

**Disinfection**

Three options to choose for the disinfection of treated wastewater before discharging into the water body are using Cl2, NaClO, and UV. Chlorine gas is chosen due to broad spectrum antimicrobial, easy to use, can reduce environmental pollution, low operating cost.

3.3 **Component C: Roads and Bridges**

The investment is to construct Nguyen Tri Phuong and the South Link Road with four bridges in the alignment with the roads. This is in line with the city transportation master plan, therefore no options were considered.

4. **BASELINE CONDITIONS IN THE PROJECT AREA**

4.1 **Geography and Terrain**

Da Nang City is located in the middle of the country, on the North - South Axis. It is 764km far from Hanoi to the North, 964 km far from Ho Chi Minh City to the South, and 108km from Hue city to the Northwest. It borders Thua Thien – Hue to the North, Quang Nam to the West, and the China Sea to the East.

Danang terrain includes the coastal plain and mountains. The hilly terrain covers a large area in the North of city with height compared with sea water level of about 700 – 1500m. The coastal plain is low, which is suitable for paddy field cultivation and often affected by flood in raining season.
Phase 2 of DN – PiIP consists of three components A, B and C, which is located in 6 inner districts of the city: Hai Chau, Thanh Khe, Son Tra, Ngoc Hanh Son, Lien Chieu, Cam Le with the urban area of 241.51 km² and one rural district - Hoa Vang. The project will be constructed within the plain area and the city centre. (Annex 1).

4.2 River network and Sea

River network

River network passing Da nang city is short and declined, and most of them originated from the west, northwest and Quang Nam province. Meteorological system is the main source which provides the fresh water to meet demands of Da Nang city. The Rivers of the City are: Tuy Loan River, Cu De River (in the north), Yen River, Qua Giang River, La Tho River, Vinh Dien River and Han River. Tuy Loan and Cu De have independent water basins and locate in Da Nang city. Other Rivers are all downstream of Thu Bon and Vu Gia Rivers.

Vinh Dien River is the branch of Thu Bon River at Cau Lau Bridge, approximately 5km toward the upstream. Vinh Dien River brings part of Thu Bon water and receives the flows of La Tho and Qua Giang Rivers before discharging into Han River. The river will receive the treated wastewater discharged from Hoa Xuan WWTP at Co Man village (called Tu Cau river) (N: 15°59’ 17.4’’; E: 108°13’ 19.3’’) with the smallest water flow of 67.37m³/s. The river has currently been used for water way and flora and fauna system is poor without any valuable and protected species.

Cu De basin is on the northern city and has plume shape, which tilts North East - South West. The total area of the River basin is 472km² Total length of Cu De River is 38km. The river will receive the treated water discharged from Lien Chieu WWTP at the downstream (N: 16°5’ 19’.9; E: 108°7’ 4.7’’) with the smallest water flow of 20m³/s. The river has currently been used for water way and aquatic system is poor without any valuable and protected species.

Sea

Da nang city is considered as a coastal city with nearly 70km sea shores traversing from the foot of Hai Van pass to Non Nuoc area with a range of beaches that are potential for tourists.

4.3 Social and environmental conditions

Although the socio-economic development is significant, Da nang city is experiencing problems in the deterioration of infrastructure such as roads and waste water collection and drainage system, which has resulted in local flooding in low areas, blocked waste water discharging into the receiving body. As a result, the environment within the city has become worse recently.

The percentage of households connected to the city drainage system is still low, at about 20%. Most of the untreated water is discharged into the river or into the ground, causing surface and groundwater pollution.

1 Source: Statistical Yearbook of Da Nang, 2009
The surface water quality in most of the rivers has signs of pollution with organics and coliforms but the concentrations are still within the allowable standard in accordance with QCVN 08:2008. The groundwater in the Low Income Areas (LIAs) is heavily contaminated with organics and coliforms, the concentrations of BOD5, coliforms exceed the standard regulated by QCVN 09:2008.

The seawater at several places especially at the river mouth has signs of organic pollution. This will probably affect the potential of tourism of the city, which may influence the sustainably economic development of the city in the future.

5. IMPACT ASSESSMENT AND IDENTIFICATION OF MITIGATION MEASURES

Impact assessments and mitigation measures for each component investment were developed based on document reviews, meetings with key agencies, field visits to project sites and collection of environmental baseline data (air, noise, vibration, sediment, sludge analysis, etc). A checklist method was used to identify key issues and the required mitigation measures, based on knowledge and experience in the country and taking into account good international practices. In addition to the EIA reports, a Social Impact Assessment (SIA), Resettlement Action Plans (RPs) have also been prepared in line with relevant WB's safeguard policies. These have all been taken into account in EIA preparation and all documents have been disclosed to the public and are available for consultation in the Bank's infoShop as well as nationally.

5.1 Overview of the Project Impacts

5.1.1 Potential positive impact

The project investment will improve the environmental and social conditions in Da Nang city in general and for the people living in the project area in particular. The project is to upgrade infrastructure, social and environmental sanitation for low-income areas such as roads, electricity, water and waste collection, social services such as childcare and community meeting halls. The project also improves the collection and wastewater treatment, storm water drainage to overcome flooding and environmental pollution in the project area. Nguyen Tri Phuong road and The Southern Ring Road of the city completed will create social-economic development opportunities for the city. Residents of suburbs have access to urban infrastructure such as education, health and income opportunities to improve thanks to trade with the outside. The population density in the center may reduced due to the people are probably to move to downtown to seek opportunities in the new urban areas.

5.1.2 Potential negative impact

Besides the above-mentioned positive effects, the potentially negative impacts have been evaluated in the full EIA report. Below is the summary of typical impacts:

- Land Acquisition and Resettlement
- Dismantling buildings, fences in preparation for construction
- Potential impacts during the construction such as dust, wastewater, runoff water, solid wastes and other impacts such as noise, vibration, damage of public and private works
• Potential impacts during operation phase such as odors, sediment and sludge treatment, chlorine gas.
• Physical Cultural Resources such as temples in construction area, relocation of graves
• The cumulative effects such as plant waste water treatment area of Lien Chieu and Hoa Khanh Industrial Zone wastewater.

5.2 Potentially negative impacts and proposed mitigation measures

5.2.1 Impacts during the Land acquisition and resettlement phase

The need to minimize to the extent possible land acquisition and resettlement was a factor taken into account during the feasibility study for three components. The summary of number of affected households and land acquisition is reflected in Table 5-1.

Table 5-1 Table of Agricultural and Residential Land Impacts

<table>
<thead>
<tr>
<th>No</th>
<th>Phase</th>
<th>Project component</th>
<th>Households whose agricultural lands are permanently affected (Households)</th>
<th>Households whose residential lands are permanently affected (Households)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Affecte d under 20%</td>
<td>Affecte d over 20%</td>
</tr>
<tr>
<td>1</td>
<td>2B</td>
<td>Component A: Upgrading territory infrastructure in LIAa</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>2A</td>
<td>Component B: Construction of Son Tra and Lien Chieu drainage system</td>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>2B</td>
<td>Component B: Expanding and constructing the drainage systems in Lien Chieu, Son Tra, Cam Le, Hai Chau districts and treating plant</td>
<td>185</td>
<td>135</td>
</tr>
<tr>
<td>3</td>
<td>2A</td>
<td>Component C: Nguyen Tri Phuong road</td>
<td>24</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>2B</td>
<td>Component C: Ring Road southern city</td>
<td>176</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td></td>
<td>402</td>
<td>428</td>
</tr>
</tbody>
</table>

Mitigation measures: A detailed Resettlement Action Plan (RAP) has been prepared for the project and was approved by both Government of Vietnam and the World Bank.
5.2.2 Impacts during the Land clearance and constructions

Key impacts will include: (a) relocation of existing infrastructure (water supply, electricity, etc.), (b) site clearance such as demolishing roads, fences and earthworks construction, (c) increased traffic during construction, wastewater from construction sites, worker recreation, runoff water from freshly excavated areas, and disposal of solid waste materials, including material from canal dredging, some of which may be contaminated with organic and odorous pollutants.

During the detailed design of the project works, attention will be given to mitigating these impacts to the extent possible by incorporating into the designs, bidding documentation, and resulting contracts. Specifically, the bidding documents and the contracts will reflect (i) the provisions of the comprehensive Environmental Codes of Practice (ECOPs) for small-scale urban construction works that have been prepared for the project (see Table 5.2 below); and (ii) site specific impact and mitigation measures that have been prepared for each of the project works where impacts and mitigation measures are beyond, or in addition to the provisions of the ECOPs. Full details on the ECOPs and the site-specific measures are included in the EIAs.

Categories of Impacts Covered by the ECOPs are as follows:

- Dust generation
- Air pollution
- Impacts from noise and vibration
- Water pollution
- Drainage and sedimentation control
- Management of stockpiles, quarries, and borrow pits
- Solid waste
- Management of dredged materials
- Traffic management
- Interruption of utility services
- Restoration of affected areas
- Worker and public safety
- Chance findings

5.2.3 Impacts during operation

In the operation phase, the most concern negative impacts on workers and local people living in the surrounding area are (i) odors, and (ii) sludge and chlorine gas.

Mitigation measures: Odors arising from water treatment facilities and sludge will be collected and treated by biological methods to ensure 99% H2S removed. Also, green trees will be planted around the landscape to reduce odors in the surrounding environment. Sludge will be dried and agglomerated then buried in Khanh Son landfill. Chlorine gas will be used for disinfection the effluent automatically in warehouse and workers are equipped with full protective equipment and trained to operate and handle incidents.
5.2.4 Potential impacts on Physical and Cultural Resources

There are 1027 graves that need to be relocated, of which 850 graves in phase 2A and 177 graves in phase 2B. The activity results in the WB’s policy on Physical and Cultural Resources (OP 4.11) being triggered. None of the other cultural resources in the project area will be affected by the project because they are away from the construction area by at least 300-400 m.

Mitigation measures: Impacts on identified cultural resources, associated mitigation measures and environmental monitoring are addressed in EIAs. Mitigation measures to relocate graves are identified through community consultation, relatives and local authorities. The mitigation measures include relocation, relocation time and funding support for the entire relocation were determined, the relatives of graves are responsible for conducting the relocation under monitoring from the local authority and PMU.

The EMPs include clear guidance for project activities on identified PCR locations, and also chance finds procedures to be followed, in line with Government regulations and consistent with World Bank policy. The chance find procedures are illustrated in Figure 5.1.

Figure 5-1: Chance Find Procedures

Archaeological artifacts found during project construction (Contractor and CSC) → Temporarily stop construction, and install a protection fence; immediately contact the PMU → All parties record the scene (in the form prepared by the CMC) → Implement next steps under guidance of the DCIT → PMU reports by letter to the provincial Department of Culture, Information and Tourism (DCIT)

5.2.5 Cumulative impacts

The EIA identified that Cu De river in which Lien Chieu WWTP will discharge its treated wastewater is the same as that into which Hoa Khanh Industrial Zone also discharges its effluents. As long as both point sources respect national standards for effluent discharges, the EIA has shown that the receiving waters can absorb the discharges without any significant impact on river water quality. Thus there is a cumulative impact resulting from operations of the two WWTPs, Lien Chieu WWTP and Hoa Khanh industrial Zone WWTP, but it is not considered significant. However, the responsible agency, Da Nang DONRE, must carefully carry out its responsibility of periodic inspection and assessment of wastewater quality outputs of both Lien Chieu and Hoa Khanh WWPT. The PIIP project includes capacity building and assistance to the Recipient to ensure this monitoring takes place.
6. ENVIRONMENTAL MANAGEMENT PLAN

Based on the assessment of the potential negative impacts discussed and the mitigation measures outlined in Item 5, this part presents a summary of the Environmental Management Plans (EMPs). The EMPs identify actions to be carried out under each responsible agency in the city including the environmental monitoring program and the implementation arrangements. These take into account the need to comply with the Government’s EIA regulations and the World Bank’s safeguard policies.

6.1 Basic principles

As a part of the EIA, an Environmental Management Plan (EMP) is a safeguards instrument that consists of information on and guidance for the process of mitigating and managing adverse environmental impacts throughout project implementation. Typically, in Vietnam, an EMP comprises a list of mitigation measures to be carried out by contractors, an environmental monitoring program, organizational arrangements, and an estimated monitoring cost.

There is a comprehensive regulatory framework in Vietnam related to EIA preparation, environmental standards, protection and management of forest and cultural property, and other aspects related to construction and operation of facilities and infrastructures. The project EMP’s are consistent with these regulations.

To facilitate effective implementation of the EMPs, PIIP-PMU will: (a) establish an Environment and Social Unit (ESU) responsible for ensuring timely implementation of the EMP, including monitoring, reporting, and capacity building related to safeguards; (b) assign the Construction Supervision Consultant (CSC) to be responsible for supervision of the contractor’s safeguard performance as part of the construction contract and this requirement will be included in the CSC terms of reference (TOR); and (c) hire qualified national consultants as the Environmental Management Consultant (EMC) to assist the ESU in performing these tasks.

The city water supply, drainage, urban environmental management companies and transportation agencies as appropriate, will be responsible for implementing the mitigation measures during the operation stage of the project and they will ensure that the mitigation measures are implemented and adequate budget is provided. The City Steering Committee (CSC) chaired by the Chairman or Vice Chairman of the City People’s Committee (CCP) will provide the overall policy guidance and oversight of project implementation.

In terms of laying out the mitigation measures of the EMP, there are two fundamental parts. Firstly, the project has developed and will use Environmental Codes of Practice (ECOPs). These ECOPs, which are presented in the EIA, outline typical general low-level impacts that can be expected to occur in a wide range of construction activities of the project. These include mitigation measures for these impacts and a process for including them in the project’s construction contracts. Secondly, all site-specific impacts that are either not covered in the general ECOPs or which are of an order of magnitude that require mitigation measures not covered in the ECOPs, are described in more detail in the EMP.
Impacts due to, and mitigation measures for, land acquisition and resettlement are presented separately in the respective subproject RPs and they will be implemented and monitored separately.

6.2 Management Organization and Responsibilities

Environment management responsibilities have been defined in the EIA and the related EMPs. Environmental management during construction involves the PIIP-PMU, CMC, contractors, and the Independent Environmental Monitoring Consultants (IEMCs), Community, Local Authorities such as DONRE, and NGOs. Details of these responsibilities are provided in the EIAs.

6.3 Environmental Monitoring

It is essential to design the monitoring program and monitoring frequency appropriately to be able to record both the overall performance of the project works as well as the short-term impact due to construction activities. The environmental monitoring program will be implemented during the pre-construction, construction and operation phases. Environmental monitoring plan should include two main activities of (a) monitoring of mitigation measures and (b) monitoring of environmental quality at 3 levels:

- Monitoring the level of compliance with mitigation measures,
- Community-based monitoring, and
- Monitoring the environmental parameters set out in the EIAs.

6.4 Environmental Supervision

Environmental supervision during construction will be the responsibility of the PMU and its contractors assisted as needed by DONRE and community representatives in accordance with national environmental law and other legal regulations such as Decision 80/2005/QD-TTg dated April 18, 2005.

6.5 Independent Environmental Monitoring Consultant (IEMC)

The IEMCs will be recruited by the PMU and responsible for carrying out environmental sampling and monitoring at least twice a year, on all environmental-related issues regarding the works. Based on their regularly field visits and the collection of secondary data from CMC, contractors and PMU, they will check, review, verify and validate the overall environmental performance of the project and the relevant mitigation measures and monitoring programs provided in the EMP are being fully complied with. The IEMCs will also supply specialized assistance to the PMUs and, if required, to the CSCs, on environmental matters.

6.6 Costs of Environmental Management Plan

The EMP cost will comprise: (a) cost for implementation of the mitigation measures by contractor, (b) cost for supervision by the CSC, (c) cost for the independent environmental monitoring consultant (IEMC), (d) monitoring of environmental quality, and (e) PMU safeguard management costs. Costs for the implementation of the mitigation measures during construction
will be part of the contract costs while the costs for monitoring by the CSC is provided for in the construction supervision contracts. Costs for PMU operations related to the EMP are provided for in the project management budget of the PMU. None of these costs can be easily calculated separately.

7. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

7.1. Public consultation during preparation of the EIAs

Community consultation is a key component in EIA process which is required by World Bank safeguard policies and Vietnam decree No. 80/2006/ND-CP. Two rounds of community consultation were carried out by EIA consultant.

First round

The objective of first round consultation was to: (i) collect opinions/feedback from affected people and local authorities on environmental impacts as well as effective mitigation measures to complete EIA/EMP report; and (ii) have initial agreement in cooperation to local authorities during project implementation process.

The first round of public consultation was described as follows:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Subject</th>
<th>Method</th>
<th>Achievements</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Introduce project activities to relevant agencies</td>
<td>- PC leader of project communes/wards/local NGOs.</td>
<td>- Direct interview</td>
<td>- Record of information collected for each project ward/commune</td>
</tr>
<tr>
<td>- Collect initial information on existing situation of environment baseline in the project area.</td>
<td>- 30% of total households in the project area.</td>
<td>- Investigation through questionnaire</td>
<td>- Investigation notes</td>
</tr>
<tr>
<td>- Receive information on environmental issues to which attention of the community should be given.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15 communes have been consulted. These are Tho Quang, An Hai Bac, An Hai Dong, Son Tra district; Binh Hien, Binh Thuan, Hoa Cuong Bac, Hai Chau; Tam Thuan, Thanh Khe; Hoa Tho Dong, Hoa Hiep Bac, Hoa Khanh Bac, Lien Chieu; Hoa Lien, Hoa Phuoc communes, Hoa Vang district; Hoa Xuan, Cam Le district. Hoa Quy, Hoa Hai, Ngu Hanh Son district.

Second round

The second round of public consultation was conducted after the draft EIA report was completed by Environmental Assessment Consultant. The objective of consultation in this round was to: (i) inform affected households and local authorities the potential impacts and proposed mitigation
measures; (ii) collect feedback on additional impacts or mitigation measures during phases of project implementation (pre-construction, construction and operation phases). See table below for more details.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Subject</th>
<th>Method</th>
<th>Achievements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update, add comments into the report and final check before submitting the EIA report to the City PC and WB</td>
<td>Project wards and Affected households</td>
<td>Provide summary of revision content and related document to ward/communes PC by formal letter</td>
<td>The affected household’s comments and proposed mitigation measures were updated and added in the report</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provide detail address for sending feedback</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conduct community meeting for discussion and comment collection</td>
<td></td>
</tr>
</tbody>
</table>

Summary of results

- The PMU must apply the mitigation measures stated in the report to minimize the identified negative impacts on the environment and society.
- The investors must have a specific plan to arrange an appropriate resettlement plan for totally affected households. The compensation and clearance must be carried out quickly based on the policies of the Government and WB.
- During construction time, constructors must have a reasonable plan to avoid damaging the public works especially power and water supplies, to minimize the negative impacts on the local people such as dust, noise, traffic safety and social security in the project area to an acceptable level.
- Constructors must follow strictly the regulations on safety transportation to avoid accidents.
- For operation of the WWTP, the mitigation measures stated in the report must be strictly applied to reduce odor to an acceptable level, to protect the surface water in the Vinh Dien and Cu De rivers.
- Periodic check of the quality of input and output wastewater in the WWTP must be strictly carried out to ensure the WWTPs are always in a good operation.
- The investor must work closely with the relevant agencies in the city to implement the project as the schedule, in good quality and comply with the mitigation measures to minimize the negative impacts in three phases: Pre-construction, construction and operation of the project and put the project in effect as scheduled.

7.2 Information Disclosure

- The EIA summary report in Vietnamese was disseminated to the project affected wards in March, 2011
- The full EIA report in Vietnamese was disseminated to Danang People’s Committee on November 25, 2011
• The full EIA report in English was disseminated at the World Bank office at 63 Ly Thai To, Hanoi, Vietnam on September 5, 2011
• The full EIA and Executive Summary reports in English have been disseminated in Infoshop in Washington DC.

8. CONCLUSION AND RECOMMENDATION

Implementing the project is necessary because the project completion will contribute largely to improved sanitation conditions through: (1) develop a number of services (water supply, water supply for fire fighting, wastewater and solid waste collection) for 09 LIAs (2) build and develop a collection system and wastewater treatment, (3) development of transportation systems (bridges and roads) in the south of city that contributes to develop infrastructure, urban landscape in order to meet overall development needs of the city.

However, it would not avoid the negative impacts during the phases of pre- construction, construction and operation of projects.

During pre-construction phases, some negative impacts will affect the local environment and local populations in the project areas. Land acquisition and resettlement of project affected households as well as relocation of a substantial number of graves will be required. Detailed Resettlement Plans and relocation of graves were prepared as part of project preparation.

During the construction phase, there will be negative impacts, including vehicle and equipment exhaust emissions, smoke, dust and noise from construction equipment; road and sewage system construction, rain water and sewage sewer installation, wastewater from construction workers and construction activities, construction solid waste, dredged sludge and some contaminated waste, among others. These have been identified in the EIA studies. These impacts can be mitigated by ensuring that the project contractors comply with the provisions of their contracts, including those which relate to environmental impacts. The PMUs and their CSCs will be responsible for ensuring that this compliance occurs. In accordance with their contracts, contractors will be required to prepare site-specific detailed design documents, including environmental provisions. The site-specific EMPs will be approved by the project owner prior to the work commencing. Periodic monitoring reports will be prepared by independent consultants and the results will be submitted to the World Bank and the Government.

To facilitate effective mitigation of impacts during operation, the project will also provide support to ensure that local regulations and operation manuals related to operation of the project facilities will be put in place.

The PMU is committed to the compliance with the mitigation measures in three phases of the project and comply with the policies of the World Bank and the Government in the EIA report.

9. APPENDIX 1
THE POSITION LAYOUT OF INVESTMENT PROJECT ITEMS IN PHASE II (2A & 2B) OF DN-PIIP