

# Initial Environmental Examination

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September 2014

## VIE: Viet Nam Water Sector Investment Program – Vinh Water Supply Subproject

Prepared by Nghe An Water Supply Company for the Asian Development Bank.

**Asian Development Bank**

**MFF0054-VIE: PFR3**

**VINH WATER SUPPLY SUBPROJECT**

**VINH CITY, NGHE AN PROVINCE**

**FINAL REPORT**

**APPENDIX 11**

**INITIAL ENVIRONMENTAL EXAMINATION REPORT**

**September 2014**

Currency equivalents

In this report using the exchange rate 1 USD = 21.036 VND.

**ABBREVIATIONS**

ADB	Asian Development Bank
DDSC	Construction Management Consultant
CSC	Construction Supervision Consultants
DN	Diameter Nominal (Metric system)
DOC	Department of Construction
DOF	Department of Finance
DONRE	Department of Natural Resources and Environment
EIA	Environmental Impacts Assessment
EMA	Environment monitoring Consultants
EMP	Environment monitoring plan
IEE	Initial Environmental Examination
MONRE/ BTNMT	Ministry of Natural Resources and Environment
MU	Management Unit
NAWASCO	Nghe An water supply one member limited company
NPPC	Nghe An People's Committee
PMU	Project Management Unit
QH	Planning
QL	National road
TCXDVN	Vietnam construction code
TOR	Terms of Reference
UBND	People's committee
USD	United States Dollar
USEPA	United States Environmental Protection Agency
VNĐ	Viet Nam Dong
WHO	World Health Organization
WTP	Water Treatment Plant

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## **EXECUTIVE SUMMARY**

### **Background and Scope**

1. The project, classified as Environment Category B, is judged to have some potential adverse environmental impacts in relation to pipeline construction activities. The unavoidable construction impacts are temporary and can be mitigated.
2. Nghe An People's Committee (NPPC) has approval the Vinh water supply system expansion with the addition of 3,141 new households connection. The IEE covers rehabilitation and upgrading of existing water distribution pipes and the addition of a new section of distribution network.

### **Project Description**

3. The water production capacity of the Vinh Water Treatment Plant (WTP) is 60,000 m<sup>3</sup>/d. The water source comes from an existing intake located in the Dao river. From the WTP, the water is distributed through an aging pipeline network that loses about 39% of the production. So, although the water demand is projected to increase in the next 10 to 20 years and that the WTP capacity is enough, it is the lost through the distribution network that creates the biggest threat of overloading the capacity of the WTP. Therefore, the replacement and expansion of the distribution network have to be addressed in the following years.
4. Currently, the distribution network consist of a combination of pipes made out of cast iron (different ages), steel, galvanized steel, black steel and unidentified material and will all be replaced by HDPE piping. All original pipes range in diameter between some unidentified size to DN400 and the sizes to be installed range between DN90 for residential areas to DN400 for the main pipelines. The replacements and installation will be implemented accordingly to the volume required with an increase in capacity where it is needed.
5. Also, the water distribution network of Vinh is installed in a primary type of setup being piping and valves in different areas without the facilities to control and monitor adequately the flow of water in the system. Therefore, a system of main reading mechanisms will be installed in specific area to gain the capabilities to follow on time the water flow versus the consumption. This will allow the authorities to monitor the integrity of the distribution network. All these operation will be implemented to reach a targeted reduction of 15% loss by 2025.

### **Impacts and Mitigation Measures**

6. The main benefit of the proposed project is decreased supply costs to consumers as a result of reduce loss of water, and for some users, shifting from non-piped sources to a piped water system under NAWASCO.
7. The Table below summarizes the potentially adverse environmental impacts of the project, mainly associated with construction works, and corresponding safeguards and mitigation measures.

<b>Project activities</b>	<b>Negative impacts</b>	<b>Mitigation measures</b>
The construction activities	Impacts due to noise and vibration	Out-of-date equipment is not allowed to use; night construction is avoided.
	Air pollution as a consequence of dust and exhaust fumes	Watering for dust elimination is provided. Material and solid waste means of transport must be covered completely.
	Water pollution due to domestic wastewater	Workers camp and construction site are equipped with sanitation facilities.
	Water pollution due surface water and drainage water from replaced pipe.	Arranging the temporarily trench during construction.
	Environment pollution as a consequence of waste solid	Provide dust bins at the workers camp, construction waste solid dump and transporting solid waste out of construction site to waste solid treatment plant and construction landfill.
	The Impacts of workers concentration on social environment.	Limiting the concentration of workers, construction organization on schedule; Provide the required sanitation facilities, and security for workers.

**Table 1. Mitigation measure summary of negative impacts of the project activities**

### **Information Disclosure, Public Consultation, and Grievance Redress**

8. As regulation of Vietnamese law, to small-scale capacity under 50,000m<sup>3</sup>/day to work using raw water like Dong Hung WTP, it is not necessary to conduct public consultation. However, consultation on water supply options is essential during project preparation. With the support of Environment and Natural Resource Engineering One member Co., Ltd and Pacific Ocean Engineering., JSC (PCO) public information and consultation activities were carried out as part of a baseline survey of local environmental conditions along the new and the existing distribution network. A team conducted public meetings in all the communes in autumn 2011. All participants supported the project and some ad concerns mainly on work site related issues (dust and noise).

9. Three-step complaints solving procedure will be established to handle environmental impacts and land occupation. As a guideline, any complaint related to any project's aspects will be solved through negotiation to get agreement. Complaints will be submitted toward 3 levels: First through commune/ward's PC, then the Town's PC and finally through PPC. If an agreement was not reach, then they will be law court as the final method. NAWASCO will bear all administrative and legal cost arising in such complaint solving processes.

### **Environmental Management Set-up**

10. **Institutional Arrangement:** The project will be implemented under the Nghe An Province People's Committee as the Executing Agency and the NAWASCO as the project implementing agency. A Project Management Unit (PMU) has been created to supervise the implementation, on behalf of NAWASCO.



11. The PMU will be responsible for fulfilling the environmental requirements of the project, particularly for incorporating the mitigation measures and safeguards identified in this report in the detailed engineering design of the pipeline and distribution network construction and replacement, as well as in the bid documents and construction contract documents. The PMU will also be responsible for commissioning water and air quality sampling activities, undertaking environment-related investigations that may arise during implementation (in coordination with the DoNRE's Environment Protection Center), and responding to environment or nuisance-related complaints from residents or businesses affected by the project works.

12. Environment and Natural Resource Engineering One member Co., Ltd will be requisitioned to provide environmental monitoring support during project construction (using as baseline the environment survey that was conducted as part of this IEE), and to conduct follow-up consultations and interviews with local residents to identify concerns or grievances arising during construction.

13. Monitoring compliance with the safeguards in the construction phase - especially with the implementation of the safeguards provided in the construction contract, as recommended in this report - will be put to task the construction supervisor which can be assigned to NAWASCO (and supervised by the PMU). The compliance monitoring and auditing will be fully documented, and the findings and recommendations will be sent immediately to NAWASCO. During the operation phase, NAWASCO will be responsible for the protection and monitoring of effluent, and the results will be reported to the Division of Environment and Natural Resources.

14. Division of Natural Resources and Environment (under the District People's Committee) will conduct monitoring and random testing environment before, during and after construction, as well as in urgent cases. The division will also consider the monitoring report of EPRC. If any unusual case found, District PC can ask for payment of fines and emit a suspension notice with a specific time limit to the responsible unit. If a complaint is formally received from the public through the PC's, the Division of Natural Resources will conduct verification.

15. Within three months after completion of construction or no later than a year, an environmental monitoring and audit report of the completion of the project's components will be prepared by an eligible environmental research institute, for example Environment and Natural Resource Engineering One member Co., Ltd. This report will be reviewed and approved by the Town's PC and submitted to ADB.

16. The environmental monitoring, including environmental benefits monitoring, will be included in the project preparation management system (PPMS) for the project. Backed by a local environmental specialist, the PMU will be responsible for analyzing and unified data through its information management system. The PPMS will be designed to allow adequate flexibility to adopt the remedial action regarding project design, schedules, activities and development impacts. Initially, the PMU and consultants will complete a comprehensive PPMS procedures to systematically generate data inputs and outputs of the project components and environmental agreements. Socioeconomic indicators concerned will be used to assess the impact of the project. PMU will refine the PPMS framework, confirm objectives achieved, set up detailed monitoring and recording arrangements, and establish systems and procedures no more than 6 months after loan's effect.

17. Budget. The monitoring budget covers: (a) survey on awareness and following consultation with local residents conducted by assigned unit of PMU - Environment and

Natural Resource Engineering One member Co., Ltd to serve preparation of IEE; (b) monitoring quality of surface water, ground water and air during construction; (c) survey pipe ditches to check materials which can be dangerous to workers; (d) local environmental specialist supporting PMU (in preparing of ToRs, air and water sample test evaluation, draft safeguards regulations combined in bidding document and construction contract, preparation of report of PMU) and (e) training for PMU's staff and community authorities on environmental impact management of construction of pipeline and related safeguard measurements (prepared by environmental specialist). The total estimated budget is \$18,500 that will be taken from the ADB loan partly under the PMU incremental cost and Construction Supervision Consultant.

18. During the operation of the new water treatment plant, water quality monitoring of drinking water taps at various locations in the new or expanded NAWASCO service areas will be done routinely by the Environment Protection Agency of the DoNRE in compliance with Vietnam regulations and using the agency's own budget.

### **Project Implementation Schedule**

9. The main project tasks are presented in the table below

<b>Tasks</b>	<b>Tentative schedule</b>
Approval by Nghe An PPC	08/2014
Loan agreement negotiation and signing	11/2014
Establishment of PMU	Early 2015
Preparation of detailed design, cost estimate and bidding document, procurement and selection of bidder.	2nd Quarter 2015
Update EMP and conduct consultation with downstream communities.	3 <sup>rd</sup> Quarter 2015
Coordinate with the Environment Protection Center on regulatory compliance issues	All duration of the project
Construction duration (24 months)	Start Early 2016

### **Conclusion and Recommendation**

19. The proposed project will produce significant benefits for the population of Vinh, specifically by enabling HHs that are currently not served or only partially served by NAWASCO to shift from reliance on wells as a source of water (which has to be boiled or filtered) to more secure and safe piped water source.

20. The potential adverse environmental impacts of the project are mainly the consequences of construction activities, in particular the potential impairment of water and air quality in areas near the pipeline construction corridor, and nuisance and safety hazards posed to nearby HHs and businesses. However, these impacts are temporary and can be mitigated.

21. HHs that will be affected by construction activities, either because of dislocation or damage to property, will be relocated and/or compensated in accordance with ADB guidelines. A resettlement plan has been prepared for this sub-project.

22. For purposes of compliance with ADB environmental assessment guidelines, no additional study or full environmental impact assessment is needed to further assess the potential environmental impacts of the project.

## **A. INTRODUCTION**

### **A.1 PURPOSE OF THE IEE AND THE PROJECT BACKGROUND**

#### **A.1.1 Purpose of the IEE**

1. Based on the strategic development of water supply, drainage of Vietnam Urban oriented vision 2025 and 2050, fresh water and sanitation are considered as benchmarks for the development of each area. Therefore, the upgrade and expansion of water supply systems has been mentioned. Specifically, raising the level of service coverage for the urban grade IV or higher, enhancing the ability to recover costs through water cost and creating an environment for businesses which operate under the market rules, modernize technology, increase water resources safeguards and environmental improvements.

#### **A.1.2 Background of project**

2. The Vinh city water supply network rehabilitation and upgrading project is part of the seven water supply subprojects<sup>1</sup> that formed the third Periodic Funding Request (PFR-3) of the Multi-tranche Financing Facility (MFF0054-VIE) for Support of the Water Sector in Viet Nam. The tranche finances 7 water companies for urban water supply, including one economic zone as seen in Figure A-1.



**Figure A-1: PFR-3 subproject locations in Vietnam.**

<sup>1</sup> Subprojects in Nghe An Province (Thai Hoa, Vinh & Cua Lo), Thai Nguyen Province (Thai Nguyen City), Bac Giang Province (Bac Giang City), Quang Nam Province (Dien Nam - Dien Ngoc and Tam Hiep) and Thanh Hoa Province (Nghi Son Economic Zone)

3. This project, classified as Environment Category B, is judged to have some potential adverse environmental impacts in relation to pipeline construction. The unavoidable construction impacts are temporary and can be mitigated.

4. This report was prepared from May to September 2013 by NAWASCO with reference to the ADB Safeguard Policy Statement (ADB SPS 2009). It follows the standard outline for environmental assessments: legal and administrative framework; description of the environment; description of the project and its significance; assessment of environmental impacts and mitigation measures, including alternatives considered; public consultation and information disclosure; and environment management plan.

5. The scope of this assessment covers the aspect of the treated water distribution network from the major pipeline to the distribution entries to new households.

6. In summary:

**Name of project:** Vinh city water supply network rehabilitation and upgrading project

**Executing Agency:** Nghe An provincial people's committee.

- Address: Number 3, Truong Thi road, Vinh city, Nghe An province
- Telephone: (84) 38 3844619; Fax: (84) 38 3844656

**Project owner:** Nghe An water supply one member limited company (NAWASCO).

- Address: Number 32, Phan Dang Luu road, Vinh city, Nghe An province
- Telephone: (84) 38 3844727; Fax: (84) 38 3842208.

Vinh city water supply network rehabilitation and upgrading project stage 1 includes 02 components:

- Component 1: Network rehabilitation and reducing water loss;
- Component 2: Technical assistance for implementation and operation.

**Project objectives:**

- Reducing the rate of water loss to less than 30% in the first years and 18% for 2020, 15% for 2025 and thereafter by the proposed technical solutions and improve the management the assets of the network.
- Completing pipeline network grade 1 to improve service efficiency of water supply network and to be basic of development water supply network for the regional water shortages, especially areas of low salary people.
- Improving service efficiency and safety of water supply. Improving management capacity of NAWASCO to ensure network stability, reducing time of stop-working due to incident.
- Capacity management and operation of water supply systems NAWASCO to project operation and maximize efficiency and sustainable development

The results of project will contribute in socio-economic development and improving environmental conditions in the city, and development of commerce and services.

## **A.2 Policy, Legal and Administrative Framework**

7. Vietnam's Law of Water Resource was passed in June 2012. It establishes water as a resource to be managed as an economic good. Water resources boundaries are to be delineated according to hydrological rather than administrative boundaries. The law also gave strong institutional focus on creating a national apex body for water resources management, the setting up of river basin organizations, decentralization of management for water resources assets including infrastructure, and greater accountability for water services delivery.

8. The water law also provided for establishment of more effective regulatory institutions, including the use of abstraction licenses, discharge permits and more strengthened safety procedures for infrastructure development and operation. The Law was not only intended to facilitate shift to more sustainable and economically efficient development of the country's water resources; it was also intended to support achievement of the country's broader imperatives of poverty alleviation, socio-economic development and environmental protection.

9. The Ministry of Agriculture and Rural Development (MARD) was originally responsible for implementing the water law; this responsibility was later transferred to the Ministry of Natural Resources and Environment (MoNRE). Subsequently, MoNRE was mandated to direct river basin management activities throughout the country.

10. Under the Law on Water Resources, the GoV issued Decree No. 201/2013/ND-CP: on stricter regulations for effective water resource management. Under this Decree, projects requesting water abstraction from underground or surface water or for discharging wastewater into water bodies have in particular to get permits and to collect opinions of representatives of local communities. The aforesaid projects include reservoirs and dams with a total capacity of at least 500 cubic meters and works using surface water with a total flow of 10 cubic meters per second, reservoirs and dams interrupting rivers' and streams' current for at least one kilometer, and works discharging wastewater into local water sources with a flow of 10,000 cubic meters per day.

11. The Law of Environmental Protection (LEP) was originally passed in 2003 and took effect in January 2004. Decree 175/CP issued in October 2004 provided implementing guidelines for (a) assignment of environmental management responsibilities among ministries, provinces and people's organizations; (b) an environmental impact assessment system; and (c) a regulatory permitting system based on standards. Chapter III of Decree 175/CP contains requirements for the submission of environmental impact assessments by investors and enterprises; the appendices to the Decree also contained detailed provisions prescribing the format and content of EIA reports. In 1998, Circular 490 was issued providing additional guidelines for the preparation and review of EIA reports.

12. In November 2005, the LEP was revised. Decree 80/2006, issued in August 2006, provided detailed implementation guidelines for the amended law, replacing Decree 175/CP. The project based EIA system was strengthened, and a new environmental management tool was introduced in the form of strategic environmental assessments (SEA) for national, provincial and inter-provincial development plans, policies and programs. Responsibility for conducting SEAs is assigned to the state agency responsible for formulating the strategy or plan. For instance, the MoNRE (with technical assistance provided by ADB) undertook a strategic environmental impact assessment of the provinces and cities. Commitment to environmental protection made for small-scale projects to be implemented in two forms: environmental protection commitment and simple environmental protection commitment with the approval of PC of commune/ward.

13. The National Assembly of Viet Nam approved a new Law on Environment Protection (LEP) on 23 June 2014. The Law will however be effective from 1 January 2015. Implementing guidelines and associated regulations are under preparation

14. Environmental management in Viet Nam is administered on the national level by the MoNRE. The environmental arm of MoNRE, the National Environmental Agency (NEA), is the body specifically tasked with environmental protection. Aside from MoNRE, environment divisions in the various line Ministries are tasked with environmental management functions related to the specific sectors.

15. At the provincial level, the relevant management authorities are the Departments of Natural Resources and Environment (DoNRE) which carry out their environmental protection activities through their respective environment divisions. In the case of Nghe An DoNRE, an Environment Protection Center is responsible for monitoring environment quality and providing technical solutions. The DoNREs come under the purview of the central MoNRE only in relation to administrative matters and technical guidance. For all other purposes, the DoNREs operate

under the direct control of their respective provincial government, through the People's Committees.

16. The Project required GoV approval through the Nghe An DoNRE. Contractors have to comply with all statutory requirements set out by DoNRE for use of construction equipment, hazardous waste & chemicals management, and operation of construction plants, e.g., concrete batching. Permits and certificates need to be obtained from DoNRE Nghe An for the Project. The delay for such approvals can take between 2 months to 3 months once the file is complete.

17. At district level, the relevant management agency is Division of Environment and Natural resources under District's PC. This division has qualified team responsible for environmental protection and consulting for District's PC leaders to make responding environmental decisions.

18. This project being funded in part by the ADB the Safeguard Policy Statement (SPS) applies and requires all the borrowers to identify project impacts and assess their significance; examine alternatives; and prepare, implement, and monitor environmental management plans. The SPS requires borrowers to consult people likely to be affected by the project and disclose relevant information in a timely manner and in a form and in languages understandable to those being consulted. Regarding IEE, SPS required the description of the environmental condition of a project, including potential impacts, the formulation of mitigation measures, and the preparation of institutional requirements and environmental monitoring for the project.

19. The ADB determined that the Project is Category B and subject to IEE. The ADB defines a Category B project as follows (ADB SPS 2009):

***Category B.** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required.*

20. Pursuant to the Decree No.29/2011/ND-CP dated 18th April, 2011, the environmental categorization is determined based on the type, scale and capacity of the proposed project. The project is just only for expansion, rehabilitation and upgrading distribution network and does not require an Environmental Impact Assessment. Nonetheless, under the said Decree, it is required to apply and prepare an Environmental Protection Commitment (EC). The preparation of the EC document shall conform to the guidelines of the Circular No.26/2011/TT-BTNMT. The EC document shall be submitted for registration to the concerned District People's Committee (DPC).

### **A.3 EXTENT OF THE IEE**

21. The IEE report involves four main activities, i.e. (i) review of the project documents including the engineering design and the Feasibility Study (FS); (ii) visiting the project site, consultations, and field validation of data and information on the existing environmental conditions relating to the identified potential impacts, issues and concerns; and (iii) Proposing mitigation measures for negative impacts on environment; (iv) Establishing an EMP and EMP implementation organization...

22. The IEE report was initiated by a review of the project's compliance with the relevant ADB Environmental Policies and Guidelines including:

- Safeguards Policy Statement, 2009;
- Environmental Assessment Guidelines, 2003; and
- Environmental Policy, 2002.

23. The review also specifically looks into the project's compliance with the legal framework of the environmental assessment of the Government of Vietnam with the Laws, Decrees, Circulars and Environmental Standards as follows:

- Law on Environmental Protection No.52/2005/QH11 dated 29th November, 2005; and

- Law on Water Resources No. 17/2012/QH13 dated 21st June, 2012.
- Relevant Decrees and Circulars:
  - Decree No.29/2011/ND-CP dated 18th April, 2011 by Government on provisions on Strategic environmental assessment (SEA), Environmental impact assessment (EIA) and Environmental protection commitment (EC);
  - Decree No.117/2009/ND-CP dated 31st December, 2009, Handling of law violations on Environmental protection field;
  - Decree No.59/2007/ND-CP dated 09th April, 2007 by Government on Solid waste management;
  - Circular No.12/2011/TT-BTNMT dated 14th April, 2011 on Hazardous waste management; and
  - Circular No.26/2011/TT-BTNMT dated 18th July, 2011 by MONRE, providing detailed guidelines for some articles of the Decree No. 29/2011/ND-CP.
- Environmental Standards:
  - Standard for the Raw Water Quality**
    - QCVN 08:2008/BTNMT - National technical regulation on quality of surface water; and
    - QCVN 09:2008/BTNMT - National technical regulation on quality of ground water.
  - Standard for the Treated Water Quality**
    - QCVN 01:2009/BYT - National technical regulation on quality of drinking water.
  - Other Relevant Standards**
    - QCVN 01:2011/BYT - National technical regulation on Hygienic conditions for Latrines;
    - QCVN 14:2008/BTNMT - National technical regulation on domestic wastewater;
    - QCVN 40:2011/BTNMT - National technical regulation on industrial wastewater;
    - QCVN 15:2008/BTNMT - National technical regulation on plan protection chemical residues in soil;
    - QCVN 07: 2009/BTNMT - National technical regulation on threshold for hazardous waste;
    - QCVN 05:2009/BTNMT - National technical regulation on ambient air quality;
    - QCVN 06:2009/BTNMT - National technical regulation on certain hazardous substances in ambient air;
    - QCVN 26:2010/BTNMT - National technical regulation on noise; and
    - QCVN 27:2010/BTNMT - National technical regulation on vibration.
- Documents for reference:
  - Guiding to build, use and maintain household latrines published in 2010 - Medical Publisher, MOH;

## **B. DESCRIPTION OF THE PROJECT**

24. The water supply system of Vinh City has a capacity of 60,000 m<sup>3</sup>/day treating water from Dao River. The distribution network was installed mostly in 1987 and before 2005 with 127 km pipes diameters D100 to D600 and over 500 km of smaller pipes. NRW is high at 39%.



25. The proposed project consists in the implementation of:

- Transmission and distribution pipeline network rehabilitation and upgrading uses pipe HDPE within Vinh City:
  - 34.63 km pipe diameter D250-D500
  - 35.95 km pipe diameter D100-D200
  - 215 km pipe diameter D32-D90
- Zoning and Network division to 5 regions for NRW reduction;
- Meter status surveying, Evaluating and Replacement (over 10,000)
- Supervisory control and data acquisition
- Support for the implementation and operation of the project.

26. The project will benefit over 58,000 households with improved services. 3,141 households will receive piped water for the first time, including 160 poor households.

## **B.1 JUSTIFICATION OF THE PROJECT**

### **B.1.1 Geographical location of project site**

27. Vinh City is located in the south of Nghe An Province, with a natural area of 104.97 km<sup>2</sup> and a geographic coordination from 18 °38' 50 " to 18 ° 43'38" North latitude, from 105 °56' 30" to 105 ° 49' 50 " East longitude. The city is 295 km south from the capital city of Hanoi, 350 km from Hue, 1447 km north of Ho Chi Minh City.



**Figure B-1 Geographical location of Vinh city**

### **B.1.2 The Project's Components**

#### **B.1.2.1 Rehabilitation of water supply network, reducing of water loss**

28. The Project Scope is to cover the water supply of 21/25 wards of the city and Hung Thien commune (Hung Nguyen district), the wards including: Dong Vinh, Ha Huy Tap, Le Loi, Quan Bau, Hung Binh, Hung Nguyen, Hung Phuc, Hung Dung, Cua Nam, Quang Trung, Doi Cung, Le Mao, Trung Thi, Ben Thuy, Hong Son, Trung Do, Vinh Tan and Hung Dong; the communes



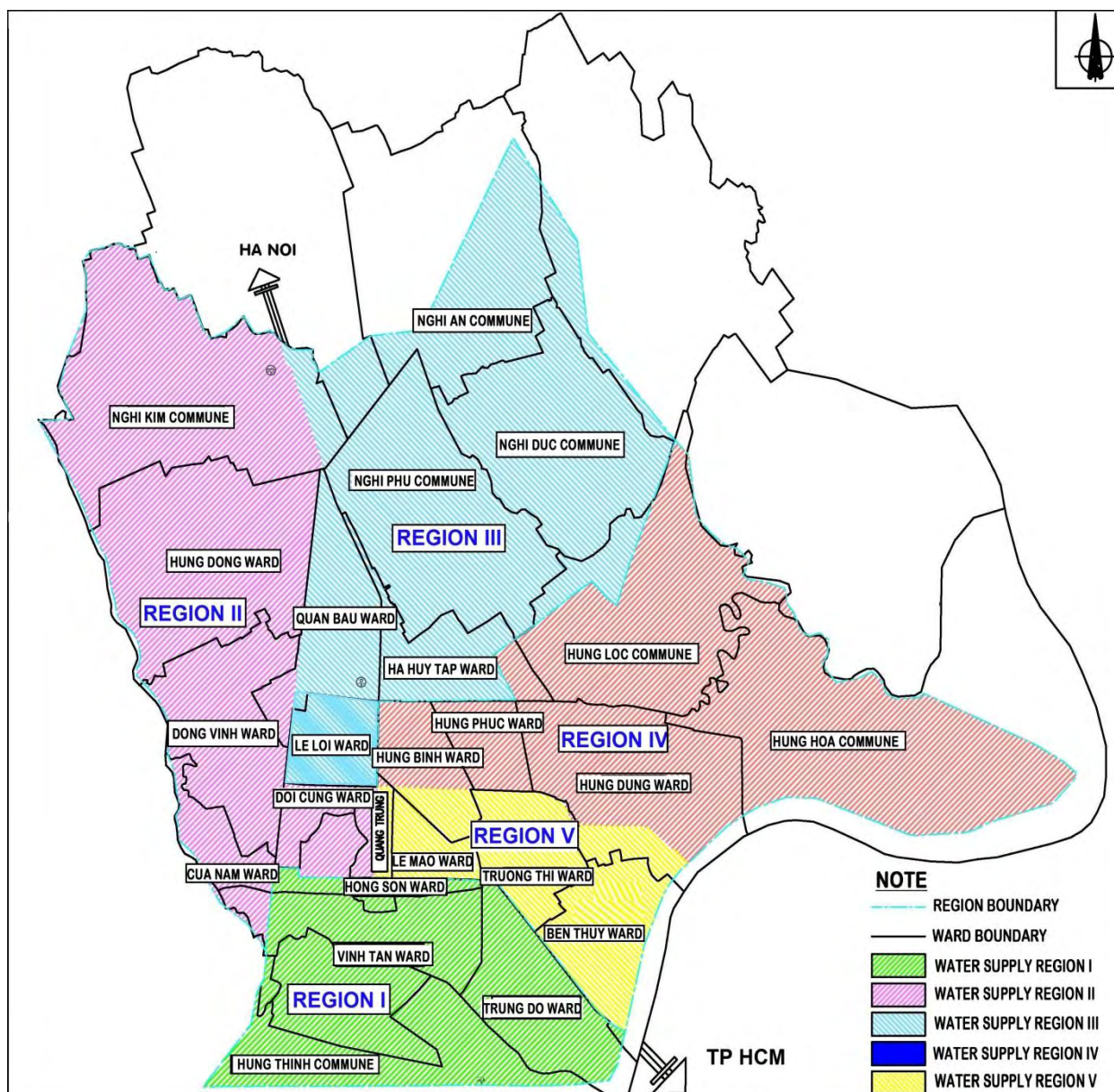
including: Nghi Phu, Hung Loc, Hung Hoa, Nghi Duc, Nghi An, Hung Thinh (Hung Nguyen district). Hung Chinh commune is supplied from water supply system of Hung Nguyen ward, Nghi Lien commune is supplied from water supply system of adjacent Vinh (see Figure B-2).

29. The scope of water supply network after implementation of the project is presented in the table below:

**Table B-1 Scope of water supply network of project**

No.	Ward/ commune	Scope of water supply coverage (from Hung Vinh WTP) (%)		Note (increasing coverage)
		Currently	After project implementation	
1	Dong Vinh ward	88.09	90.00	1.91
2	Ha Huy Tap ward	98.16	99.50	1.34
3	Le Loi ward	97.51	99.50	1.99
4	Quan Bau ward	96.64	100.00	3.36
5	Hung Binh ward	99.04	100.00	0.96
6	Hung Phuc ward	99.26	100.00	0.74
7	Hung Dung ward	93.42	97.00	3.58
8	Cua Nam ward	89.30	93.00	3.70
9	Quang Trung ward	100.00	100.00	-
10	Doi Cung ward	98.87	100.00	1.13
11	Le Mao ward	99.71	100.00	0.29
12	Truong Thi ward	97.82	100.00	2.18
13	Ben Thuy ward	84.11	90.00	5.89
14	Hong Son ward	95.10	96.00	0.90
15	Trung Do ward	92.08	97.00	4.92
16	Vinh Tan ward	97.88	99.00	1.12
17	Hung Dong ward	83.07	90.00	6.93
18	Nghi Phu commune	59.91	80.00	20.09
19	Hung Loc commune	70.76	85.00	14.24
20	Hung Hoa commune	91.00	98.00	7.00
21	Nghi Duc commune	92.87	97.00	4.13
22	Nghi Kim commune	-	60.00	60.00 60.00
23	Nghi Lien commune	-	60.00	
24	Nghi An commune	0	0	
25	Hung Chinh commune	0	0	Using water from Hung Nguyen water supply system
26	Hung Thinh commune	98.50	99.00	0.50

Figure B-2 Project Location



30. Currently, almost all of the piping are outdated, joints are old and broken causing water loss. The proposal of old pipe replacement is presented in the Table below and in Figure B-3.

Table B-2 Proposal of old pipe replacement

No.	Name, position and diameter of piping routes	Proposed designing	Length
I	<b>Pipeline network grade 1</b>		
1	Existing cast iron pipeline DN400 along the east Tran Hung Dao street	Replaced by DN400 - HDPE	1115
2	Existing cast iron pipeline DN300 along the east Truong Chinh street, from pile D08* to pile D20 <sup>th</sup> .	Replaced by DN400 - HDPE	1220
3	Existing steel pipeline DN400, L=1450m in the north Le Hong Phong street, from pile D 34 <sup>th</sup> to D 36 <sup>th</sup> , and DN400 along the south Le Hong Phong street, from D36 <sup>th</sup> to D 37 <sup>th</sup>	Replaced by DN400 - HDPE	2210
4	Existing cast iron pipeline DN300. L=690m along Phan Dang Luu street, from pile D37* to pile D42*.	Replaced by DN300 - HDPE	690

No.	Name, position and diameter of piping routes	Proposed designing	Length
5	Existing cast iron pipeline DN300, L=980m along Nguyen Thai Hoc street, from pile D34 <sup>th</sup> to D18 <sup>th</sup> .	Replaced by DN400 - HDPE	980
6	Existing cast iron pipeline DN300, L=980m along Phan Boi Chau street, from pile D20 <sup>th</sup> to D20*.	Replaced by DN500 - HDPE	980
7	Existing cast iron pipeline DN300, D400 along the south Nguyen Sy Sach street from pile D20* to D 39* (the pipeline DN400, L=950m has the first point is the crossroad of Phan Boi Chau street, the pipeline DN 300, L=1820m, from the end point of DN400 pipeline to the end of Nguyen Sy Sach- Buu Dien bridge)	Replaced by DN500 – HDPE	2770
8	Existing cast iron pipeline DN300, L=620m , in the west Mai Hac De street , from pile D20* to D 22*	Replaced by DN300 – HDPE	620
9	The old cast iron pipeline DN300, L=670m in the North Nguyen Van Troi, from pile D56 to pile D57	Replaced by DN400 - HDPE	670
10	The cast iron pipeline DN300, L=810m in the north Phuong Hoang street, from pile D06 to pile D56 and DN200, L=440m from pile D06* to pile D05.	Replaced by DN400 - HDPE	1250
<b>II</b>	<b>Pipeline network grade 2</b>		
1	Old cast iron pipeline FN200, L=1500 on the west Phong Dinh Cang street, from pile D53 to D56*	Replaced by DN200 - HDPE	1500
2	The cast iron pipeline DN150, L=1130m in the west Hesman street, from pile D36 to pile D38*	Replaced by DN200 - HDPE	1130
3	The old pipeline DN150, L=850 in the west Vo Thi Sau street, from pile D36* to pile D36**	Replaced by DN200 - HDPE	850
4	Old cast iron pipeline DN150, L=1280m in the east Nguyen van Cu street from pile D28* to pile D52	Replaced by DN150 - HDPE	1280
5	Old cast iron pipeline DN150, L=450m in the west Nguyen van Cu street from pile D52 to pile D54*	Replaced by DN200 - HDPE	450
6	Old cast iron pipeline DN150, L=585m in the west Tran Quang Dieu street, from pile D54** to pile D37**	Replaced by DN150 - HDPE	585
7	The galvanized steel pipeline DN150, L=900 in the south Dang Thai Tan street, from pile D08* to D49	Replaced by DN150 – HDPE	900
8	The cast iron pipeline DN100, L= 550m in the south Ngo Duc Ke street, from pile D03* to pile D03**	Replaced by ND150 - HDPE	550
9	The steel pipeline DN150, L = 500m in the south Hai Thuong Lan Ong street, from pile D44 to pile D44*	Replaced by DN150 - HDPE	500
10	The steel pipeline DN150, L = 950m in the east Ha Huy Tap street , from pile D26 to pile D26*	Replaced by DN150 - HDPE	950
11	The steel and cast iron pipeline DN150, L = 7015m, on the road in the resident areas of the ward	Replaced by DN150 - HDPE	7015
12	The steel pipeline DN100, L = 10000m, pipeline routes in resident areas	Replaced by DN100 - HDPE	10000
13	Replaced some pipeline	Replaced by DN200 - HDPE	640
<b>III</b>	<b>Pipeline network grade III and services</b>		
	All the black steel pipe, routes pipes from D32 to pile D90), L = 215000m, in the resident areas	Replaced by D32 - D90 HDPE	215000



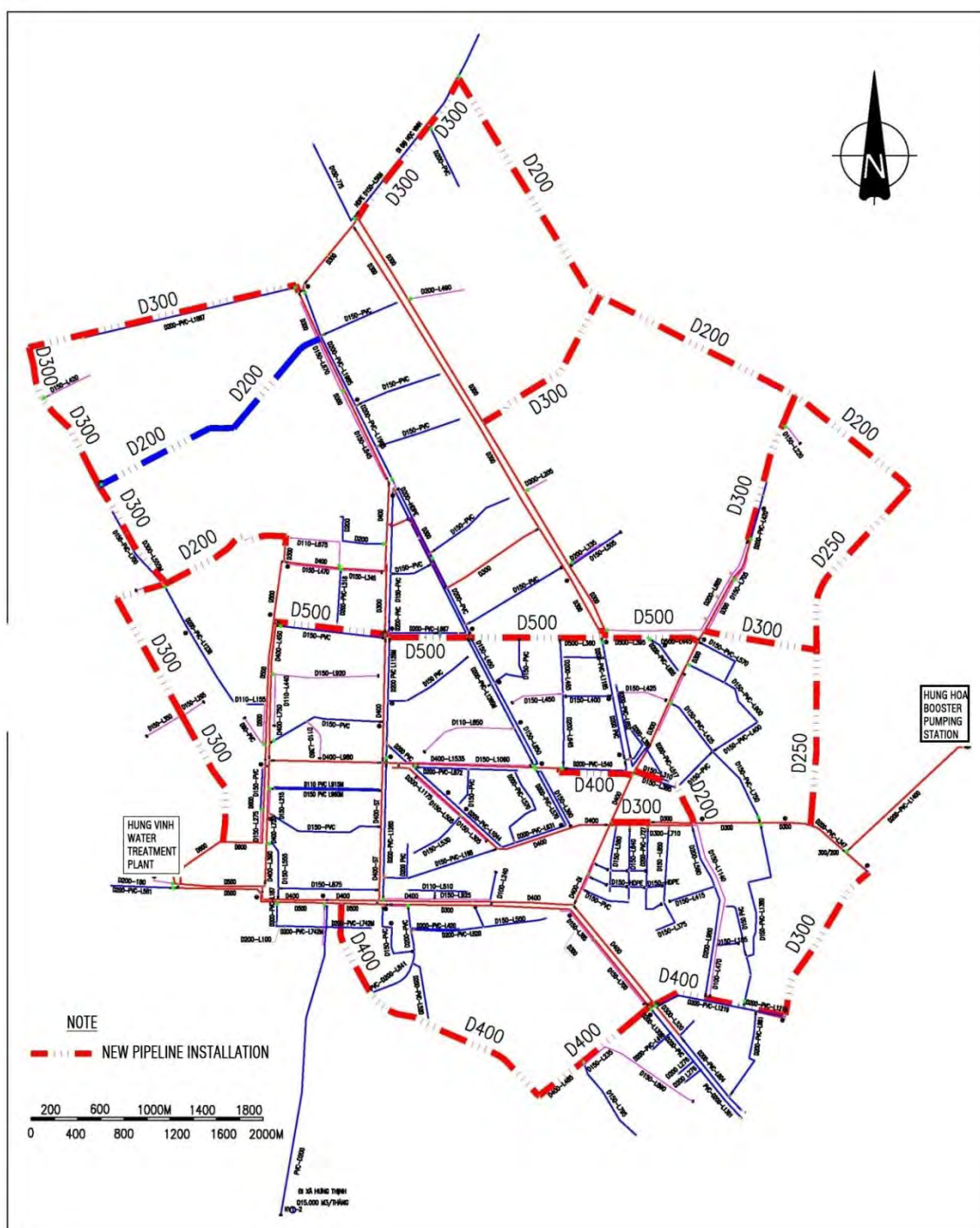
31. Also, new pipe routes to improve required flow and pressure of water supply system is needed. The proposed solution is presented in the table below and in Figure B-4.

**Table B-3 Proposed installation of new piping routes**

No.	Name, position and diameter pipelines	Solution designs	Length
<b>1</b>	<b>Pipeline network grade 1</b>		
1	The pipeline DN400, L = 2600m: in the west Ho Xuan Huong street linking to line –planning along Cua Tien river , from pile D02* to D06*	Installation new pipe DN400 - HDPE	2600
2	Pipeline DN300, L = 640m: in the north Nguyen Van Troi street, from pile D57 to D56*	Installation new pipe DN400 – HDPE	640
3	pipeline DN300, L = 1465m: on the west line-planning along Lam river ,from pile D56* to D48	Installation new pipe DN300 – HDPE	1465
4	Pipeline DN250, L = 3300m: in the West line-planning from Nguyen Viet Xuan street to My Ha-Hung Loc commune, from pile D55* to pile D47*	Installation new pipe DN250 - HDPE	3300
5	The pipeline DN200, L = 5500m: in the North 35 street of urban development project, from pile D47* to pile D33	Installation new pipe DN200 – HDPE	5500
6	Pipeline DN300, L = 1550m in the North Vinh- Cua Lo roadway, from pile D26* to pile D33*	Installation new pipe DN300 - HDPE	1550
7	Pipeline DN300, L = 1500m in the east 46 roadway, from pile D29 to pile D33	Installation new pipe DN300 – HDPE	1500
8	Pipeline DN300, L = 1340m in the east le Viet Thuat street, from pile D46 to pile D47*	Installation new pipe DN300 – HDPE	1340
9	Pipeline DN300, L = 2840m in the east Nguyen Xuan Linh street, from pile D07* to pile D13	Installation new pipe DN300 - HDPE	2840
10	Pipeline DN300, L = 2450m in the West Nguyen Truong to street, from pile D13 to pile D15*	Installation new pipe DN300 – HDPE	2450
11	Pipeline DN300, L = 2440m in the south Dang Thai Mai, from pile D15* to pile D16	Installation new pipe DN300 – HDPE	2440
12	Pipeline DN300, L = 1000m in the north line-planning of Hung Dung district, from pile D39* to pile D39**	Installation new pipe DN300 - HDPE	1000
14	Pipeline DN300, L = 1000m will be waited to zoning in the resident areas of Vinh city	Installation new pipe DN300 - HDPE	1000
<b>II.2</b>	<b>Pipeline network grade II</b>		
1	Pipeline DN200, L = 2400m on the North Nguyen Chi Thanh street	Installation new pipe DN200 - HDPE	2400
2	Pipeline DN200, L = 1700m on the South Tran Binh Trong street, from pile D13* to D13**	Installation new pipe DN200 - HDPE	1700



Figure B-4 Location of new installation pipeline grade 1 and 2



#### b) Partition of water supply zones and master flow meters installation

##### Partition of water supply zones

32. Separating water supply network into smaller networks will upgrade monitoring and management of the resource. Each zone has one or more connection points that will be connected to grade II pipes and where a master flow meters will be installed.

33. Based on 05 manager branches, to propose separating network to 05 water supply zones, each zone is separated into small partition areas. The scope of water supply of each region are presented in the table below:

**Table B-4 Partition of water supply network**

No	Zone	Scope of service	Characteristic	Number of customer	
				Currently	Expected
1	Region I is managed by branch No.1	Includes Cua Nam, Hong Son, Trung Do, Vinh Tan wards and Hung Thinh commune (Hung Nguyen)	This region is the manager by branch No.01 and is limited at the southern side of the roads: Phan Dinh Phung, Tran Phu, Le Duan and Nguyen Du and have pipes grade 1 along the route throughout.	8.906	9.550
2	Region II is managed by branch No.2	Includes Cua Nam (the rest), Quang Trung, Doi Cung, Dong Vinh and Hung Dong wards.	Based on existing service of branch No.02, the next stage to develop more customers and cut Nghi Kim for project water supply for vicinity Vinh	13.543	13.800
3	Region III is managed by branch No.3	Includes Le Loi, Quan Bau, Ha Huy Tao and Nghi Phu wards.	Based on existing service of branch No.03, the next stage to develop more customers not connected.	11.150	12.350
4	Region IV is managed by branch No.4	Includes Hung Phuc, Hung Binh, Hung Dung wards and Hung Loc commune and the rest of Nghi Duc commune.	Surrounded by Le Loi. Nguyen Sy Sach, Le Nin, Le Hong Phong, Phong Dinh Cang and Nguyen Viet Xuan street.	10.221	12.740
5	Region V is managed by branch No.5	Includes Le Mao, Hung Binh (the rest) Truong Thi, Ben Thuy and Hung Dung wards.	Surrounded by Nguyen Du, Le Duan, Tran Phu, QuanG Trung, Le Hong Phong and Nguyen Viet Xuan street.	11.129	11.280

#### Partition of network and master meter installation

34. For management and controlling water lossless, each partition zone is installed a master meter to determine water flow:

**Table B-5 Main works concerning for partitions of network**

No	Content of work	Unit	Quantity					
			Region I	Region II	Region III	Region IV	Region V	Total
<b>A</b>	<b>Pipeline networks</b>							
1	Pipe D250 – HDPE (included accessories)	m	380	-	-	-	-	380
2	Pipe D200 – HDPE (included accessories)	m	300	260	870	2,250	320	4,000
3	Pipe D150 – HDPE (included accessories)	m	2,500	1,000	4,000	3,900	3,400	14,800
4	Pipe D100 – HDPE (included accessories)	m	300	370	1,850	1,200	280	4,000
<b>B</b>	<b>Works on the network</b>							
<b>I</b>	<b>Water meter grade 1</b>							
1	Water meter D200 (electromagnetic)	Piece	1		1		1	3
2	Meter chamber D200 (mechanical)	Piece					2	2
3	Water meter D150 (electromagnetic)	Piece	1	1	1	2	1	6
4	Meter chamber D150 (mechanical)	Piece	3	6	6	8	3	25

No	Content of work	Unit	Quantity					
			Region I	Region II	Region III	Region IV	Region V	Total
5	Water meter D100 (electromagnetic)	Piece		1	1	1	1	4
6	Meter chamber D100 (included accessories)	Piece	1	4	7	4	2	18
<b>II</b>	<b>Water meter grade 2</b>							
1	Meter chamber D150 (included accessories)	Piece						
2	Meter chamber D100 (included accessories)	Piece	2	1	7	3	9	22
3	Meter chamber D80 (included accessories)	Piece	2	2	3	5	2	21
4	Meter chamber D65 (included accessories)	Piece	2	3	4	5	3	20
<b>III</b>	<b>Note renovation cost for the division of network</b> Renovation costs for the extraction of network nodes	LS						1
<b>IV</b>	<b>Valve chamber</b>							
1	Valve D250 with cap (included accessories)	Piece	1					1
2	Valve D250 with cap (included accessories)	Piece			1	2		3
3	Valve D250 with cap (included accessories)	Piece	2		3	3	2	10

#### c) Installing Supervisory Control And Data Acquisition (SCADA) –first stage

##### Equipment in the position measurement

35. RTU devices are the programmable controller (Programmable Logic Controller - PLC) integrated input channels equipped to collect measurement signals from the flow and pressure with the analog format (4-20mA) or digital pulse force.

36. The PLC must have minimum 01 serial communications port Mod bus RTU and 01 communications port built-in Ethernet TCP (without using the expansion module) configuration allows two independent transmission lines in computer at central management office. The transmissions are done via 2 types of device:

- GPRS wireless transmission
- High-speed ADSL internet transmission

37. The RTU and communications device at the measuring station will be supply backup power by uninterruptible power supply (UPS) and is laid in the panel which its casing meet IP54 standard for outdoor installation

##### SCADA system network management

38. A SCADA system is built to monitor and control the remote measurement stations. SCADA software is installed and programmed at the central management office with Graphic User Interface (GUI). The GUI must be designed to be friendly with users, the drawings describe the water supply system in the city, position pipe, equipment at actual field.

39. The measurement equipment at the station must use multiple communication techniques to ensure the continuous data transmission, including the use of wireless systems (GPRS: General Packet Radio Service) and wired broadband internet system (ADSL).



40. In case one of the two communication transmission wireless/wired internet interrupted, the remaining lines be ensure collected and managed data operation information of remote measurement stations by SCADA management software located in center office . Also, the SCADA software will alarm about the interrupt communications.

41. SCADA software is configured to be a backup system (Redundancy): 02 host (server) operation and redundant parallel to each other. When a vulnerable server, the server remaining in power supervisory control. SCADA software must operate on a Dbase 3 database that allows optimal use of server resources. This software must be able to expand the number of surveillance and control (I / O point), and have an open communication capability allows integration with multiple product lines PLC / RTU facilitate expand the system later.

42. SCADA software is designed with alarm, trending and report is convenient for the operator, and control system.

43. SCADA software allows configuring Web-server format, allowing remote operation and management the monitoring system via the internet.

44. The equipment used at the remote measurement station and SCADA systems are easy to maintain and the collection and storage of data following is relatively simple. Remote measurement systems and control vary from simple controllers to complex networks of computers and communication equipment.

45. The device of remote measurement system and remote control system must be reliable for the place conditions in the city. Remote communication device must be able to operate continuously in a tropical environment.

#### ***B.1.2.2 Assisting PMU for project implementation and operation***

a) Assisting PMU for project implementation

##### **The PMU activities**

46. PMU manage the entire supply related to project implementation activities for which they are responsible. Activities will include, but not limited to, the following:

- Financial Management Project.
- Solving problems related to the planning and implementation of project.
- Preparing for compensation and land clearance.
- Reporting all aspects of project implementation: progress on physical, financial, environmental, social, and organizational
- Coordinating with other agencies and entities of the city during the project implementation
- To manage the bidding process and selection of contractors or consultants, including tendering, bid evaluation and contract drafting.
- Organize annual financial audits related to project
- Organization controlling the implementation of Environmental Management Plan

##### **\* Proposed technical assistance:**

- Procuring equipment for PMU
- The assistance service of the bidding
- Contacts management and constructions supervisory.
- The environmental monitoring services
- External audit services
- Community programs and education

- Training and experience exchange field trips
- b) Technical assistance and capacity improvement of NAWASCO in management and operation
47. Technical assistance and capacity improvement of NAWASCO in management and operating as follow:
- Improving capacity of NAWASCO in management and operation;
  - Training and experience exchange field trip;
  - Procurement of management and operation equipment for the PMU.

#### **B.1.2.3 Existing Facilities**

48. The Project will only rehabilitate existing facilities (water treatment plant, water intake). The initial assessment did not identify any outstanding environmental issues related to the operation of these facilities. All mitigation measures defined in Table H-2 pertaining to handling of chemicals, waste storage/stockpile, and / other storage in existing facilities will be followed.

**Figure B-5 Photos of the Project Area**

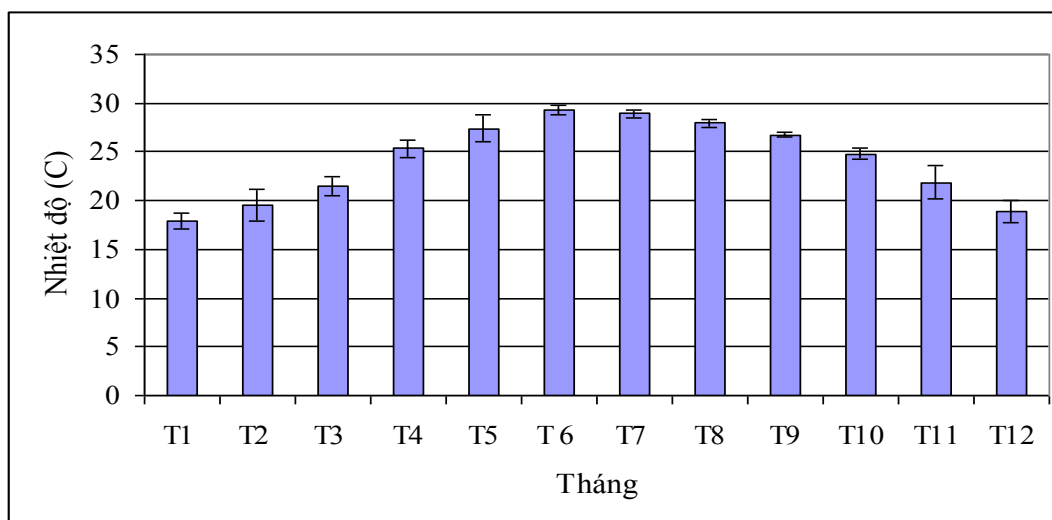


## C. EXISTING CONDITIONS ENVIRONMENTAL IN THE PROJECT AREA

### C.1 NATURAL CONDITIONS

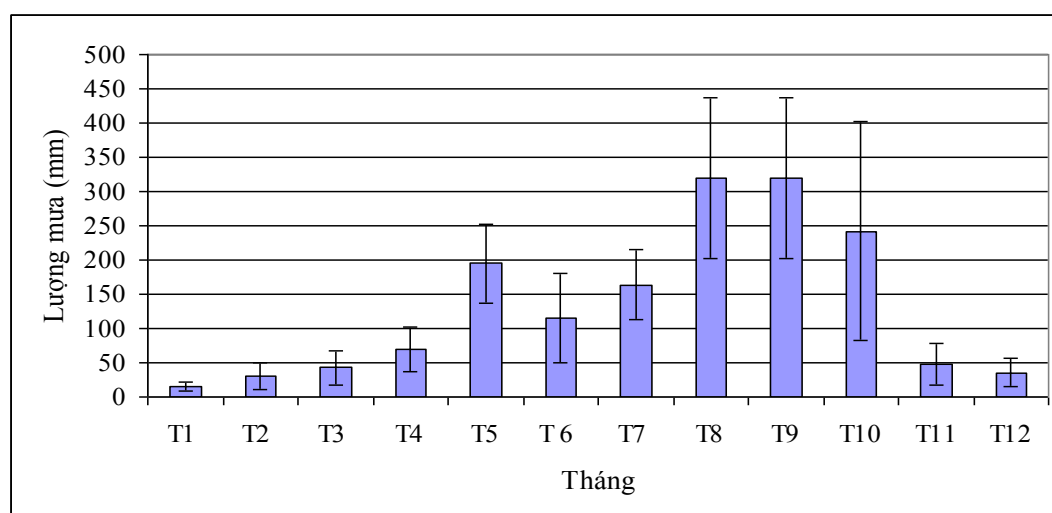
#### C.1.1 Climatic conditions

49. Project area is located in North Central Vietnam, with two distinctive seasons : The dry season is from December to April, and the rainy season is from May to November. The winter climate is influenced by the northeast monsoon that causes small and prolonged rain, sometimes as long as 15 to 20 days. Rainfall during this season is low , often from 30-40cm for the whole season but the episodes are long. This causes the average humidity during the winter months to remain above 85%. The summer climate is distinctively dry and hot, with the Southwest wind (Laos wind) blowing.



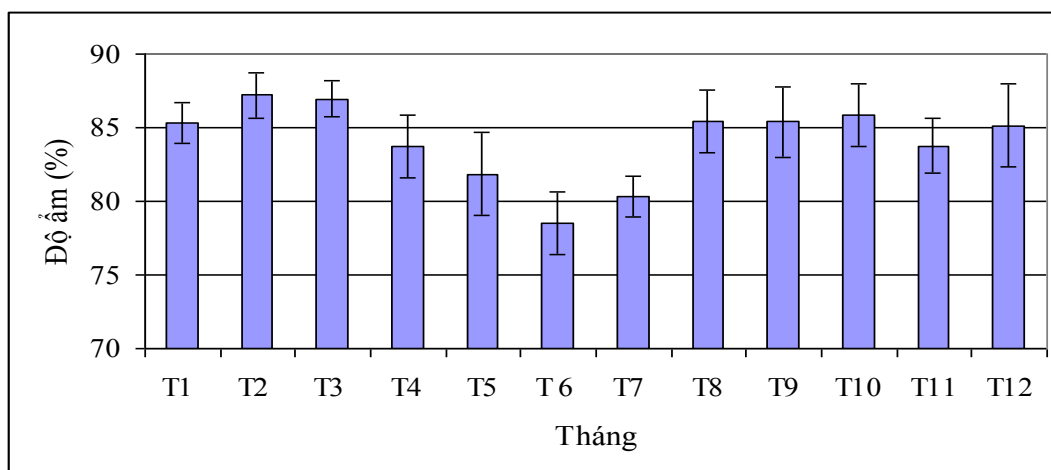
Source of data: Nghe An Province Statistical Year Book 2008

**Figure C-1 Monthly average temperature during the year in Vinh city**



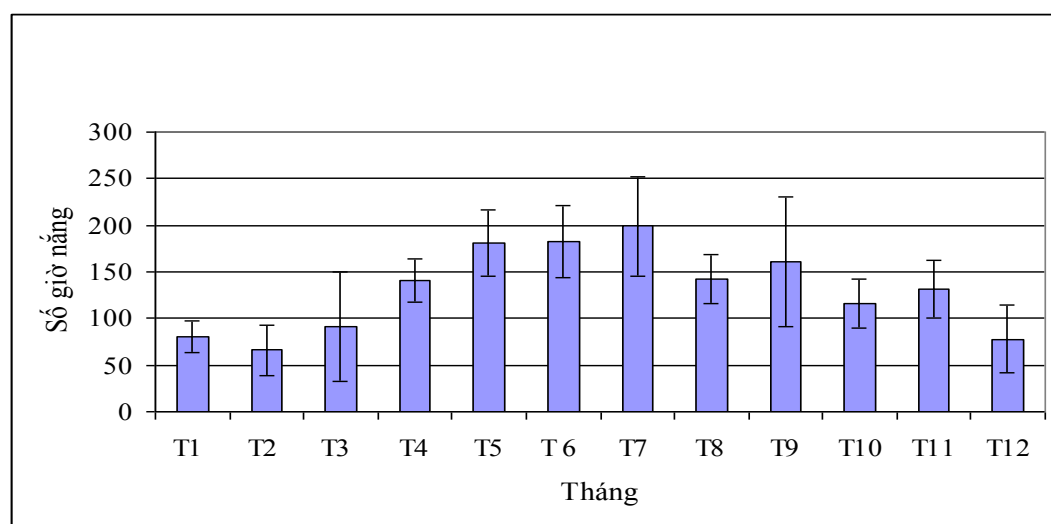
Source of data: Nghe An Province Statistical Year Book 2008

**Figure C-2 Monthly average rainfall during the year in Vinh city**



Source of data: Nghe An Province Statistical Year Book 2008

**Figure C-3 Monthly average humidity during the year in Vinh City**



Source of data: Nghe An Province Statistical Year Book 2008

**Figure C-4 Monthly average total sunny hours during the year in Vinh City**

Air temperature:

- Annual average of high temperatures : 30° - 34° C
- Highest absolute temperature in record : 42,1° C (June -1912)
- Annual average of low temperatures : 15° - 18° C
- Lowest temperature in record : 4° C (January-1914)

50. The annual average temperature of the city is 230C-240C. The warm season is from May to September; the hottest month is July; and the highest temperature in record is 42,10C. The cold season is from October to April of the following year; the coldest month is January; and the lowest temperature in record is 40C. Temperature difference between day and night range from 5 to 80C.

51. Air temperature is an important natural factor in the spread and transformation of pollutants in the air. It also plays an important role in the process of decomposing organic matters. The higher the temperature is, the faster the decomposition of organic pollutants will be.

Air Humidity:

- Annual average of humidity : 85%
- Lowest humidity : 15%
- Highest humidity : 95%

52. The project area is located in a region of very high humidity, with its annual humidity average reaching 83-85%. Wet season lasts from September to April of the following year; and the average humidity of this season is around 90%. The most humid months are in mid-winter, with an average humidity of 88-90%. The hot dry period is in mid-summer when the Southwest wind is active. The month with the least moisture is July, with an average humidity of 75%. The lowest humidity can possibly reach 30%.

Precipitation:

- The average annual rainfall: 2125.0 mm
- The highest annual rainfall in record (1989): 3520.0 mm
- The lowest annual rainfall in record: 1100.0 mm
- The highest daily rainfall (on 1/10/1989): 596.7mm
- The highest rainfall of 3 consecutive days (18-20/9/1973): 784.6 mm
- The highest monthly rainfall (10/1989): 1592.8mm.

53. Annual precipitation is relatively important; especially in the areas upstream Lam River rainfall may exceed 2000mm/year. Number of rainy days are also high, annually about 130-150 days. The rainy season lasts seven months starting in May and ending in November. Three of those months consist of heavy rainfall: August, September and October. The rainfall reaches maximum in September; and monthly rainfall of these 03 months ranges from 400-500mm on average accounting for 50-55% of the annual rainfall. These three months also consist of many days of large rainfalls. On average, more than 10 rainy days with a rainfall of more than 50mm/day have been observed monthly (of this, 05 days having a rainfall over 100mm/day). The highest daily rainfall on record may exceed the 400-500mm. The month with the lowest rainfall is February, with only 80-90mm.

Wind:

54. In summer, the direction of prevailing wind is Southwest or South with 40-50% frequency. In winter, the prevailing wind direction is Northwest, North or Northeast with a frequency of about 50-60%.

55. Average wind speed in the plain is about 1.5-2m/s. In the coastal region, wind is accelerated significantly, with an average wind speed reaching up to 2-3m/s; and it is very rarely that the winds are calm (frequency of calm wind is only 10-15%).

Specific weather phenomenon:

\* Hot dry West-South wind (Lao's wind):

56. North Central Vietnam is one of the regions, in which the hot dry west-south wind exerts the strongest effect in the whole country. The most prevalent period of hot dry West-South wind is two months in June-July. During these months, in Nghe An Plain, , there are 8-10 hot dry days observed on average (of this, 2-3 special days have recorded high temperatures that may exceed 39 – 40°C, and a low humidity that may be down below 20-25%).

\* Storms:

57. According to statistics in 50 years (1954-2004), there were 63 storms landings or approaching Nghe An coastal area. Of these 63 storms: September has the highest number of 19 storms, August has 15 storms, October has 12 storms, July has 11 storms, June has five storms, and November has one.

58. Because of its close distance to the sea, the storm speeds can reach and exceed 40 m/s. Storms usually are accompanied by heavy rains, often exceeding 100 mm/day and sometimes reaching 300-400 mm /day.

\* Drizzle:

59. Nghe An Plain has a rainfall similar to that in the Northern Plain of Vietnam. In all seasons, there are 40 days observed with drizzle, concentrated mainly in the two months of February and March. During these two months, the number of days with drizzle per month reaches around 15.

### **C.1.2 Topographical and Geological Characteristics**

60. Vinh city is located in the coastal plain, south of the Lam river and Hong Linh mountain range with the highest peak of 600m. The terrain is flat, with the average elevation of 3 to 5.5 m. The city's ground slopes down evenly to the south and east-south direction. Within the city's perimeter, there is Quyet mountain, 100 m high.

61. Vinh city is located in the sediment area of the delta downstream Lam river, composed of several strata of yellow, brown, grey, black sand. Types of clay sand include fluid, tight and medium. Bearing capacity of the soil surface is from 1 to 1.5 kg/cm<sup>2</sup>.

### **C.1.3 Hydrographical and Hydro-geological Conditions**

#### **C.1.3.1 Hydrographical**

##### **a) Lam river**

62. Lam river, also known as Ngan Ca or Ca River, is one of two largest rivers in the North Central Vietnam. The river originates from Nam Can area, in Laos. The main part of the river flows through Nghe An. The last part of the river confluences with La River from Ha Tinh becoming the province border between Nghe An and Ha Tinh. Finally, the river flows to the sea at Hoi river mouth. Total length of the river is 556 km. The part of the river flowing through Vietnam is 360 km long, with a basin area in Vietnam of 17,730 km<sup>2</sup> (in a total of 27,200 km<sup>2</sup>). The river basin's average elevation is 294 m with an average slope of 18.3%, and a river density of 0.60 km/km<sup>2</sup>. The river has a total water capacity of 21.90 km<sup>3</sup> corresponding to an annual average flow of 688 m<sup>3</sup>/s and an annual module flow of 25.3 L / s.km<sup>2</sup>. Unlike other rivers in the North Vietnam, the flooding season in Lam River basin is late. On average, the flood regime occurs from August to October. This river basin area has the shortest flood season and the longest dry season. In three months from August to October, the total volume of river water accounts for 50% of the total water volume in the year. In the study area, at the time when floodwater comes from the river upstream and meets the strong sea tides, thus, making water levels rise, the water drains slowly and flood time is prolonged. Typically, real water level is 2.14m, measured at Hoi river mouth reached 2.14 m. On 28 September 1978, the measured water level rose to 3.64 m. During the flood in October 1988, the water level in Nam Dan reached up third alarm level, and the floods in Ben Thuy lasted 192 hours (more than 8 days).

##### **b) Rao Dung river**

63. Rao Dung River has a basin area of 82km<sup>2</sup>, is 10km long and serves as drainage for a part of Vinh City and a part of Nghi Loc District through the Rao Dung Discharge Gate into Lam river. During the flood season, as the gate is closed, not all water from the Northern basin flowing into Rao Dung River can escape fully, causing flooding to a large area north of the city. Because of the downstream location, the rivers in Vinh are affected by both flood in the upstream and the tidal regime. In the rainy season, water flowing down from the upstream flows down causes the river water level to rise. These fast flowing rivers in stormy rains and under tropical low pressures sometimes cause flood. The flood in 2002 September 19th to 20th is a typical example. During this flood, the Rao River water level in Vinh reached up to +3.70 m, causing flooding to some areas in Vinh City, such as Cua Nam, Doi Cung, Vinh Tan and Ben Thuy. The usual water level is +0.5m (with average rainfall approximately 200mm) at Quang Nghi Discharge Gate.

### **C.1.3.2 Hydro-geological**

64. Due to its nature, the Vinh ground structure consists of sandy soil layers, with shallow ground water level, (the level is highest in the rainy season). When digging to a depth below 1 meter, there exists phenomenon of sand flowing. Groundwater occurs at depths from 0.5 to 1.9 m, changing seasonally but is generally stable at an average depth of 0.8 to 1.2m. Groundwater has two layers:

- Upper layer, lying in the sand stratum at depths from 0.5 to 1.9 m, has no pressure.
- The second layer situated in the sub-sand layer is separated from upper layer by the mixed clay layer and often has a high salinity:

### **C.1.4 Ecological Characteristics**

65. Practical survey showed that general ecosystem in the project area includes agricultural ecosystems and aquatic ecosystems (in lakes, ponds, rivers and channels). Overall, the ecosystem in this area is poor; having no rare species listed in the Red Book that should be protected.

66. Agricultural ecosystems: a man-made ecosystem, often located in suburban areas, with features including:

- Plants: The main plants include: on land, there are rice, beans, peanuts, corn ... (planted by humans) and other weeds, shrubs; in water there are grass, moss, algae and vegetables grown under water (such as water spinach,...).
- Animals: include mainly species such as hamsters, birds (sparrows, kingfisher, stork, jumping jack ...), reptiles (lizards, chameleons, water snake, cobra ...), the frogs, toads, fish (existing in nature such as the perch, tilapia, carp, bighead carp, catfish, eel ... and reared in ponds such as unisexual tilapia, grass carp, black carp ...), shrimp, insects dominated in quantity (including crickets, locusts, grasshoppers, beetles ...), the pests of rice, vegetables. Currently, due to human use of chemicals for plant protection, number of animals such as fish, shrimps have been increasingly reduced.

67. Aquatic ecosystems: The project area has many water bodies like lakes, canals. Of these water bodies, there are items to be upgraded and renovated, including Bac channel, Cua Nam Lake, Vinh Citadel Moat System and Dong Vinh ditch.

68. Aquatic ecosystem of the stagnant water bodies (ponds and lakes) has the following main species:

- Plants: mostly water hyacinth, duckweed, algae, weeds, and shrub species.
- Animals: fish (like carp, bighead carp, catfish, perch, tilapia,...), shrimps, crabs, snails, clams, kingfishers ...

69. Aquatic ecosystems in the drainage canals: Most of the canals in the city receive rainwater and untreated waste water. Therefore, canal water has been seriously polluted water; and there are very few dwelling species. Some channels like Bac Channel are less polluted, thus, having plants such as water hyacinth, water spinach, weeds and coastal plants; and animal species that can survive in polluted water such as tilapia, snails and clams.

70. Due to the pressure of population growth and urbanization, water surface area has gradually shrunk. In addition, because the lakes and canals have become more polluted the number of species has increasingly declined.

### **C.1.5 Climate change issues**

71. Expected climate change impacts in the Center of Vietnam include increased in frequency and/or intensity of tropical cyclones; increased rainfall and run-off; an expansion in flooded areas and a rise in annual flood levels; in opposition, aggravation of drought events could also occur. Also, Vinh city, being located in a coastal plain, a rise in sea level could cause

surface water wells in some areas to become unfit for consumption. Although the intergovernmental panel for climate change (IPCC) does not forecast any great changes in the timespan of the project (2015-2025) but more in the years 2060 to 2090, punctual events due to climate change, notably recurrent flashfloods could affect the infrastructures and notably the water intake pipe in the Dao river and the banks where the pipeline connect could suffer from increased erosion. As such, climate change impacts will be considered during design.

72. Measures to protect infrastructures (in particular water intake) from disaster risk (flash flood, drought etc.) will be identified during the detailed design.

73. The above measures will contribute to the safety of water supplies during such events (flood, drought etc.). This will also help to implement the Water Safety Plan to be implemented in parallel with the support of the World Health Organization (WHO).

74. Preliminary Climate Risk Screening Checklist has been filled and is presented in a separate document. Results from this screening shows low risk for the Sub-Project.

### **C.1.6 Unexploded Ordnances (UXO)**

For more than 35 years after the war ended, Vietnam is still contaminated with hundreds of thousands of tonnes of UXOs (unexploded ordnances) scattered all over the country. During earth work and especially for the pipeline excavation corridor, survey for unexploded ordnance prior to construction work has to be conducted by a specialized agency

### **C.1.7 Natural risk issues**

75. Vietnam has been classified as a low seismicity region. However, some moderate earthquakes occurred in Vietnam. 90% of Earthquakes have taken place in the northwestern Vietnam. In the other regions, there were not any earthquakes of magnitude larger than 5.5 Earthquake. A Seismological Station is present in Vinh.

76. Flooding has been an issue in the past years and will continue to be in the future, especially with the aggravated climate brought by the climate change due to greenhouse gas emissions. Focusing in the recent past, in 2007 a series of five floods occurred in only one month period causing huge damage on both people and properties in the central districts of Nghe An province in the Ca River basin; also in October 2010 about 50 casualties and widespread inundation occurred in the same area. Although flooding will be a risk that the authorities will need to address in the next decades, the proposed project should not be affected by this issue.

## **C.2 SOCIAL-ECONOMIC CONDITIONS**

### **C.2.1 Population and population distribution**

77. According to statistics combined with the results of the census dated 31/12/2011, the population of Vinh city in 2011 was 308,868 people. The suburban part of the city (8 communes), having 89 thousand people, constitutes 29.4% of city population. The inner city (17 wards), having about 213.9 thousand people, constitutes 70.6% of the city population.

78. The average population density was 2941 persons/km<sup>2</sup> (2011), which is 15 times the average density of the home province (189 persons/ km<sup>2</sup>). Most wards have a population density higher than the average except for the wards including Dong Vinh, Quan Bau and Hung Dung, The wards having a population density of 3.7 to 4 times higher than the average, are Hong Son, Quang Trung and Doi Cung. Indicators on population for Vinh City in 2005-2009 are shown in the following table.

### **C.2.2 Jobs and incomes**

79. After more than 25 years of “Doi Moi” (rehabilitation), Vinh City has constantly implemented socio-economic development and achieved significant accomplishments. Per



capita income has increased rapidly from 6.94 million Vietnam Dong (VND) in 2000 to 15.6 million in 2005; and in 2010, it is estimated to be 38 million VND.

80. The economic structure of the city in recent years has shifted in a positive direction, in terms of proportion of industries – construction sector has increased and the sectors of services, agro-forestry and fisheries have reduced. Specifically, the structure comprise construction sector up from 37.2% (in 2005) to 40.6% (in 2009), services sector decreased from 61.1% (in 2005) to 57.5% (in 2009), agriculture reduced from 2.4% (in 2005) down to 1.9 % (in 2009).

**Table C-1 Economic restructure in Vinh city from 2005-2009. (Unit :%)**

Year	2005	2007	2008	2009
Economic structure GTTT(real cost)	100,0	100,0	100,0	100,0
- Industries-construction	36,5	38,6	39,0	40,6
- Services	61,1	58,1	57,9	57,5
- Agro-, forestry, fisheries	2,4	3,3	3,1	1,9

Source: Statistical Yearbook 2009 of Vinh city

81. Economic scale of Vinh City has increased rapidly in recent years. In 2008, GDP reached 3401 billion, up 16.0% compared to that in 2007 and 2.8 times higher than that in 2000. The annual average rate of economic growth in the 2001-2005 period reached 11.9% per year, and in the three years period from 2006 to 2008 it increased by 15.4% per year. In 2009:

- Total investment in social capital: 5,780 billion, up 24.4% compared to 2008;
- Value added (compared to the fixed price 94) is estimated at 3967.9 billion VND, up 16.7% compared to 2008;

82. Output value (compared with the fixed price 94) is estimated at 8261.9 billion VND, up 19% compared to 2008.

### **C.2.3 Health**

83. Works on health care, medical staff and facilities for health sector in Vinh City in recent years have underwent several favourable changes. Number of malnourished children declined from 42% in 1995 to 29% in 2000, down to 18% in 2005 and reached 15.0% in 2009. The health system in the city has been diversified. Public health facilities, hospitals and private clinics have been increasingly established forming an extensive network. In the city, there are two regional level hospitals: Military Hospital Nr. 4 and Traffic & Transport Hospital Nr. 4 with 300 beds. There are four provincial level hospitals, with a total of 1360 beds and 7 medical specialty centers. There are two municipal level hospitals with 200 beds. The number of commune-level health facilities is 18. Life expectancy of people has improved and was expected to reach 72 years old in 2010 and 75 in 2020.

### **C.2.4 Education**

84. Schools and pre-schools (kindergartens) have been invested, focusing on facilities and improvement of teaching quality. Currently the city has a total number of 100 schools, with 1628 classes, 4551 teachers and 59,737 students. Of these, 12 high schools (including six public schools and six private schools) with 13,600 students, 25 secondary schools with 19,200 students, 29 elementary schools with 16,900 students. The pre-school system (including different types: public and semi-public and private schools) has 34 schools with 1,900 children aged 3-5 and 7800 nursery children aged 1-3. For many years, the city has always been leading of the entire province (Nghe An Province) on the number of students passing university and college entrance examinations. The city's project on solidification of classes and schools and its plan on school upgrading to achieve national standards have been implemented positively and effectively. The goal that 100% primary school, secondary school and 60% kindergartens have more than one storey buildings has been achieved. Comprehensive education quality has been improved. So far, the city has completed universal secondary education programs; and the number of schools certified with national standard is 52. Vocational training of the city has been

developed as well. In the period 2000-2005 alone, more than 16,000 students were trained and 21,484 graduates entered the workforce.

### **C.2.5 Culture, History and Travel**

85. The area for urban trees is 11m<sup>2</sup>/citizen. Vinh is, in the Nghe An province, the city that has the most tourism potential with its rich culture, many historical/cultural sites such as Hong Son Temple (with three festivals), the Temple of King Quang Trung, Mount Quyet, Can Linh Pagoda, Mo River Islet, old Vinh Citadel... It is also home of folk-song singing such as Vi Dam singing and fabric ward singing. There are also centers of modern culture such as Central City Park, Ho Chi Minh Square, Nguyen Tat Thanh Park, and Cua Nam Lake Park. There is a total of 11 sites ranked at the national heritage level..

**Table C-2 Monument and Scenic spots ranked as National heritage level**

No	Name	Type	Year of ranking	Place
1	Old Vinh Citadel	LSCM	1998	Cua Nam Ward, Doi Cung Ward
2	Can Linh Pagoda	LSKT	1992	Cua Nam Ward
3	Hong Son Temple	LS	1984	Hong Son Ward
4	Mount Quyet,	LS	1962	Trung Do Ward
5	Lang Do Heritage Site	CM	1994	Hung Dung Ward
6	Ben Thuy Junction	CM	1988	Ben Thuy Ward
7	Grave and Temple of Tran Quy Khoang	LSVH	1999	Hung Loc Commune
8	Mo River Islet	CM	1997	Ben Thuy Ward
9	Uong Family Temple	CM	1992	Hung Loc Commune
10	Hoang Family Temple	CM	1995	Hung Loc Commune
11	Tria Temple	CM	1995	Hung Loc Commune

Note: LS: historical, CM: revolutionary, VH: cultural, KT: architectural. (Source: Board of Management of scenic spots and monuments in Nghe An)

#### Old Vinh citadel:

86. The citadel has a perimeter identified as follows:

- To the North: it borders residential areas of Doi Cung Ward;
- To the South: it borders Dang Thai Than Street, Cua Nam Ward;
- To the East: it borders residential areas of Quang Trung Ward;
- To the West: it borders residential areas of Cua Nam Ward.

87. In 1884, Emperor Gia Long moved the office town from Dung Quyet mountain to Vinh Yen, and built Nghe An Citadel using soil. In 1931, King Minh Mang rebuilt the citadel using lateritic-stones. The citadel has a French architectural structure with six edges, a perimeter of 2412 m long, 4.42 m high. The citadel has an area of 420,000 m<sup>2</sup>, including a surrounding moat 28 m wide and 3.2 m deep. The citadel has three gates: Tien Gate is the main entrance looking toward the South, Ta Gate looking toward the East, Huu Gate toward the West.

88. Over a long time, together with war destruction, the Old Vinh Citadel hardly has anything left. There exist only three gates and ditches surrounding the citadel. Nghe An province and Vinh city plan to restore the citadel to become a major cultural park.

89. Old Vinh citadel was classified by the Ministry of Culture and Information as a national heritage site on 24/01/1998 according to Decision 95/QD-BVHTT



**Figure C-5 Ta Gate of Vinh ancient citadel**



**Figure C-6 Can Linh Pagoda**

Can Linh pagoda:

90. Can Linh Pagoda (likely Su Nu pagoda) is a large and beautiful pagoda, has been certified as historic heritage site at national level in 1992. The pagoda built during the Le Dynasty formerly in Vang Village, Yen Tuong Commune, Hung Nguyen District, is now in Cua Nam Ward, Vinh City. The pagoda was built as a site to worship Shakyamuni Buddhist – the Buddhism patriarch - and other monks who had been abbot of the pagoda. Can Linh Pagoda is a main Buddhist center of Nghe An province, serving the spiritual life of Buddhist believers and people in the region; and it is also a site of tourist attractions. Annually, the pagoda organizes many major holidays that attract people and tourists.

### **C.3 INFRASTRUCTURE CONDITIONS**

#### **C.3.1 Storm water and sewerage system**

91. Currently, the drainage system of Vinh City is a combined system for both rainwater and wastewater (including domestic wastewater and industrial wastewater). Proportion of people who are connected to the combined sewage services is 75%. Main sewage lines are 262.8 km long in total, equal to a ratio of 7.63 km/km<sup>2</sup> urban land. Currently, the city's main sewage is implemented in three ways as follows:

- For the Northern part of the city, sewage water is discharged into Rao Dung River at Rao Dung Dam, then flows to Lam River (in the East of the city) through Bac Channel.
- For the Southern part of Vinh City, sewage water flows into Vinh River (a tributary of Ke Gai River) and Lam River through Ditch No. 2, No. 3 and Hong Bang Ditch.
- For the Western part of the city, water is drained into Ke Gai River though Ditch No. 1 and No. 4.

92. Storm water drainage system: includes system of ditches, sewers, three pumping stations with a total capacity of 60,000 m<sup>3</sup>/h, and regulation lakes:

- Primary drains 1: Total length of 17.0 km, of which, Bac Channel is an opened channel 6.0km long, 4.0 to 40.0 m wide, draining for Northern part of the city (water flows through Rao Dung Dam to Lam River); Ditch No 2, 3 and Hong Bang with a total length of 6,5 km, and a width from 2.5 to 5.0m that are used for water; Ditch No 1 and Dong Vinh with a total length of 4.5 km, a width from 2.5 to 5.0 m used for drainage from Western part of the city (water flows into Ke Gai River).
- Secondary drains: Include 64 lines with a total 91km long, a width from 0.7 to 1.0 m running along a number of main roads (cylinder or box culverts).
- Tertiary drains: Totally 90 km long, located in the residential areas. These level ditches have many different widths, typically from 0.3 to 0.6 m.

- Curvert and pipe: 349.
- Irrigation pumping station include 03 stations with total capacity 60.000 m<sup>3</sup>/h.

**Table C-3 Irrigation pumping station**

No.	Station	Capacity of station (m <sup>3</sup> /h)	Number of pumps	Pump capacity (m <sup>3</sup> /h)
1	South-west	24.000	06	4.000
2	South (Den bridge)	27.000	04	4.500
3	Vinh Tan	9.000	03	3.000

(Source: Project on technical infrastructure investment and urban embellishment for Vinh City phase 2007-2010).

93. Regulation lakes include: lake on Central park, Goong lake, lake around Vinh ancient citadel, Cua Nam lake as below:

**Table C-4 Existing lakes of Vinh city**

Name of lakes	Area (ha)	Average Depth (m)	Minimum depth (m)	Maximum depth (m)	Water volume (m <sup>3</sup> )
Goong lake	5	1,2 - 1,5	0,8 - 1,2	1,8 - 2,0	600.000 - 750.000
Central park	11	1,4 - 1,6	1,0 - 1,2	1,8 - 2,2	1.540.000 - 1.760.000
Vinh ancient citadel	7,2	1,2 - 1,4	0,9 - 1,3	1,7 - 2,0	600.000 - 700.000
Cua Nam lake	3,6	1,3 - 1,7	0,8 - 1,1	2 - 2,5	397.800 - 612.000

Source: Urban Infrastructure Management and Development JSC, May 2009)

**Table C-5 Existing drainage catchments and main drainage system**

Drainage Basin	Area (ha)	Main drainage system	Wards/communes	Drainage Basin
Basin No. 1	331	Dong Vinh Ditch, Cua Nam Ditch	Cua Nam, Dong Vinh	Basin No. 1
Basin No.2	262	Ditch No 1	Le Loi, Doi Cung	Basin No.2
Basin No. 3	773,1	Hong Bang Ditch, Ditch 2, Ditch I8	Le Loi, Hung Dung, Hung Binh, Le Mao, Truong Thi, Vinh Tan, Hong Son, Trung Do	Basin No. 3
Basin No. 4	350	Ditch No 3	Hung Dung, Truong Thi, Ben Thuy, Trung Do	Basin No. 4
Basin No. 5	1.706	Bac channel, ditch I5, I6, I6A, I7	Nghi Phu, Hung Dong, Hung Loc, Ha Huy Tap, Hung Binh, Le Loi, Hung Dung, Quan Bau	Basin No. 5

(Source: Urban Infrastructure Management and Development JSC, May 2009)

### **C.3.2 Wastewater collection and treatment system**

94. Vinh city currently has no separated system for wastewater drainage. Wastewater is collected into the same drainage network of ditches used for rainwater. Wastewater is mainly domestic wastewater. Approximately 72% of households use septic tanks, into which the sewage from toilets flows directly. Wastewater from kitchen, bath, laundry and septic tanks are being discharged directly into drainage ditches.

95. Wastewater collection and treatment system are under construction in phase 1A of the KFW project on water drainage, including the following items of investment:

- Wastewater collection pipelines (gravity-flowing) from separation wells to the wastewater pumping stations.
- Wastewater transmission pipeline: from the pumping station No 2 to the wastewater drainage ditch (gravity-flowing) behind the pumping station No. 3, then flowing to the main pumping station and wastewater treatment plant.
- The local newly constructed wastewater pumping station include:
  - + Wastewater Pumping Station No. 2: the average capacity until 2010 is 7,700m<sup>3</sup>/day, and in 2015 will be 18,500 m<sup>3</sup>/day.
  - + Wastewater pumping station No. 3: the average capacity until 2010 is 4,900m<sup>3</sup>/day, and in 2015 will be 7,200 m<sup>3</sup>/day.
  - + The main pumping station: the average capacity until 2010 is 12,600m<sup>3</sup>/day, and in 2015 will be 36,300 m<sup>3</sup>/day.
- Central wastewater treatment station: Building a station with an average capacity in Phase 1A of 25,100m<sup>3</sup>/day.

96. The data are above were retrieve in the April 2010 report published by the supervising consultant of the KFW project on water drainage.

97. Combined system, embankment of canals and ponds in approved feasibility study of medium-sized cities development project vinh sub-project.

### **C.3.3 Water supply system**

98. Water supply system of Vinh City has a capacity of 60,000m<sup>3</sup>/day, including collection facilities and pumping stations to transfer raw water from Dao River, 6 km away from the water treatment plant. Network of main water supply pipelines has diameters ranging from D63 to D600 and a length of 34.3 km. The amount of water loss is about 39%

99. According to the results of the socio-economic survey, it is shown that households in Vinh City have different sources of water, including tap water at home, water from public taps/tanks, rainwater, well water, or even sometimes have to buy water. Water source in usage is as follow in table C-6.

**Table C-6 Water source in use by people in Vinh city**

<b>Water source</b>	<b>Number of people</b>	<b>Percentage (%)</b>
Taps in private houses	1,825	60.3
Public taps and tanks	16	0.5
Rainwater	412	13.6
Well water	1,182	39.0
Buy water	88	2.9
	3523 (People surveyed)	

(Source: Socio-economic survey in Vinh city, 5 /2010)

### **C.3.4 Current stage of waste solid management and environmental sanitation**

#### **a) Current stage of waste solid management**

100. In recent years, the process of industrialization and urbanization in the city of Vinh has increased rapidly. This also leads to the increasing problem of solid waste. According to the statistics of the Vinh Urban Environment Company, amount of solid waste in Vinh City has increased relatively quickly. Solid waste collected daily is mostly domestic waste solid, In 2000, the amount of solid waste collected was only 20,000 tons/year, with an average of 60 tons per day; the rate of collection is estimated to reach 70%. In 2008, amount of solid waste collected was 30,000 tons per year, with an average of 88 tons per day; and the collection rate is estimated at 90%. In 2009, due to annexation of some communes into the city, amount of solid waste increased, with the collected amount reaching approximately 57,000 tons per year, (an

average of 158 tons per day); and the collection rate is estimated at 92%. The uncollected volume of solid waste was processed by households in the suburban areas.

101. Most solid waste are not classified at the source but instead are collected in mixed form, then are transported to landfills. Because the solid waste collecting network is not fully covered throughout the city, and public awareness on environmental protection is not high, there still exist the phenomena of dumping solid waste indiscriminately in public places, especially into the lakes such as Old Vinh Citadel Moat and drainage ditches such as Bac Channel. This causes water pollution, water clogging, and flooding during rainy events.

102. According to the statistics of the socio-economic survey in May 2010, the coverage of solid waste collection in the project area is as following table C-8:

**Table C-7 Coverage of waste solid collection**

	Inner city (%)	Sub-Urban (%)	Overall (%)
Available	98,8	46.3	72.9
Not available	1,2	53.7	27.1
Total	100,0	100.0	100.0

(Source: Socio-economic survey in Vinh city, 5 /2010)

103. The table above shows that over 70% of households sampled in the survey is served with garbage collection; and almost 100% of urban households are using this service. This percentage in the suburban areas is much lower, only less than 50%. In the inner city, most of the households are using this service provide by Urban Environmental Company of the city, while only about 75% of households are served with solid waste collection by the city's public company, the rest are served by private companies. Among households, whose garbage is not collected, there are nearly 5% of households often throwing rubbish into the ponds, lakes or other public places, 80% of households self-treating rubbish by incineration and over 10% processing by landfill.

104. Waste solid treatment:

- Domestic solid waste: primarily handled by the methods of recycling and reuse. However, these methods can reduce only 10-12% waste volume. In Vinh City, there is 01 solid waste treatment plants, namely Dong Vinh Solid Waste Treatment Plant, using Seraphin technology with a capacity of 80-100 tons per day. Initially this plant has achieved some remarkable results in primarily treating amounts of solid waste generated by the city.
- Industrial solid waste: In small- and medium- production facilities, industrial solid waste, especially industrial hazardous solid waste (like oil, solvents, broken batteries and accumulator etc ) have received almost no attention. Meanwhile in large-scale factories, the problem of industrial solid waste has just been cared for but not in a complete and fully proper way. Actually, inspection by Department of Natural Resources and Environment of Nghe An province in the past 02 years showed that nearly 100% of establishments and enterprises have not yet registered for owners of hazardous waste sources, therefore, industrial hazardous waste has not been classified separately but actually still be collected and mixed with domestic solid waste. Therefore, solid waste from industrial establishments, factories (such as the Hoang Thi Loan Knitting Factory, Saigon-Nghe Tinh Beer JSC, Long Thanh Krap Paper Production Plant etc) has been polluting the environment. Vinh City currently has no separate facilities for handling hazardous industrial waste.
- Medical Solid Waste: Vinh City now has HOVAL MZ4 solid waste incinerator financed by the Republic of Austria, installed at Nghe An Friendship Hospital, with a burning capacity of 400-500 kg/day. The incinerator not only incinerate solid waste for hospitals, public establishments in the city of Vinh, but also serves the surrounding districts like Hung Nguyen, Nghi Loc, Cua Lo Town. In addition, the TB hospital was also installed another incinerator. However, medical waste is only collected 90%, the rest is mixed with household waste

105. The entire solid waste, collected in the city of Vinh is transported to Dong Vinh Landfill designed for receiving wastes from the city. The landfill site was built in 1977, now expanded by two times, with an area of 6ha, surrounded by 3m high walls and water drainage system. However, over many years of usage, the landfill site is overloaded; loading height is now up to 7 - 8m; wastewater leakage from the site has not been collected and treated; odor dispersal on a large scale affecting the lives of people living near the landfill site.

106. Supported by aid from the Danish government and loans from German Bank for Reconstruction since 2005, the Urban Environment Company of Vinh City has been building the complex for solid waste treatment in Nghi Yen Commune, Nghi Loc District (with an area of 53ha, 30km to the city center) for the past 20 to 25 years. Striving to be completed and put into operation at the end of 2010, it uses sanitary landfills as treatment method.

#### **b) Current stage of sanitation**

107. There are many issues related to environmental sanitation in residential areas such as wastewater, garbage, bad odor, dust, noise etc. However, the level of each issue differs for each different residential area. Results of consultation with residents on six environmental issues are presented in following table.C-9.

**Table C-8 Environment problems in resident areas**

No	Problem (yes or no)	Urban (%)	Suburban (%)	Overall (%)
1	Overflow and spills of domestic wastewater	10.2	16.7	13.4
2	Bad odours	45.4	44.3	44.9
3	Dusts	43.5	27.1	35.4
4	Noise pollution	13.5	7.4	10.5
5	Indiscriminate dumping of solid waste	11.0	27.0	18.9
6	Poison with pesticides	3.7	2.0	2.8
	No issues mentioned above	7.0	15.3	11.1

Source: Socio-economic survey in Vinh city, 5 /2010

108. Only 11.1% of the opinions said that in their neighborhood there are none with regard to the 6 environmental problems mentioned in the survey. Meanwhile the rest, nearly 90%, said that in their residential areas there exist issues related to environmental pollution.

109. Pollution caused by bad odors scored the highest proportion of 44.9%. 35.4% of the opinion said that in their living areas there is the problem of dust pollution. This problem becomes more serious in the inner city. 18.9% said that in their living areas, there is the problem with garbage thrown indiscriminately. This problem becomes more serious in the suburban areas partly due to bad habits of residents, but mainly due to the fact that solid waste collection service is not really good. There are 13.4% of the opinions saying that there exists the problem of wastewater spills, and this problem occurs more often in suburban areas, where the drainage system has not even been built in many places. 10.5% of the comments mentioning that they are living with noise that exceeds the permitted levels. This problem is more common in the inner city, where many engines, machines are in operation on the street as well as in construction sites and factories etc Respondents also said that there exist the above-mentioned problems related to environmental pollution due to indiscriminate littering by people (24.5% of agreement opinions); due to some households farming poultry and cattle near their houses (23.9%); due to roads crossing (22.2%); due to waste discharged from the factories nearby (16.3%) and due to dusts from construction sites under construction (12.9 %) etc.

### **C.3.5 Existing of Transporting system**

#### **a) Outbound traffic**

110. National Highway 1A:

- National Highway 1A (old road section): goes into the city center via the streets, namely Nguyen Trai, Mai Hac De, Le Loi, Quang Trung, Tran Phu, Le Duan, Nguyen Du, with a broad cross- section of 41-45-56m.
- National Highway 1A (new road section to bypass Vinh City): was built due to growing road traffic on National Highway 1A, to reduce traffic congestion for the city of Vinh, to reduce environmental pollution. The starting point of this new road section is 1km North from Quan Hanh Town; and the end joins the old National Highway 1A at Ben Thuy Bridge. The Vinh City-bypass road section of National Highway 1A is 25km long, 12m wide (the roadbed is 11m wide).

National Highway 46:

- QL46 road is 80.75 km long running from Cua Lo to Vinh, passing Nam Dan - Thanh Chuong to Thanh Thuy border Gate, and then linking to Laos.
- Road section running through Vinh city merges into streets, namely Nguyen Trai, Mai Hac De, Le Loi, Quang Trung, Phan Dinh Phung and Nguyen Sinh Sac.

Road Vinh - Cau Hoi (Provincial road 535): Length of 11km, passing through Vinh City merges into Le Viet Thuat street.

111. Riverside road along Lam river: Cua Hoi - Vinh - Nam Dan: length 56km: The road section from Cua Hoi to Hung Hoa Gasoline Depot is 11m wide, of which the asphalt roadbed is 9m wide. For the road section passing through Vinh City, the road is 42m wide, with the width of one-way lane on each side equal 11m..

Hung Hoa - Hung Loc - Nghi Duc – Nghi An - Nghi Truong - Nghi Xa Road:

112. links the Riverside Road along Lam River with Provincial Road 536, 20km long, 6.5m wide, with a roadbed of 3.5m.

Vinh bus stations:

113. City bus stations: There are 02 major bus stations: one is Vinh Bus Station - located on Le Loi Street near the city center and the other is Vinh Market Station- located behind Vinh Market. Each bus station has an area of about 1 ha. Recently, the number of buses traveling in and out of the stations has grown rapidly. In addition to the stations, there are many bus stops in the city to serve passengers, such as the one in front of Vinh Railway Station, and that in Cua Nam..

Railways:

114. North-South Railway runs west of the city. Vinh Railway Station is a station of the type II scale. There are often 28 trains passing daily. Passenger traffic in the railway station is up to an average of 5000 visitors per day. Vinh Railway Station currently serves as both cargo terminal and passenger terminal. Although the cargo terminal is small and amount of transported goods is small, the cargo terminal is causing many obstacles for the passenger terminal..

Waterways:

115. The city has a vivid river system, with continuous split and merging of different tributaries. Lam River is the largest river in the region, being the confluence of most tributaries in areas such as Cau Duoc River, Cua Tien River, Dao River, Rao Dung River and Vinh River (Ke Gai). Lam River facilitates development of waterway traffic. There are also major ports along Lam River such as Hung Hoa Oil Port, Ben Thuy Port.

Airways:

116. Vinh Airports is located in Nghi Loc District, Nghe An Province. It is about 6km north from the center of Vinh City, 250km south from Noi Bai International Airport, and 1800 km north from Tan Son Nhat International Airport. Vinh Airport, a Class IV airport, has domestic flights mainly to exploit the following three main routes: Ha Noi - Vinh, Da Nang - Vinh, Tan Son Nhat - Vinh. The airfield includes two fields sized 207.0x 105.5m.



117. The airport traffic capacity meets the two ATR72 aircraft (or Fokker 70) and two A320 or A321 aircrafts in peak hours

**b) Urban traffic**

118. The roads (streets) system in the inner city of Vinh was built as planned. The main streets are roads of 41-45 - 56m wide. The roads having 4-6 vehicle lanes are Cao Thang, Quang Trung, Truong Thi, Le Loi, Nguyen Trai, Mai Hac De, Phan Dinh Phung, Tran Phu, Nguyen Du, Le Mao Street, etc. Exceptionally, the Xo Viet Nghe Tinh, Lenin, 3-2 Road are 56m wide with eight vehicle lanes. The other major roads of 30 - 40m wide with four vehicle lanes are Nguyen Sy Sach, Phan Boi Chau, Tran Hung Dao, Truong Chinh, Ha Huy Tap, Nguyen Van Cu, Le Hong Phong, Minh Khai Street etc. Many internal roads inside residential areas are 12-24m wide. Most of them are asphalted but have not yet invested completely, so the quality is low. These roads tend to be flooded during the rainy season and dusty during the summer, thus, causing sanitary problem.

119. According to the planning in 2007, the whole city has 237 roads that have been named with the total length  $L = 215.502$  km. However, hundreds of roads inside residential areas of wards and communes have yet to be named. Urban road density reaches  $4.66 \text{ km/km}^2$

120. Highway Vinh-Hung Tay and road from road QL46 to riverside road along Lam river were approved in feasibility study of medium sized development project Vinh sub-project.

## **D. IMPACTS, ALTERNATIVES AND MITIGATION MEASURES**

121. During project implementation, there are different impacts on environment. They are directly or indirectly, for long time or short time, potentially or cumulated that can degrade and pollute local environment. The assessment and forecast impact during the project implementation is the basic intervention for choosing mitigation solution on environment. The environment impacts are identified within two phases:

- Water network rehabilitation and upgrading;
- Operation phase.

### **D.1 Area of influence of the Project**

122. The area of influence of the project includes the area served by the existing and new pipe network. It includes 21/25 wards of the city and Hung Thin commune (Hung Nguyen district), the wards including: Dong Vinh, Ha Huy Tap, Le Loi, Quan Bau, Hung Binh, Hung Nguyen, Hung Phuc, Hung Dung, Cua Nam, Quang Trung, Doi Cung, Le Mao, Truong Thi, Ben Thuy, Hong Son, Trung Do, Vinh Tan and Hung Dong; the communes including: Nghi Phu, Hung Loc, Hung Hoa, Nghi Duc, Nghi An, Hung Thinh (Hung Nguyen district)

## **D.2 THE SOURCES OF IMPACT OF THE PROJECT**

### **D.2.1 Solid waste impact source**

#### **D.2.1.1 Construction stage**

123. During the construction stage, main pollution sources are listed in order as shown in table below.

**Table D-1 Source of impacts during construction stage**

<b>Project activities</b>	<b>Pollutants</b>	<b>Environment Effected</b>
Construction of supporting works such as fencing walls, wastewater treatment works, management houses, tree planting.	Dust, hazardous fumes (CO, SO <sub>2</sub> , NO <sub>2</sub> , VOCs, CxHy.); noise; oil and lubricants; wastewater from construction, from executing vehicles and equipment: bulldozers, excavators, rammers, cement mixers. wastewater; solid wastes generated by workers on site; Construction wastes and debris generated during construction stage; Storm water, erosion of top soil during construction stage.	<ul style="list-style-type: none"> <li>• Air environment</li> <li>• Water environment</li> <li>• Soil environment</li> <li>• Biodiversity</li> </ul>

#### **D.2.1.2 Operation phase**

124. During the operation stage, main pollution sources are listed in order as shown in table below:

**Table D-2 Source of impacts during operation stage**

<b>Project activity</b>	<b>Pollutants</b>	<b>Environment affected</b>
Operation of water supply network belong on project	overflow water from broken pipe, waste water from repairing activities and maintenance	Air environment; Water environment; Biodiversity Social environment

### **D.2.2 Non-waste relating impacts**

125. Impacts that do not relate to wastes and pollution project include:

- The activities of vehicles and construction machines like trucks for construction materials and front bucket excavator.
- During construction, the construction workers who come from other site may create social impact on the communities such as disease migration, social problems, and disputes with local people etc.
- During construction, materials transporting and traffic accident could happen if the drivers don't comply safety traffic laws and other work site safety measures.

126. In general, non-waste related impacts do not directly affect physical environment but they have influence on the life of local people. Specific impacts of this type are presented in the subsequent sections of this report.

### **D.3 ASSESSMENT OF NEGATIVE IMPACTS**

#### **D.3.1 Environmental impacts during construction stage**

127. Activities carried out during construction stage of the project include:

- Water supply network Rehabilitation and upgrading;
- Installing the Monitoring management and data collection system;
- Replacing existing water meters.

128. All of these activities will generate three main impacts, spoil management, residual matter management and heavy haul machinery operation. From these three, impacts on air, soil, water and humans are potential. These impacts and others are described in the sections below.

##### ***D.3.1.1 Impact caused by Presence of Workers***

129. It is projected that thousands of workers will be employed during the time of construction of project works. The following are some characteristics of the expected crew found on the work site:

- The majority of workers will work as drivers and construction workers.
- Most of these labors come from other areas because the local labor force does not meet the professional requirements of the work.
- Most workers will live in temporary quarters in the project area.

130. The above-mentioned characteristics could cause some impacts during construction stage, which are presented below:

- Conflicts between workers and local people: Some differences in lifestyle, income and culture between construction workers and local people can lead to conflicts.
- Possibility of increase of social disturbance in the area: So far, there is almost no disturbance in the project area. However, the flow of hundreds of workers from different areas to the project area could increase presence of social evils, for example, alcohol consumption and drug abuse, prostitution, gambling...
- Increase in water pollution: Specific impacts of the project components will be assessed in detail later in this chapter.
- Increase in infectious disease transmission: The concentration of large number of people in the construction area creates favorable conditions for the spread of waterborne diseases (cholera, dysentery, typhoid, diarrhoea) or intermediary disease transmitters (malaria, dengue...). This impact is likely to occur if no measures are taken to enforce sanitary conditions.

131. These impacts are negative but preventable (see details in Chapter E).

##### ***D.3.1.2 Impacts on air quality***

132. Cause of air pollution during construction phase includes:

- Digging of pipe trench and replacing old pipes;
- Transporting construction materials;
- Installation of new HDPE pie.

133. These activities will pollute the air quality with dust, noise, air emission from machines and vehicles used in construction areas.

#### Dust pollution

134. Dust mainly contains dirt, sand dust, soil dust. Concentration of dust in the air will increase along the roads used to transport materials to construction areas, especially in dry season. Causes of dust pollution include excavation, ground leveling, transporting and unloading of construction materials. Physico-chemical compositions of dust of this type are soil and sand particles, which are larger than 10 microns in size- heavy dust considered to be of low hazard level. This dust does not spread far, settles easily and directly affects workers and people living near the construction site, the aesthetic of the area, photosynthesis process of plants and the health of residents around the project area.

135. Dusts arising include suspended and settled particles. Presently it is difficult to define the concentration of suspended dusts due to the lack of assessment methods, therefore in this report, emission coefficient of dust on the surface and dust concentration in the volume of surface effects to humans is only preliminary estimated following WHO's Rapid Assessment Method.

#### Exhaust emissions pollution

136. In the leveling phase of the project, emissions are primarily created by transport means, machines and vehicles utilized in site leveling. Emission level of pollutants depends on many factors including air temperature, vehicle speed, length of a trip, engine cylinder, fuel type ... Main emission components at this stage are mainly toxic gases and fumes arising from engines: CO, NO<sub>2</sub>, SO<sub>2</sub>, VOCs, CxHy...

137. According to estimates by WHO for trucks using DO oil and diesel, pollution loads of CO, SO<sub>2</sub>, NO<sub>2</sub>, and VOC emitted from transport vehicles are shown in table below.

**Table D-3 Pollution loading of trucks**

Pollutants	Pollutant load per vehicles' loading capacity (kg / km)					
	Loading capacity < 3,5 tons			Loading capacity 3,5 - 16 tons		
	Inside city	Outside city	Highway	Inside city	Outside city	Highway
TSP dust	0,2	0,15	0,3	0,9	0,9	0,9
SO <sub>2</sub>	1,16 S	0,84 S	1,3 S	4,29 S	4,15 S	4,15 S
NO <sub>2</sub>	0,7	0,55	1,0	1,18	1,44	1,44
CO	1,0	0,85	1,25	6,0	2,9	2,9
VOC	0,15	0,4	0,4	2,6	0,8	0,8

Note: Average forecast, a car consuming 1000 liters of gasoline will generate 291 kg of CO; 11.3 kg of NO<sub>x</sub>; 0.4 kg alhedryde, 33.2 kg of hydrocarbons (HC), 0.9 kg of SO<sub>2</sub>; S: sulfur content in gasoline (%).

138. Using the calculated pollutant loads for vehicles used to transport sand for site levelling, the average concentration at any point can be determined by applying Sutton's computational model as follows:

$$C = \frac{0,8E \cdot \left\{ \exp\left[ \frac{-(z+h)^2}{2\sigma_z^2} \right] + \exp\left[ \frac{-(z-h)^2}{2\sigma_z^2} \right] \right\}}{\sigma_z \cdot u}, \text{ mg/m}^3$$

Where:

- C - Pollutant concentration in the air (mg/m<sup>3</sup>).
- E - Pollutant load from emission source (mg / m / s).
- z - - Elevation of calculation point (m).
- h - Elevation of the road surface in comparison with ground around (m).
- u – Average velocity of wind in construction site (m/s).
- $\sigma_z$  - Diffusion coefficient of pollutants under z direction (m).

139. Diffusion coefficient of pollutants  $\sigma_z$  in vertical direction (z), with the stability of the atmosphere in Vinh is B, is determined by the formula:

$$\sigma_z = 0,54 x^{0,74}, m$$

Where: x - Calculated distance from emission sources by wind flow direction, m

#### **\* Impacts due to noise**

140. At present, in Vietnam there are no regulations on noise levels of machinery and equipment used for construction. Table below introduces limits of noise level arising from some operating machinery and equipment at a distance of 15 meters from the location of equipment, and the regulation of the US General Services Department on allowable noise levels. This regulation is used as reference for evaluation of noise level of equipment in construction site.

**Table D-4 Noise level limiting of construction equipment's**

No	Type of equipment	Noise level at distance of 15 m, dB(A)	Requirements of the US General Service Dept. dB(A)
1	Front bucket Excavator	72-96	<75
2	Truck	70-96	<75
3	Power generator	70-82	<75

Source: Air Pollution and treatment of exhaust emissions - Science and Technology Publishing House, Ha Noi-2000.

141. The transmission process of sound in the air depends on the characteristics of sound waves (frequency and wavelength). Where sound is created from a point, a spherical wave system will spread out a speed of 464 m/s for the first sound generated. Actually, sound transmission from the source point will be represented by the following formula:

$$\text{Noise level at position 1} - \text{Noise level at position 2} = 20 \cdot \log(r_2/r_1)$$

Where:

- $r_1$  - position of noise level determination which is at 1.5 m height and at a distance of 1 meter from the point of noise.
- $r_2$  - distance to calculated position (m).

142. The above formula shows that when the distance doubles, the sound level will decrease 6dBA. Thus, when executing construction works, the noise level in the area will increase. Noise levels at different distances from the construction site are shown in table:

**Table D-5 projection of noise levels in areas around the construction site**

Distance from noise sources	Unit (m)					
	15	30	60	120	240	480
Noise level (dBA)	70-96	Noise level	70-96	Noise level	70-96	Noise

		(dBA)		(dBA)		level (dBA)
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(Source: Centre for Environmental Engineering of Towns and Industrial Areas)

143. As such, in this construction phase, executing machinery and equipment may generate high noise levels within the working area of workers (70-96 dBA). However, as noise in the air dies out rapidly with distance, its impact on the surrounding residential areas is insignificant, except locations adjacent to the construction site.

144. At the time of monitoring environmental quality of the project area, the measured noise level is much lower than the standard. However, in the construction process, the noise level in this area and its vicinity would definitely increase. During the construction phase, noise is generated mainly from the following sources:

- Construction machines;
- Transporting materials vehicles.

145. The noise level at peak hours in the construction site can reach 80-85 dBA. At a distance of about 5 meters from bulldozers, shovels, and hammer machines, noise level can be over 90 dBA. This noise level can bring about fatigue, reduced hearing ability, cause workers to lose concentration and increase the rate of accidents.

#### **D.3.1.3 Impacts on water environment**

146. In the construction stage of the project, impacts on water environment include pollution caused by wastewater from workers daily activities, from cooling water of equipment and machines, and run-off storm water on the surface of construction site. Impacts from wastewater during construction process are assessed as follow:

##### **a) Impacts of domestic wastewater**

147. Domestic wastewater contains many pollutants that originate from such activities as eating, bathing, washing and hygiene of humans. Typical pollutants are suspended solids, organic matters characterized by BOD, nitrogen compounds (mainly ammonia and organic nitrogen), phosphorus, bacteria causing diseases (Coliforms or E-coli). Normally, one person uses from 100 to 200 liters of water a day; however, due to the limited working time in construction site, the water volume used by each person is limited from 50 to 70% of the domestic water supplying standard.

148. Domestic wastewater can cause decline to the quality of surface water in local drainage channels and lakes. Besides, disease transmission is fastest in water environment. With concentration of a large number of people in a limited area, generated wastewater is a potent disease transmission factor to local residents and workers and will be treated at the municipal wastewater treatment plant.

##### **b) Impacts of run-off storm water**

149. Concentration of soiled particles in rainwater depends on various factors: hygienic conditions and surface characteristics, slope, local air pollution, rain intensity and duration...Compositions of run-off rainwater is difficult to estimate and changes with rain duration. However, it can be anticipated that rainwater running off from construction site has high turbidity, contains high concentration of suspended matters and oily substances on the surface. According to statistics of the World Health Organization (WHO), in general concentration of pollutants in run-off rainwater is 0.5-1.5mgN/L; 0.004-0.04mgP/L; 10-20 mg COD/L and 10-20 mg TSS/L.

150. The highest volume of run-off rainwater flowing from a large basin into rivers and lakes can be calculated by the formula widely used in the USA and many European countries as follows:

$$Q = 0.278 . \psi . h . F \quad \text{m}^3/\text{s}$$

Where:

- 0.278 - unit converted coefficient;
- $\psi$ - flow coefficient, depending on the nature of surface and slope... For urban area: X can be 0.55 - 0.7, for industrial zone: X can be 0.65 - 0.85, for lawns: X can be 0.15 - 0.35;
- h- average rain intensity of the selected rain, mm/h;
- F- Drainage area, m<sup>2</sup>

\* Calculating the pollution loadings of rainwater

151. Early rainwater contains a large amount of pollutant substances deposited on the surface such as: oil, grease, dusts, and soils... of the construction process in sunny days. The amount of pollutant substances deposited in rainwater is calculated using the following formula:

$$M_{\max} = \frac{M_{\max} \cdot k_z \cdot T}{F}$$

Where:

- $M_{\max}$ - The highest possible volume of dirty substances deposited in water after a period without rain T days (for industrial zones and areas of high traffic density,  $M_{\max}$ = 200-250 kg/ha).  $M_{\max}$  for calculation is 200kg/ha.
- $k_z$ - dynamic coefficient of accumulated dirt, depending on city levels, can be flexible from 0.2 - 0.5 days<sup>-1</sup>. Take  $k_z$  = 0.3 days<sup>-1</sup>.
- T – dirt accumulating time (T=15 days)
- F - project area (hectares)

152. Run-off rainwater has high flow quantity, but mainly in few months of rainy season (August-October). During those months, rainwater volume in the area is rather high, therefore possibility of mixing and diluting is high, and concentration of pollutants reduces quickly.

#### **D.3.1.4 Impacts on soil environment**

153. Construction activities of excavation, digging and leveling will affect local soil environment, create impacts such as erosion, which directly affects agriculture production and landscape. Erosion will increase the sedimentation in urban drainage systems

154. Digging of pipe trench will impact on changing of physical and chemical characteristic of soil. However, the areas with an impacted site are small-scale, so these impacts are small and can be reduced.

#### **D.3.1.5 Impacts caused by solid waste**

##### **a) Solid Waste from Construction**

155. Construction wastes in this stage account for a high proportion, including : redundant soils, sand, stones, cement bags, iron, steel, pieces of scrap wood, tins, containers and other matters in which the majority is solid wastes arising from removing the top organic layers. If this huge volume of waste is not collected and disposed of properly, it will cause secondary pollution due decomposition process, and thus badly affects the local environment. Wastes such as mud, soils and sand, useless cement should be handled appropriately to avoid scattering, which can badly affect the irrigation and drainage system. For example, soils and sand can deposit and block water flow, limiting the draining capacity. Impact scale and level of construction wastes depends on construction and management methods.

##### **b) Domestic Solid Waste**

156. The nominal amount of domestic solid wastes generated from workers activities in construction site is 1.3 kg/person/day.

157. Domestic solid wastes contain major components of decomposed vegetables, fruits, redundant foods that account for 55 - 70% volume of domestic wastes. The rest includes plastic bags and containers, which are not biodegradable. All the domestic wastes generated by workers is collected and put into containers of 1000-liter volume. Public Service Work Company

or Urban Environment Company of Vinh city will be contracted to collect and dispose of domestic solid wastes daily.

158. In fact, workers awareness in keeping the environment clean is often limited, arbitrary littering is likely to happen in construction area making the environment polluted. When there is indiscriminately littering on the construction site, decomposed, organic matters create ideal environment for the development of harmful bacteria. Those difficult-to-decompose wastes such as plastic bags and containers will deposit and block the flow when it rains heavily.

159. Besides domestic and construction wastes, there are also other hazardous wastes, especially old ductile iron pipe which are replaced by HDPE pipe. For the hazardous wastes, if there is no any solution to collect and treat them, they will accumulate in soil, water, and air and pollute seriously.

#### **D.3.1.6 Impacts on social-economic environment**

##### **a) Public health**

160. All pollution sources during processes of ground leveling, construction of technical infrastructure can create direct and indirect impacts on the health of local residents. The impact levels on public health depend on the pollutant concentration and effect time.

161. When dusts get into the lungs, they cause physical stimuli, lung fibrosis and respiratory diseases. These dusts have negative impacts on the health of not only human but also animals and plants. They can cause corneal inflammation and asbestosis when contacting with them at high concentration.

- CO: Carbon monoxide is a colorless, odorless and tasteless gas. It is harmful to human, animals and plants. Human resistance ability to CO is very low. Some microorganisms on the ground can absorb CO from the atmosphere. CO gas is toxic due to a stable combination with hemoglobin in the blood creating carboxyl hemoglobin (HbCO) which reduces the ability of oxygen transportation of blood to cells.
- SO<sub>2</sub>: Sulfur dioxide is considered the most toxic among sulfur oxide family. This gas is colorless, cannot burn, and has pungent odor. SO<sub>2</sub> can infiltrate into skin and makes the alkali reserve in blood reduce, excretes ammoniac through urine and alkali through saliva.
- NO<sub>2</sub>: Nitrogen dioxide gas is pink and as an odor at concentration of 0.12 ppm. NO<sub>2</sub> of 100 ppm can kill human and animals after a short contact time. At the concentration of 5 ppm, after a few minutes of contacting, respiratory can be badly affected. Contacting with NO<sub>2</sub> of concentration 0.06 ppm for a long time can result in lung diseases.

162. Generally, SO<sub>2</sub>, NO<sub>x</sub> are stimulated gases, which will form acid with exposure to moist mucous. SO<sub>2</sub>, NO<sub>x</sub> get into the body via the respiratory system or the saliva into the gastrointestinal tract and subsequently into the circulatory system of the human body. SO<sub>2</sub>, NO<sub>x</sub> combine with dusts to form suspended acid particles, which can get into the lung alveoli if it is smaller than 2-4 µm.

163. During construction stage, the health of workers can be negatively affected due to frequent contact with this source of pollution. In addition, if the lifestyle of workers is not organized well, diseases can easily arise affecting the health of workers and local residents

164. In addition, the concentration of workers will be important. If their life is not organized well, it will affect their health and transmit disease into around site.

##### **b) Infrastructure**

165. The project formation and its activities in combination with existing activities in the area act to degrade the traffic system more rapidly. More dusts and noise are generated because of transportation of materials.



166. Increased traffic density in the area will also affect the travel efficiency of people. Transport of construction materials may increase traffic congestion; risk of traffic accidents will be higher unless appropriate solutions for traffic control are adopted.

167. On the other hand, it is the development of the project that contributes to the improvement of the existing road system - the development and completion of local infrastructure in accordance with the development planning of Vinh City.

**c) Potential conflict or competition for water resource**

168. The project is located in the Lam river basin, also known as the Ca river. This basin is the largest hydrographic basin in the Nghe An province. The water intake of 60 000 m<sup>3</sup> per day does not create a shortage in the river for other users. Also, the intake being directly in the river and the raw water intake pipeline being reserved specifically for the WTP usage, competition upstream or downstream is not expected.

**d) Public safety**

169. The public safety could be at risk for various reason if the sites are not properly managed. Falls in excavation pits not well secured and moving machinery in the work area are the main concerns. There is also the management of spoils that could cause some problems if they are not properly managed. Dried up spoils surface could become airborne and be aspirated through breathing causing respiratory problems to people at risk such as infants and elderly people.

**D.3.1.7 Risks and incident assessment**

170. The possibility of UXOs (landmines, bombs or other kinds of explosives) remaining under the ground is still high. Therefore, there is risk of explosions during construction phase.

171. Other risks such as occupational accidents in the construction site may occur if workers do not observe discipline and apply safety measures strictly. Given that the nature of construction work is mainly carried out on the ground, the risk of falls is low.

**D.3.2 Environmental impacts during operation phase of project**

172. Once the components go into operation, main impacts is impacts on social-economic and environment incident can be listed as following:

**D.3.2.1 Impacts on social-economic conditions**

173. Deployed project will reduce water loss rate to less than 20% and supply to the regional water shortages, specially areas of low salary people.

174. Activities of the project contributed to improving the quality of life for people in Vinh city and vicinity

**D.3.2.2 Environment risks and incidents**

175. Although environmental risks and incidents hardly occur, precautions and mitigation options must still be in place:

**a. Piping brakeage risk**

176. During operation phase of project, broken pipe risks can occur. The mainly reason of broken pipe is rehabilitation of road and pavement. This problem can occur in flooded areas incident and upset people's daily life and business activities in the region.

**b. Natural risks**

177. Natural risks disasters such as whirlwinds, cyclones, hails, lightning, floods can occur. It can distort and break water supply piping and electrical equipments on network. However, it hardly occurs.

c. Risk caused by human activities

178. The risk of labor shortage especially skilled labors, could create difficulties for the implementation of the project.

## **E. MITIGATION MEASURES FOR NEGATIVE IMPACTS ON ENVIRONMENT**

179. The project increases the rate of usage water and contributes to improve the quality life of citizens. However, during project implementation, potential negative impacts on environment can occur... even in operation and maintainace phase. The ploblem of mitigation measures for negative impacts on environment must be established during project implementation.

180. The project impacts on overall city. Construction activities are deployed in large scale for a long time. So, during construction phase, there are some measures to reduce pollution from dust, waste air, noise of vehicles and construction machines, waste domestic solid and other source. The construction management methods are proposed to reduce negative non-relating waste impacts as traffic jams and accidents, order and security...for environment.

181. During construction implementation, a large amount of waste construction solid will occur. Investor coordinate with Consultants determine a landfill base on approval of receiving unit. Transporting management is reasonably avoids traffic jams, and scatter soil. The landfill must be constructed in national standards and codes.

### **E.1 MITIGATION MEASURES FOR NEGATIVE IMPACTS ON ENVIRONMENT DURING CONSTRUCTION PHASE**

#### **E.1.1 Mitigation measures for negative impacts on environment during construction phase**

182. As presented in Chapter D, pollution in construction phase is from dust generated from construction activities: ground-working, excavation, material transportation, concrete mixing and from exhaust gases of transportation vehicles in project area. Therefore, measures to ensure workers and public safety will be taken. The workers and public safety guidelines published by MoLISA will be disclosed to contractors and will be followed. In particular, worker education and awareness seminars for construction hazards should be given. A construction site safety program should be developed and distributed to workers. Detailed measures are included in Table 8 Environmental Management Plan.

183. To minimize these negative impacts, PMU must require Constructors to implement following measures:

##### **E.1.1.1 Reducing measure for noise and vibration**

184. The construction phase has happened for a long time and impacted on many road of ward, commune. Construction of project require use of many different equipment that generate high noise levels, therefore noise pollution is unavoidable during the construction phase. Mitigation measures will be carried out during the construction phase includes

- Construction machine and equipments are subjected to frequent technical inspections to ensure best operating conditions to meet the noise and vibration standards for construction equipment.
- Motorized vehicles, trucks, construction equipment used in project must be inspected for noise and vibration. This is a bidding requirement.
- Do not use outdated vehicles and machines to transport construction materials.
- Materials for transportation are not overloaded in comparison with defined load

- Reduce construction activity and transporting work from 22h00 to 06h00 the next morning in order not to affect surrounding residential areas.
- Incorporate noise reduction solutions for the high noise level machines such as generators, compressors ...
- Construction plan is properly designed to avoid generating noise during the rush hours in project affected areas.
- Limit the operation time of the machinery and equipment that generate high levels of dust and noise. There be no construction from 11h30 to 13h00 and after 22h00 at night.
- The construction workers will be equipped with labor protection equipments and ear plug button if necessary.

#### ***E.1.1.2 Minimizing dust and air pollution***

185. Air pollution is one of the major problems during construction phase of project. The following measures are proposed to reduce air pollution in the area

##### **\* Dust mitigation measures:**

- Cover all transportation means of construction materials (sand, soil, cement, stones) to avoid dust dispersal
- After digging pipe trenches, soil and stone must be collected and compacted to backfill when the project is completed, waste solid is transported to landfill.
- In hot- dry weather, spraying water at construction site to prevent dust pollution.
- Provide workers with protective gear (helmet, mask, gloves, boots or working shoes, protective clothes and other protective equipments) to avoid harmful effects from exhaust gases, dust, corrosive materials (cement, mortar) and accidents at work
- Apply appropriate regulations for material transportation vehicles to prevent traffic jams in project area.

##### **\* Waste air mitigation measures:**

186. In construction, technical activities such as cutting, welding...are mostly done outdoor. The generated pollutants are easily dispersed throughout atmosphere. Although generated gases will be easily diffused, temporary covering measures will be used to prevent transferring gases into surrounding areas to avoid affecting public health.

187. In addition exhaust gases from transportation vehicles also contain contaminants such as dust, SO<sub>2</sub>, NO<sub>2</sub>, CO, CO<sub>2</sub>... To minimize pollutants from these sources the following measures will be implemented:

- Comply with the labour safety regulations in preparation of construction process like the soil construction method, the machinery and equipment arrangement, accident prevention measures, lightning protection issues, warehouse arrangement, material storage, temporary camps, logistics services ...
- Arrangement of transportation routes in an appropriate way. Construction of barrier isolating hazardous areas, flammable and explosive materials... Installing lighting system in areas where there is work at night and for work protection. Cover the areas generating dust and use watering trucks for roads in dry season.
- Precise Manpower Planning to avoid overlap among the different implementation processes; applying modern construction methods, mechanized operations and optimizing construction process.
- Providing full documentation on machinery and construction equipment. The technical parameters should be checked regularly. Installing fire indicator light, lights and other necessary signs. Checking leakages; pipelines need painting according to standards, such as fuel, steam, gas pipelines ....

- Workers are fully equipped with labor safety equipment such as labour clothes, gloves, glasses, helmets, safety belts while working at high places ...
- The means to prevent accidents and safety equipment must be installed and ready to use in case of emergencies.
- Motorized vehicles, trucks, construction equipment used in project must be inspected for noise, vibration and exhausted gases satisfying VN environmental standards. This is a bidding condition.
- Limit vehicles using diesel to minimize SO<sub>2</sub> emissions.
- Increase frequency of vehicle maintenance; do not use expired vehicles.
- Clean up immediately wastes in construction process. The waste must be collected and transported to disposal areas by small trucks.
- The trucks for material transportation are to be covered preventing dust scattering;
- During the construction, minimize dust by spraying water frequently.

188. After construction for each component, perform equipment and vehicle inspections, cleaning of the exterior and housekeeping of construction site to ensure aesthetics and environmental sanitation.

#### ***E.1.1.3 Reducing pollution caused by domestic wastewater***

\* Reducing pollution caused by domestic wastewater of workers.

189. Wastewater of construction workers has low discharge but high level of pollution. Because of long construction, project owners need to have solutions to limit the effects of workers' wastewater. The measures are:

- Minimizing number of workers staying in construction sites. Workers will their own meals. There are no common kitchens in construction sites. Minimum but reasonable human resources need to be organized during construction phases
- Using local labor will reduce impacts from domestic activities of workers.

\* Rain-water and construction wastewater system

190. During the construction and operation phase, rainwater can carry materials from project area to city drainage system. Therefore, the impact of rainwater run-off needs to be minimized. More importantly, to prevent flooding in rainy season, the following measures will be implemented:

- Building drainage system for construction process and partitioning rainwater drainage system in according with drainage system planning of construction site in particular and overall in general;
- Concentrated construction and completing each route avoid digging everywhere. The construction method is reasonably, backfill the pipe trench in the soonest avoid flood on the drugs;
- Do not gather materials near drainage system to prevent material migration to wastewater drainage system;
- Regularly inspecting, dredging, and unclogging drainage sewers to prevent construction waste from drain-pipes;
- Do not leave open: solid waste and chemicals used in construction, especially oil, grease from engines to mix with water causing environmental pollution;
- Limit constructing in rainy and stormy seasons.

#### ***E.1.1.4 Solid waste and spoils from construction activities***

\* Solid waste construction collecting:

191. Construction wastes are mainly debris, shuttering, damaged construction materials. These wastes will be collected and classified into groups and treated as following:

- Old piping will be collected, reused, and recovered.
- Waste fuel generated from machines was discarded in separate containers, not discharged into environment. To minimize the negative impacts caused by waste oil generated during construction, project owner will implement following measures:
  - + Minimize vehicle and machinery repair in project area. Maintenance area will be temporarily arranged and there will be a waste oil collection system from maintenance process, and maintenance of motorized construction equipment.
  - + Waste oil and grease generated in project area are not disposed and are collected into appropriate containers in project area.

**\* Soils management:**

- Soil for digging pipe trench, old piping and broken construction materials are completely utilized to level ground and create ground level for project area; organic soil could be utilized to level and improve expected planting area of trees in the park to minimize waste transportation and disposal;
- Volume of remaining soil by ground work might pollute environment because generating a lot of dust during excavation, embankment, transportation and disposal. They can be used for leveling materials for lowing areas in construction process of.

192. Use of temporary spoil storage sites for extended periods should be avoided, and the mounds should be watered regularly to prevent excessive dust production. At construction areas close to streams, silt traps should be used to prevent sediment build-up and excessive water turbidity. The use of plastic tarps to avoid soil erosion from the spoils should be implemented. It provides a block from the rain and reduces the wind capacity to dry the soil and lift some of the dust.

193. A large fraction of the excavated material will be used to backfill the trench after the pipes are laid. As such it is not expected that an excessive amount of spoils from the pipeline construction will need to be disposed. In any case, the final disposal areas for the excess spoils should be carefully sited so that these are not vulnerable to flooding, and are located on stable slopes to prevent slumping. If possible, the disposal areas should be covered by topsoil and re-vegetated. Around the disposal areas, adequate drains should be installed. The excavation spoils should be treated as a resource and their possible beneficial uses maximized-for instance, as base material if suitable for raising road-top levels in flood-prone sections and, for filling in of areas being developed for settlement use, or for constructing or improving protective riverside embankments.

194. Tender documents for the pipeline construction should include provisions to prevent improper handling of spoils. Contractors should explain the excavation methods to be used and the measures for handling spoils. Before areas are designated for spoils temporary storage or final disposal, the contractor should examine the physical suitability of the sites and also assess alternative beneficial uses of the material. The soundness of the measures should be part of the selection criteria for awarding construction contracts.

**\* Domestic solid waste:**

195. Domestic waste solid of construction workers that is no much will be collected compacted on potable dustbin with volume 1000 l. The amount of soil, construction waste generated during construction can be used for ground work. Because the project area is large, the components can not be implemented simultaneously, waste dumping need planning properly. It is required to sign in contract with Vinh city Urban Environment Company (URENCO Vinh) for transporting waste to the disposal areas under regulations. After completion of construction, the contractor must clean up and keep area lay-out as initial.

#### ***E.1.1.5 Traffic management***

196. Structure of roads within construction site will be arranged logically to avoid traffic conflicts which are dangerous to people and construction vehicles.

197. With regards to traffic order, arranging the motorized vehicles based on volume and route.

198. The direction staking system, warning signs must be located at entrances, and at accident-prone areas

#### ***E.1.1.6 Sanitation, and labor safety during construction phase***

199. The basic environmental protection measures, labour safety and health safety of workers during construction process include:

- Planning construction and arranging human resources appropriately and sequentially to avoid overlapping among the construction stages such as: side clearance, ground work.
- Maximum application of advanced construction methods, mechanization of steps and construction process.
- Comply with labour safety regulations when planning construction process such as land construction method, machinery and equipment arrangement, electrical accident prevention measures; arrangement of warehouse and material storage, temporary camps; lightning system....
- The application of labour safety measures in preparation of construction progress such as time and construction sequence to ensure the stability of works; construction order of underground works, reasonable construction layout to limit removal; reasonable construction layout in order not to cause obstruction
- The facilities for workers such as restaurants, rest houses, bathrooms, medical aid stations, toilets ... is mandatory.
- Arranging appropriate transportation means.
- Constructing barrier isolating potentially dangerous areas such as electric stations, flammable explosive materials ...
- Designing and installing complete lighting system for places in which there is work at night.
- Machinery and equipment must be accompanied with full documentation and must be frequently inspected technically.
- Workers or operators must be trained adequately and practice good problem-solving techniques. They are skillful and timely on- location to handle, inspect and operate according to instructions . The handling must be systematically carried out according to schedule. In case of unexpected problems, operators need guidance and practice on safety procedures. During construction, scaffold and overhead equipment erecting, workers are required to be equipped with strap hook for security.
- Labour safety measures for workers are indispensable. Hence, workers will be fully equipped with necessary labour safety gear to for physical protection. The gear consist of protective clothes, helmets, gloves, glasses, boots ...

#### ***E.1.1.7 Minimizing social problems***

200. Apart from compensation issues, side clearance to minimize social problems in construction phase will be performed together with following measures:

- Construction phase is a prolonged period causing a significant effect on the environment and inhabitants of the area. The mitigation measures for air, soil, water, ecology pollution and health of inhabitants should be considered seriously. PMU and Contractor will coordinate closely with the local authorities, schools and regional security personnels to

propagate, supervise, prompt, detect and handle violations in timely manner to solve problems arising from social relationships between staffs, workers and local people .

- Update on the construction progress and on-site schedule. Collaborate with local authorities to inform about construction time, schedule and routes for transporting materials to avoid the psychological impacts on people in the area and inconveniences during the construction process.
- Coordinate with local authorities and other related agencies to organize programs such as: education, propagandization of civic consciousness for workers, introduce local customs and habits to migrant workers to encourage integration with local community.
- All workers must issued with Identity Card to facilitate entry to construction site and for manpower tracking.

## **E.2 MITIGATION MEASURES FOR NEGATIVE IMPACTS ON ENVIRONMENT DURING OPERATION PHASE**

201. Mitigation measures for negative impacts on environment during operation phase include reducing measures for impacts on social-economic and environment incident.

### **E.2.1 Reducing measures for impacts on social-economic**

202. The project go into operation phase bring economic benefits to society in the area which is shown in stability, improving citizen people's livelihoods by using clean water.

203. Establishing activity rules of each units in the project components. Activity checking and supervising is conducted by many agencies. Quickly remedy the problems that arise in the community.

204. Culture-social education by pictures, banners, radios. Encouraging the people in the area made civilized lifestyle.

### **E.2.2 Solution of reducing environment accidents**

205. By technical solutions such as replacing old dust-iron pipe and valves by the new HDPE pipe and valves, the project reduce water loss into environment. So environment incidents cause by water loss and broken pipe is reduced.

206. Beside, project owner must do the following measures to reduce environment incidents:

- Assigning staffs for regularly checking water pipelines and facilities of project;
- Handling and repairing timely of water leaking pipe, broken pipe cause by natural accident, human activities to avoid water loss and flooding which can affect to local people;
- Signing and recommendation symbol for people to know what the water pipes go through residential areas to avoid damaging pipes.

## **E.3 Potential impact of project**

<b>Construction Phase</b>
1) Excavation work for the pipeline trenches will produce spoil; heaps of excavated soil beside the trench could obstruct community access, and erosion from spoil storage areas could silt up nearby streams and drains. Dry heaps could cause dust nuisance.

<b>Construction Phase</b>	
Soils from specific areas could be contaminated.	
2)	Obstruction to traffic flow, partial and complete, during raw water pipeline construction, exacerbated by the narrow road and work spaces: <ul style="list-style-type: none"> <li>• Local residents could be cut off from the road due to the trench-building;</li> <li>• Increased traffic of dump trucks carrying spoils to and from storage areas;</li> <li>• Air pollution from excavation and transport equipment;</li> <li>• Traffic hazard to pedestrians, especially school children and elderly;</li> <li>• Emergency units could face rerouting delays that could be life threatening for specific cases</li> </ul>
3)	Nuisance and public safety hazards caused by pipeline excavation and pipe-laying activities in urban areas;
4)	Accidental detonation of unexploded ordnance (UXO) during pipeline excavations
<b>Operation Phase</b>	
5)	Damage cause to the new network by human activities or from natural causes.
6)	Increase in the volume of municipal wastewater generated.



## **F. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION**

### **F.1 THE NECESSITY AND BASIS PRINCIPLES**

207. The Community consultation and information process aims to ensure the participation of local authorities, relevant enterprises and community at project area. Community's participation is one of basic conditions ensuring community's support for project, help project to be strongly and favourably performed. In addition, The community consultation on project environment and the insurance of their positive participation decrease potential adverse impacts and problems which are not recognized by environmental impact assessment team. In fact, The sooner community participates in project preparation, the more closely the relationship between community and project becomes. Since then, Community can contribute their own valuable proposals to project.

208. Community consultation was conducted in accordance with:

- clause 8, article 20 in Environmental protection law No. 52/2005/QH11 dated 29/11/2005 and meet requirements in circular No. 05/2008/TT-BTNMT dated 08/12/2008 of Minister of Ministry of Natural resources and environment on guidelines of strategical environmental impact assessment, IEE report, and environmental protection commitment.
- ADBs SPS 2009 and Public Communication Policy (PCP) 2012.

209. The purposes of community consultation are to:

- Share information about project components and project proposed activities with community at project area and relevant enterprises.
- Collect ideas and concerns about environmental sensitive problems from local authorities and community in project area; especially problems which are not recognized by EIA team. From that, community's concerns can be rationally solved in choosing designing solutions of project.
- Evaluate most fully and exactly the environmental impacts and propose most effectively and exactly mitigation measures for adverse environmental impacts.

### **F.2 COMMUNITY CONSULTATION RESULTS**

210. The content of group discussion was:

- Introduce project content: Components, investment scale and project activities
- Consultant explained the anticipated plan for project environmental impact assessment to collect community's ideas for detailed environmental impact assessment plan completion

211. Results of community's idea contribution:

- Agree absolutely, support for the project implementation.
- Recommendation of environmental protection measures during project construction and implementation, avoid affecting surrounding people.

**Table F-1: Summary Matrix on Public Consultation**

<b>Commune/ward</b>	<b>location</b>	<b>Number of participants</b>	<b>Main commonets</b>	<b>Answers of Consultant</b>
Hà Huy Tập	Meeting room of People's Committee	39	All the participants agree to implement the project.	All comments of participants will be updated on IEE report.
Cửa Nam	Meeting room of People's Committee	25	All the participants agree to the TOR of IEE.	
Quán Bàu	Meeting room of People's Committee	31	Some comments on environment	

Commune/ ward	location	Number of participants	Main commonets	Answers of Consultant
Đông Vinh	Meeting room of People's Committee	19	proplems such as dust, noise, local flooding, securitys.	
Hưng Đông	Meeting room of People's Committee	17		
Hưng Hòa	Meeting room of People's Committee	42		
Nghi Phú	Meeting room of People's Committee	19		
Nghi Đức	Meeting room of People's Committee	33		

212. 5 group discussions were conducted in 5 wards/ communes : Vinh Tan, Nghi Phu commune, Nghi An, Nghi Duc and Hung Binh wards/communes from 29/7/2013 to 6/8/2013. Minutes of meetings are presentd in Annex 1.



**Figure F-1: photos of Public Meetings**

### **F.3 INFORMATION DISCLOSURE**

213. IEE and Environmental Management Plan will be translated in Vietnamese and will be made available at the office of the People's Committees (PC) of the 21/25 wards of the city and Hung Thinh commune (Hung Nguyen district), the wards including: Dong Vinh, Ha Huy Tap, Le Loi, Quan Bau, Hung Binh, Hung Nguyen, Hung Phuc, Hung Dung, Cua Nam, Quang Trung, Doi Cung, Le Mao, Truong Thi, Ben Thuy, Hong Son, Trung Do, Vinh Tan and Hung Dong; the communes including: Nghi Phu, Hung Loc, Hung Hoa, Nghi Duc, Nghi An, Hung Thinh (Hung Nguyen district).

### **G. GRIEVANCE REDRESS MECHANISM (GRM)**

214. Complain mechanism will be established to help resolve the timely and equitable claims and questions of people affected by impacts on environment of the project construction. They can complain any aspect of the environment affected by the project.

215. Their complaints can be presented in person or in writing to PMU. In the case of direct appeal, PMU will be responsible for preparing minutes of the first meeting with the affected people. Complaints will be discussed in an informal meeting with the affected people and the PMU. If the complainants disagree with the resolution of the Management Board, may appeal to the Town Committee / district or province. Responsibilities of the PMU resolved the complaint

within 15 days. The time limit, the complainant may follow the complaint resolution process in Vietnam, or submit a complain letter to the Office of the Special Support Project of ADB policy.

216. The mechanism described below follows the procedure adopted also for raising and resolving grievance in the resettlement and the social development report. As a guiding principle, grievances related to any aspect of the Project will be handled through negotiation aimed at achieving consensus. Complaints and grievances will pass through three levels of entities, which have the potential to resolve the situation, before they can be elevated to a court of law as a last resort. NAWASCO will shoulder all administrative and legal fees that might be incurred in the resolution of such grievances and complaints.

217. The first stage venue for raising and resolving complaints and grievances is the Commune People's Committee (CPC). An aggrieved party may bring its complaint or petition before any member of the Commune People's Committee, either through the village chief or directly to the CPC, in writing or verbally. Grievances may also be raised during follow-up consultations and interviews with local residents during construction. It is incumbent upon said member of CPC or the village chief to notify the CPC about the complaint. The CPC will then meet personally with the complainant and will have 15 days after the lodging of the complaint to resolve the complaint. The committee may obtain the assistance of the Nghe An Environmental Protection Agency in evaluating the technical basis of complaints related to environmental impacts. The CPC secretariat will be responsible for documenting and keeping a record of all complaints that are lodged with the committee.

218. If not resolved in the first stage above, the second venue for grievances is the District People's Committee (DPC). That is, if after 15 days the aggrieved party or complainant does not hear from the CPC, or if the complainant is not satisfied with the decision taken on the complaint, the affected party may bring the case, either in writing or verbally, to any member of the DPC or the District CRC. The DPC in turn will have 15 days following the lodging of the complaint to resolve the case. The DPC secretariat is responsible for documenting and keeping a record of all complaints that are lodged with the district committee.

219. The third stage is the Provincial People's Committee (PPC). If after 15 days the aggrieved and affected party does not hear from the District People's Committee, or if the complainant is not satisfied with the decision taken with regard to the complaint, the case may then be brought, either in writing or verbally, to any member of the PPC or the Provincial CRC. The PPC has 15 days within which to resolve the complaint to the satisfaction of the concerned parties. The PPC secretariat is responsible for documenting and keeping a record of all complaints lodged with the committee.

220. In the event that the grievance remains unresolved even after being raised at the level of the Provincial People's Committee, the final resort is the Court of Law Arbitrates. Specifically, if after 15 days following the lodging of the complaint with the PPC, the aggrieved party does not hear from the Provincial CRC, or if the complainant is not satisfied with the decision taken on the complaint, the case may then be brought to a court of law for adjudication.

## **H. ENVIRONMENTAL MANAGEMENT PLAN (EMP)**

221. The environmental impacts and mitigation measures for the proposed project were described in Section D and E above. This section summarizes the significant impacts and mitigation measures with attention to key items to be monitored, the implementation set-up and assignment of responsibility, and the required budget.

### **H.1 Institutional Arrangement and Responsibilities**

222. The project will be implemented under the Nghe An People's Committee as the Executing Agency and the NAWASCO as the project implementing agency. A Project Management Unit (PMU) will be created to supervise the implementation, on behalf of NAWASCO, of the capital investments related to the water supply project. The creation of the PMU will follow regulation of NAPC. Circular 03/2007/TT-BKH issued in March 2007 provides guidelines on the organizational structure and function of the PMU.

223. The PMU will have two main operating groups: one for technical and administration matters, and another for planning and finance. The technical and administration group will be responsible for the detailed engineering and preparation of construction plans, and for construction monitoring. The planning and finance group will be responsible for overseeing the overall procurement process (starting from preparation of bid documents for specific works, to bid evaluations and recommendation of award, and up to payment for completed works) as well as for the overall financial monitoring of the project.

224. The IA (NAWASCO) has the ultimate responsibility for implementation of the entire subproject, including finance and administration, technical and procurement matters, monitoring and evaluation, and environmental safeguards compliance. The NAWASCO will operate the completed water supply system (WS).

225. A Detailed Design and Supervision Consultant<sup>2</sup> (DDSC) who will assist with detailed designs of subproject, and update EMP to ensure EMP meets the final subproject designs. The ADB is responsible for monitoring to ensure subproject meets the environmental safeguards of the SPS (2009).

226. The PMU will be responsible for fulfilling the environmental requirements of the project, in particular for incorporating the mitigation measures and safeguards identified in this report in the detailed engineering design of the pipeline and distribution network, as well as in the bid documents and construction contract documents. The PMU will also be responsible for commissioning water and air quality sampling activities, undertaking environment-related investigations that may arise during implementation (in coordination with the DoNRE's Environment Protection Center), and responding to environment or nuisance-related complaints from residents or businesses affected by the project works.

227. An Environmental Monitoring Agency (EMA) will be requisitioned to provide environmental monitoring support during project construction (using as baseline the environment survey that was conducted as part of this IEE), and to conduct follow-up consultations and interviews with local residents to identify concerns or grievances arising during construction.

228. A sub-group under the PMU would be designated to handle environment and public safety concerns. Its main duties are to:

- Oversee the implementation of the safeguards related to handling of spoils, water quality protection, public nuisance impacts, unexploded ordnance survey, and public safety;
- Coordinate with the different Districts PC of Vinh city on regulatory compliance issues (for water quality in streams affected by construction drainage or erosion from storage areas for excavated soil, noise and vibration from construction sites, sanitation in workers campsite, etc.);
- Check that the safeguards are adequately addressed in the bidding documents (instruction to bidders), and in the evaluation criteria for awarding contracts;
- Prepare terms of reference (TOR) for the survey of the pipeline route and distribution network to detect unexploded ordnance(if present in the pipeline work areas);
- Prepare TOR for the conduct of water and air quality sampling, including follow-up interviews with local residents on issues and concerns arising during project construction;
- Advise the PMU director on environment-related concerns arising during project construction, and recommend corrective measures;

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<sup>2</sup> DDSC contract expected to include construction supervision.

- Disseminate to stakeholders the results of environment quality monitoring and implementation of safeguards, especially among HHs or small businesses near the construction sites;
- Prepare a quarterly status reports on environment and public safety protection to be submitted (through the PMU director) to the PC.

229. Monitoring compliance with the safeguards in the construction phase - especially with the implementation of the safeguards provided for in the construction contract, as recommended in this report - will be put to task the construction supervisor which can be assigned to NAWASCO (and supervised by the PMU). The compliance monitoring and auditing will be fully documented, and the findings and recommendations will be sent immediately to NAWASCO. During the operation phase, NAWASCO will be responsible for the protection and monitoring of effluent, and the results will be reported to the specific District PC.

230. District PC will conduct monitoring and random testing environment before, during and after construction, as well as in urgent cases. The division will also consider the monitoring report of EPRC. If any unusual case found, Districts PC can ask for payment of fines and the suspension notice with a specific time limit for responsible unit. If a claim is formally received from the public through the PC, District PC will conduct verification, as described in claim solving procedures.

231. Within three months after completion of construction or no later than a year, an environmental monitoring and audit report of the completion of the project's components will be prepared by an eligible environmental research institute, for example Environment and Natural Resource Engineering One member Co., Ltd. This report will be reviewed and approved by the District's PC and submitted to ADB.

232. The environmental monitoring, including environmental benefits monitoring, will be included in project preparation management system (PPMS) for the project. Backed by a local environmental specialist, the PMU will be responsible for analysing and unified data through its information management system. The PPMS will be designed to permit adequate flexibility to adopt the remedial action regarding project design, schedules, activities and development impacts. Initially, the PMU and consultants will complete a comprehensive PPMS procedures to systematically generate data inputs and outputs of the project components and environmental agreements. Socioeconomic indicators concerned will be used to assess the impact of the project. PMU will refine PPMS framework, confirm objectives achieved, set up detailed monitoring and recording arrangements, and establish systems and procedures no more than 6 months after loan's effect.

## **H.2 ORGANIZATION OF EMP**

### **H.2.1 Organization of the project management and monitoring system**

233. The performance of EMP for Vinh city water supply network rehabilitation and upgrading project need comply with Vietnam environmental regulations and ADB safeguard policies.

Organization of the EMP system:

#### **H.2.1.1 Project Management Unit (PMU)**

234. PMU is crucial unit responsible for communicating with relevant local, provincial and national departments; and with parties responsible for performing and monitoring EMP. PMU need arrange one or two specialized staffs to do tasks. PMU officially assigns specialized staffs as environmental staffs that will monitor environment during project implementation process to ensure performance of environmental plan presented in approved IEE report.

235. The PMU will co-ordinate with community organization to encourage them to join in the process of planning, management, operation and monitoring. People must aware these roles in the organization of environment sanitation and also monitoring compliance with the management plan and environment safeguards during project implementation. The PMU is also responsible for reporting the implementation of Environmental Management Plan to Department

of Natural Resources and Environment (DONRE) and local policy during management, operation and monitoring.

236. The PMU will monitor the Contractor's implementation of mitigation measure of negative impacts during construction phase. Regarding Environmental Monitoring, the PMU is responsible for:

- Ensuring that terms and conditions related to Environmental Management Plan are specified and described in the Contract of Construction;
- Irregular checking to ensure contractors are implementing mitigation measures as outlined in the installation contract;
- Reviewing periodic reports of Construction Management Consultant (DDSC) to ensure compliance with the mitigation measures;
- Reviewing the reports of Construction Management Consultant (DDSC) on the overall impact of the project;
- Based on reports of Construction Management Consultant (DDSC), The PMU reports to ADB and DONRE on environmental compliance of projects, which are part of the obligation to report the progress of ADB 6 months;
- The PMU need coordinate with relevant units in charge of water supply, sewerage and sanitation... to operation and maintenance during project implementation;

237. The implementation of the EMP is very much and expertise requirement. Therefore, the PMU is not enough capacity of performing independently. During project implementation, the PMU shall hire environmental consultants from a local organization to support implementation of the EMP.

#### ***H.2.1.2 The Environmental Monitoring Agency (EMA)***

238. Environment Monitoring Agency is responsible for designing detailed environment monitoring program in the regulation and procedures of the Viet Nam Government and the ADB. After the detailed environment monitoring program is reviewed and approved by the PMU and ADB, EMA will be responsible for monitoring all activities of the project and ensuring that Environmental safeguard policies of the Vietnam Government and ADB are applied and monitored during project implementation

239. The EMA is responsible for:

- Ensuring the approved EMP and all project loan agreements related to environmental safeguards are fully applied during project implementation;
- Ensuring the mitigation measures are established as required aspect of project implementation;
- Evaluating the effective of the mitigation measures which the contractors and DDSC applied in the implementation process. EMA proposals and recommendations of necessary improvements to meet required safeguard to the PMU.
- Reporting periodically to PMU the actual situation of EMP implementation. In case of necessary, DDSC have more detailer research and/ or local consultation to identify potential issues and impact mitigation measures corresponding;
- Establishing standard procedures, methods and forms to assist the PMU and DDSC evaluate the schedule of contractor in the implementation of environmental monitoring and mitigation measures;
- Assistance the PMU and environmental staffs of PMU for review and check detailed designs and relevant items of the contract documents to ensure compliance with environmental safeguard policies and required monitoring and reducing the impacts;

- Organizing seminars, exposure periodically (once a quarter) with stakeholders (PMU, Construction Contractor, DDSC, community representatives and other agency) to collect the opinions in the construction, adjustment planning, Environmental monitoring and overall environmental management strategic.
- Topography survey, sampling and monitoring environmental indicators periodically (once time per 3 months) during performance of environmental monitoring contact.
- Preparing expertise documents of environment management and monitoring trainings courses for Contractor(s), DDSC, and related staff of PMU (environment specialized staffs and coordinator of packages).
- Discussion conducting with relevant enterprise (if necessary) via PMU to find the suitable solution to handle unexpected risks relating to environment sanitation.
- Through the guidance of the PMU, establish and maintain the coordination with DDSC to ensure related regulations, monitoring and reducing impacts measure, the methods and procedures of reporting need to be clearly understood and integrating into the work plans of the DDSC. The procedure also includes recommendations for appropriate penalties and proposed suspension of construction procedures if the contractor does not comply with the requirements of environmental safeguards during construction.
- Through the guidance of the PMU, establish and maintain close coordination with the DDSC to ensure relevant environmental regulations and measures to monitor and reduce environmental impact, the methods and reporting procedures need to be clearly understood and integrated into the work plans of the DDSC. The procedure also includes recommendations for appropriate penalties and procedures proposed suspension of construction work at the site once the building contractor does not comply with the safety requirements of the test environment public;
- Assisting the DDSC to prepare and apply emergency activities planning if necessary for the damage of environment or problems which encountered during construction;
- The EMA coordinates with PMU and DDSC to provide EMP and requirement mitigation measures for constructors;
- Providing the necessary assistance for community representatives in the preparation and implementation of the EMP;
- Assisting the PMU to establish and maintain environment management system, report and monitor in the coordination of local relevant agencies of environment management;
- Providing the assistance and support for environment training program and experience improvement as required;
- Providing the guidance on environment is required by the PMU to enhance overall project efficiency.

#### **H.2.1.3 Detailed Design & Supervision Consultant (DDSC)**

240. The main tasks of Detailed Design & Supervision Consultant (DDSC) is monitoring construction procedures, including the EMP, monitoring the contractor performance mitigation measure such as have described in the EMP. These tasks are specified in the Terms of Reference of DDSC and contact of DDSC and PMU and approved by ADB. Following the guidance of the PMU, these tasks in monitoring and environment include but not limited to:

- Assistance and coordination with the PMU to establish, collect and provide information about environmental indicators on site and construction implementation;
- Ensure that construction works are implemented in accordance with the approved EMP, relevant specifications and standard operation procedures specified in Contract documents for Environment Impacts Mitigation and Environment Monitoring Plan;

- Supervise the Contractor's implementation of Mitigation measures, to provide proposal in time to complete mitigation measures to meet requirements of the project environmental management;
- Preparing emergency action plan/ alternatives to treat environmental problems in emergency cases and possible damages during construction stage.
- Recommend to the PMU suspending parts or the entire construction works if the Contractor does not meet requirements of labor safety and environmental protection agreed or specified in Contract documents.
- Holding meetings with relevant parties, to collect and to provide required information about the project, to carry out working time schedule to enhance public awareness and to identify possible problems that may happen in the local community to seek for solutions for problems before carry out construction works

#### **H.2.1.4 Construction Contractor(s)**

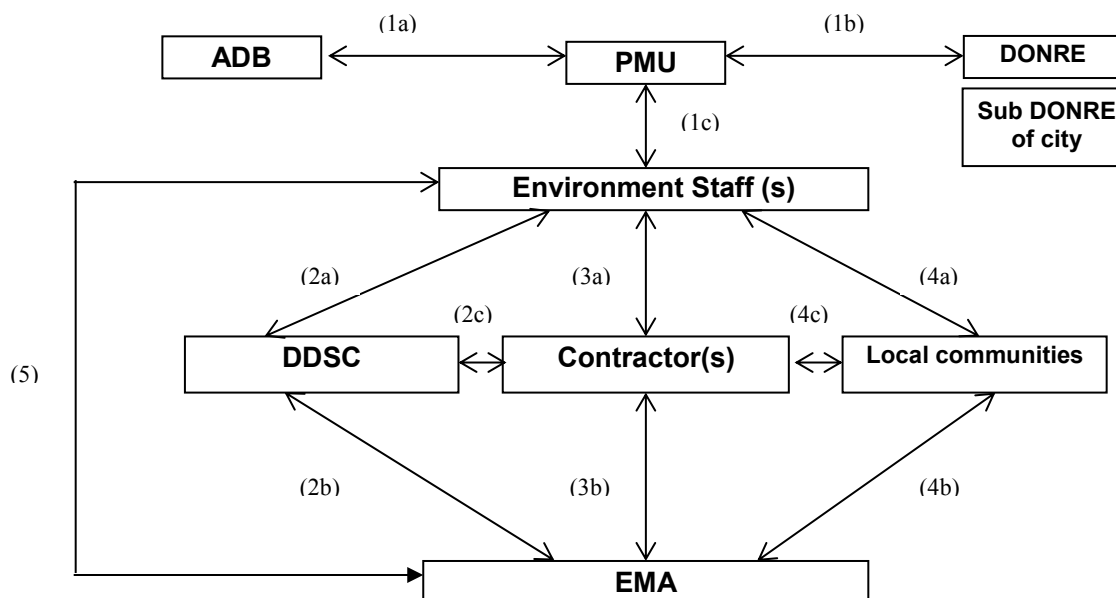
241. The Contractors are responsible for prepare a construction environmental management plan (CEMP).

242. Contractor's CEMP will be submitted to PMU and DDSC for review. Changes, if have, will be evaluated for feasibility and on legal aspect (laws, decrees, circulars and other regulations) before suitable adjustments are approved for specific cases on-site.

243. During construction, the Contractor implements CEMP under supervise of PMU, DDSC, EMA, Environment management agency and local communities.

#### **H.2.2 Approaching diagram for EMP implementation**

244. Approaching diagram in environment management and monitoring, responsibilities and reporting is present in the figure below:



**Figure H-1 Approaching diagram in Environment Management and Monitoring**

#### **H.3 MITIGATION MEASURE SUMMARY OF NEGATIVE IMPACTS OF THE PROJECT ACTIVITIES.**

245. Constructor is responsible for implementation of mitigation measure under supervision of the PMU and DDSC during construction.



**Table H-2 Environmental Impact Mitigation Plan**

Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
Pre-construction Detailed Design Phase								
Confirmation of required resettlement and temporary relocations	No community impacts	1. Affected persons well informed well ahead of project implementation.	Along pipelines and distribution networks	Before subproject implemented	See resettlement plan	See resettlement plan	NAWASCO / PMU <sup>3</sup>	Resettlement committees
Disclosure, & engagement of community	No community impacts	2. Implement information disclosure and activate grievance redress mechanism (see IEE)	At all construction sites.	Beginning of subproject	Quarterly	No marginal cost <sup>4</sup>	NAWASCO	PMU
GoV approvals	No negative impact	3. Notify DoNRE of project initiation to ensure GoV EIA requirements approved , and obtain required project permits and certificates.	Entire subproject	Before construction	As required	No marginal cost	PPC & DDSC <sup>5</sup>	PMU
Detailed designs	Minimize negative environmental impacts	4. Complete detailed designs of: <b>1)</b> Treated water pipelines rehabilitation ; <b>2)</b> treated water distribution network rehabilitation and expansion that incorporate the following: a) re- confirm assertion of IEE that no critical habitat, rare or endangered flora or fauna, or cultural property or values will be affected by any component of the water supply systems; b) minimal acquisition of agricultural land c) no or minimal disruption to water supply, utilities, and electricity with contingency plans for unavoidable disruptions; and d) Final review of ability for wastewater infrastructure to accommodate the increased wastewater that will be produced.	(a-d), Entire subproject area: 1) treated water pipeline corridors; 2) Treated water distribution network	Before construction initiated	Once with detailed designs documents	No marginal cost	NAWASCO / DDSC	PMU
EMP	Minimize negative environmental impacts	5. Update all mitigation measures and monitoring requirements of EMP where necessary to meet detailed designs. 6. Identify any new potential impacts of project and include in EMP. 7. Submit updated EMP with new potential impacts to ADB	Entire subproject	In parallel with	Once, as part of detailed design phase	No marginal cost	NAWASCO / DDSC	PMU

<sup>3</sup> Project Management Unit under NAWASCO; identified as Project Management Board (PMB) in IEE

<sup>4</sup> No marginal cost indicates that costs to implement mitigation are to be built into cost estimates of bids of contractors

<sup>5</sup> Detailed Design & Supervision Consultant

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		to review. 8. For the subproject develop individual environmental management sub-plans for: <b>a)</b> Securing GoV approvals; <b>b)</b> UXO survey & removal; <b>c)</b> Forest clearing, tree/ vegetation removal, & site restoration; <b>d)</b> Civil works; <b>e)</b> Cultural chance finds; <b>f)</b> Contaminated spoil identification & disposal; <b>g)</b> Construction materials acquisition, transport, & storage including borrow pit management; <b>h)</b> Erosion & river sedimentation control; <b>i)</b> Construction site drainage; <b>j)</b> Noise, dust & NOx, SOx, CO, CO <sub>2</sub> emissions; <b>k)</b> Worker camp operation; <b>l)</b> Solid and liquid waste disposal; <b>m)</b> Hazardous chemical & waste management; <b>n)</b> Construction & urban traffic; <b>o)</b> Utility and Power Disruption; <b>p)</b> Worker and public Safety ; <b>q)</b> Training & capacity development plan; <b>r)</b> Treated water quality management (flow and monitoring).		completion of detailed designs				
Develop bid documents	No negative environmental impact	9. Ensure the EMP is included in contractor tender documents to enable contractors to develop their CEMP <sup>6</sup> , and that tender documents specify that implementation of CEMP must be included in cost estimates. 10. The environmental management sub-plans identified in 8) above should be identified in the appropriate contractor tender documents, for the contractor to detail into CEMPs for their bidding documents. 11. Specify in bid documents that contractor must have experience with implementing EMPs, and/or provide staff with EMP experience.	All project areas	Before construction begins	Once for all tenders	No marginal cost	NAWASCO / DDSC	PMU / DDSC
UXO survey	Injured worker or public	12. Ensure military is consulted and clears areas where necessary.	All construction sites.	Before any clearing or excavation	Once	See Monitoring Plan below	PPC & military	military
Training & capacity development	No negative environmental impact	13. Develop and schedule training plan for NAWASCO / PMU staff to be able to fully implement EMP, and manage implementation of mitigation measures by contractors. 14. Create awareness and training plan for later delivery to	For all project areas	Before construction begins	After each training session	No marginal cost	DDSC	DDSC / NAWASCO

<sup>6</sup> Contractors Environmental Management Plan

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		contractors whom will implement mitigation measures.						
Procurement of Contractor(s)	No negative environmental impact	15. Ensure winning contractor bid(s) include a CEMP that addresses items 5 – 8 of the EMP” section above.	All project areas	Before contracts signed	Once	No marginal cost	NAWASCO / DDSC	NAWASCO / DDSC
Recruitment of workers	Community mischief, & sexually transmitted disease	16. Use local workers as much as possible, reducing #s of migrant worker	For all work locations	Throughout construction phase	After worker hiring stages	No marginal cost	NAWASCO / DDSC	Contractor's bid documents
<b>Construction Phase – General Mitigations for all Components of Subproject</b>								
Initiate EMP & sub-plans,	Prevent or minimize impacts	17. Initiate the EMP including individual management sub-plans for the different types of potential impacts identified in pre-construction phase. See sub-plan implementation guidance below.	For all construction sites	Beginning of construction	Once	No marginal cost	NAWASCO / DDSC	PMU & contractors
Obtain & activate construction permits and licenses	Prevent or minimize impacts	18. Contractors to comply with all statutory requirements set out by DoNRE for use of construction equipment, hazardous waste & chemicals management, and operation of construction plants, e.g., concrete batching.	For all construction sites	Beginning of construction	Once	No marginal cost	NAWASCO / DDSC	PMU & contractors
Worker camp operation	Pollution and social problems	19. Locate worker camps away from human settlements. 20. Ensure adequate housing and waste disposal facilities including pit latrines, garbage cans and recycling bins if services are available. 21. Exceeding prepared food should be offered to local charity (shelters/orphanage/food bank, temple). 22. A solid waste collection program must be established and implemented that maintains a clean worker camps 23. Locate separate pit latrines for male and female workers away from worker living and eating areas. 24. A clean-out or infill schedule for pit latrines must be established and implemented to ensure working latrines are available at all times. 25. Worker camps must have adequate drainage. 26. Local food should be provided to worker camps. Guns and weapons not allowed in camps.	All worker camps	Throughout construction phase	Monthly	No marginal cost	DDSC & PMU	contractor

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		27. Transient workers should not be allowed to interact with the local community. HIV Aids education should be given to workers. 28. Preservatives should be provided if such practice does not interfere with local belief or customs. 29. Camp areas must be restored to original condition after construction completed.						
Training & capacity	Prevention of impacts through education	30. Implement training and awareness plan for NAWASCO / PMU (Environmental staff) and contractors.	PMU offices, construction sites	Beginning of construction	After each event	No marginal cost	DDSC	DDSC & PMU
Tree and vegetation removal, and site restoration sub-plan	Damage or loss of trees, vegetation, and erosion of landscape	31. Restrict tree and vegetation removal to within designated RoWs. 32. Within RoWs minimize removals, and install protective physical barriers around trees that do not need to be removed. 33. All RoWs to be re-vegetated and landscaped after construction completed. Consult forestry department to determine the most successful restoration strategy and techniques. 34. Recuparate tree logs and make them available for local use.	All construction sites.	Beginning and end of project	Monthly	No marginal cost	DDSC / PMU	contractor
Civil works	Degradation of terrestrial resources	35. All construction sites should be located away forested, plantation, & agricultural areas as much as possible. 36. No unnecessary cutting of trees. 37. All construction fluids such as oils, and fuels should be stored and handled well away from forested and plantation areas. 38. No waste of any kind is to be discarded n private residential or business land or garbage containers, on land, or in forests/plantations.	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PMU	contractor
Civil works	Degradation of water quality & aquatic resources	39. Erosion channels must be built around aggregate stockpile areas to contain rain-induced erosion. 40. Plastic tarps should be used to cover piles to avoid drying and erosion of the piles. 41. Earthworks should be conducted during dry periods. 42. All construction fluids such as oils, and fuels should be stored and handled well away from surface waters. 43. No waste of any kind is to be thrown in surface waters.	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PMU	contractor

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		44. No washing or repair of machinery near surface waters. 45. Pit latrines to be located well away from all surface waters. 46. No unnecessary earthworks in or adjacent to all water courses. 47. No aggregate mining from nearby lakes should be allowed. 48. All existing irrigation ditches, canals and channels to be protected the same way as rivers and lakes.						
Cultural chance finds	Damage to cultural property or values & chance finds	49. As per detailed designs, all civil works should be located away from all cultural property and values including cemeteries and pagodas. 50. Chance finds of valued relics and cultural values should be anticipated by contractors. Site supervisors should be on the watch for finds. 51. Upon a chance find all work stops immediately, find left untouched, and PMU and CPC notified. If find deemed valuable, provincial cultural authorities must be notified. 52. Work at find site will remain stopped until authorities allow work to continue.	All construction sites	At the start , and throughout construction phase	Monthly	No marginal cost	DDSC & PMU	contractor
Construction materials acquisition, transport, and storage sub-plan	Pollution, injury, increased traffic, disrupted access	53. All borrow pits and quarries should be approved by DoNRE. 54. Select pits and quarries in areas with low gradient and as close as possible to construction sites. 55. Required aggregate volumes must be carefully calculated prior to extraction to prevent wastage. 56. Pits and quarries should not be located near surface waters, forested areas, critical habitat for wildlife, or cultural property or values. 57. Although it should be avoided at all costs, if aggregate mining from fluvial environments is required small streams and rivers should be used, and dry alluvial plains preferred. 58. All topsoil and overburden removed should be stockpiled for later restoration. 59. All borrow pits and quarries should have a fence	For all construction areas.	Throughout construction phase	Monthly	No marginal cost	DDSC / PMU	Contractor(s)

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		<p>perimeter with signage to keep public away.</p> <p>60. After use pits and quarries should be dewatered and permanent fences installed with signage to keep public out, and restored as much as possible using original non-organic overburden excavation spoils.</p> <p>61. Unstable slope conditions in/adjacent to the quarry or pit caused by the extractions should be rectified with tree planting.</p> <p>62. Define &amp; schedule how materials are extracted from borrow pits and rock quarries, transported, and handled &amp; stored at sites.</p> <p>63. Define and schedule how fabricated materials such as steel, wood structures, and scaffolding will be transported and handled.</p> <p>64. All aggregate loads on trucks must be covered.</p> <p>65. Piles of aggregates at sites should be used/or removed promptly, or covered and placed in non-traffic areas.</p>						
Excavation spoil management sub-plan	Contamination of land and surface waters from excavated spoil	<p>66. Uncontaminated spoil to be disposed of in DoNRE-designated sites, which must never be in or adjacent surface waters. Designated sites must be clearly marked and identified.</p> <p>67. Spoil must not be disposed of on sloped land, near cultural property or values, ecologically important areas, or on/near any other culturally or ecologically sensitive features including wetlands such as swamps.</p> <p>68. Where possible spoil should be used at other construction sites, or disposed in spent quarries or borrow pits.</p> <p>69. A record of type, estimated volume, and source of disposed spoil must be recorded.</p> <p>70. Contaminated spoil disposal must follow GoV regulations including handling, transport, treatment (if necessary), and disposal.</p> <p>71. Suspected contaminated soil must be tested, and disposed of in designated sites identified by DoNRE as per GoV regulations.</p> <p>72. Before treatment or disposal contaminated spoil must be covered with plastic and isolated from all human activity.</p>	All excavation areas	Throughout construction phase	Monthly	<p>No marginal cost</p> <p>Testing of contaminated soil (See Monitoring Plan below)</p>	DDSC, PMU & DoNRE	Contractor

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
								DoNRE
Construction Drainage sub-plan	Flooding from loss of drainage & flood storage	<p>73. Provide adequate short-term drainage away from construction sites to prevent ponding and flooding.</p> <p>74. Manage to not allow borrow pits and quarries to fill with water. Pump periodically to land infiltration or nearby water courses.</p> <p>75. Install temporary storm drains or ditches for construction sites.</p> <p>76. Ensure existing road &amp; street drains do not become plugged with construction waste .</p> <p>77. Protect surface waters from silt and eroded soil.</p>	All areas with surface waters	Design & construction phases	Monthly	No marginal cost	DDSC & PMU	contractor
Solid and liquid construction waste sub-plan	Contamination of land and surface waters from construction waste	<p>78. Management of general solid and liquid waste of construction will follow GoV regulations, and will cover, collection, handling, transport, recycling, and disposal of waste created from construction activities and worker force.</p> <p>79. Areas of disposal of solid and liquid residual matter to be determined by DoNRE.</p> <p>80. Disposed of residual matter should be catalogued for type, estimated weigh, and source.</p> <p>81. Construction sites should have large garbage bins.</p> <p>82. A schedule of solid and liquid residual matter pickup and disposal must be established and followed that ensures construction sites are as clean as possible.</p> <p>83. Solid residual matters should be separated and recyclables sold to buyers in community.</p> <p><u>Hazardous Waste</u></p> <p>84. Collection, storage, transport, and disposal of hazardous waste such as used oils, gasoline, paint, and other toxics must follow GoV regulations.</p> <p>85. Wastes should be separated (e.g., hydrocarbons, batteries, paints, organic solvents)</p> <p>86. Wastes must be stored above ground in closed, well labeled, ventilated plastic bins in good condition well away from construction activity areas, all surface water, water supplies, and cultural and ecological sensitive receptors.</p> <p>87. All spills must be cleaned up completely with all</p>	All construction sites and worker camps	Throughout construction phase	Monthly	No marginal cost	DDSC, PMU, & DoNRE	contractor

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		contaminated soil removed and handled with by contaminated spoil sub-plan. 88. During construction, a prevention kit consisting of heavy weight oil only absorbent and / or cat litter should be available to prevent infiltrations much as possible.						
Noise and dust sub-plan	Dust Noise	89. Regularly apply wetting agents to exposed soil and construction roads especially in high density areas. 90. Cover or keep moist all stockpiles of construction aggregates, and all truckloads of aggregates. 91. Minimize time that excavations and exposed soil are left open/exposed. Backfill ASAP. 92. As much as possible restrict working time between 07:00 and 17:00. In particular are activities such as pile driving. 93. Maintain equipment in proper working order 94. Replace unnecessarily noisy vehicles and machinery. 95. Vehicles and machinery to be turned off when not in use. 96. Construct temporary noise barriers around excessively noisy activity areas where possible and if the impacts of constructing such a barrier is lesser then the noise impact itself.	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC & PMU	contractor
Utility and power disruption sub-plan	Loss or disruption of utilities and services such as water supply and electricity	97. Develop carefully a plan of days and locations where outages in utilities and services will occur, or are expected. 98. Contact local utilities and services with schedule, and identify possible contingency back-up plans for outages. 99. Contact affected community to inform them of planned outages. 100. Try to schedule all outages during low use time such between 24:00 and 06:00.	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC, PMU & Utility company	contractor
Erosion sub-plan	Land erosion	101. Berms, and plastic sheet fencing should be placed around all excavations and earthwork areas. 102. Earthworks should be conducted during dry periods. 103. Maintain a stockpile of topsoil for immediate site restoration following backfilling. 104. Protect exposed or cut slopes with planted vegetation, and have a slope stabilization protocol ready.	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PMU	contractor



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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		105. Re-vegetate all soil exposure areas ASAP.						
Worker and public safety sub-plan	Public and worker injury, and health	106. Proper fencing, protective barriers, and buffer zones should be provided around all construction sites. 107. Sufficient signage and information disclosure, and site supervisors and night guards should be placed at all sites. 108. Worker and public safety guidelines published by MoLISA should be followed. 109. Population near blast areas should be notified 24 hrs ahead, and evacuated well before operation. Accepted GoV blast procedures and safety measures implemented. 110. Speed limits should be imposed on all roads used by construction vehicles. 111. Standing water suitable for disease vector breeding should be filled in. 112. Worker education and awareness seminars for construction hazards should be given. A construction site safety program should be developed and distributed to workers. 113. Appropriate safety clothing and footwear should be mandatory for all construction workers. 114. Adequate medical services must be on site or nearby all construction sites. 115. Drinking water must be provided at all construction sites. 116. Sufficient lighting to be used during necessary night work. 117. All construction sites should be examined daily to ensure unsafe conditions are removed.	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC & PMU	contractor
Construction and local vehicle traffic sub-plan	Traffic disruption, traffic block, accidents,	118. Schedule construction vehicle activity during light traffic periods. Create adequate traffic detours, and sufficient signage & warning lights at all construction locations. 119. Post speed limits, and create dedicated construction vehicle roads or lanes. 120. Inform community of location of construction traffic areas, and provide them with directions on how to best co-exist with construction vehicles on their roads.	All construction sites	Fulltime		No marginal cost	DDSC & PMU	contractor

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
	public injury	121. Increase the number of pedestrian crossings away from construction areas. 122. Increase road and walkway lighting. 123. Organize the dump trucks travelling to avoid as much as possible the circulation of empty loads on the roads. 124. Provide alternate routes and / or work planned locations to help emergency response units to plan their alternate routes			Monthly          Weekly			
<b>Specific Mitigations for Treated Water Distribution Network</b>								
Construction of treated water distribution network	Minimal negative environmental impacts	125. Mitigation measures to address potential impacts of distribution network are addressed by the mitigations identified for the raw water pipeline above.	End user property, roads, and public area	During construction	Monthly	No marginal cost	DDSC / PMU	contractor
<b>Post-construction Operation of Water Supply System</b>								
Treated water supply	Unsustainable quantity or quality of treated water	126. Develop and implement O&M manual for all equipment and operations of WS system which includes regular maintenance of treatment system components, and materials supply to ensure treated water production (m <sup>3</sup> /day) always meets WTP design specifications. Incorporate contingency and back-up plans for planned and unplanned system shutdowns. 127. Establish a regular treated water quality monitoring program to ensure the quality of treated water meets original WTP design specifications. Incorporate contingency and response plans to address episodes of decreased treated water quality, including public notification. (See Environmental Monitoring Plan below). 128. As part of #131 coordinate with Dept of Health for them to periodically monitor treated water quality to ensure it meets potable quality standards	Entire WS system          At WTP outlet and at select locations along distribution network	Quarterly, and as needed	As needed	No marginal cost	NAWASCO / DDSC	NAWASCO       EPRC / DoH
Operation of treated water pipelines and distribution network	Local flooding from ruptures	129. As part of implementation of O&M manual for entire WS system institute a regular inspection program of all pipeline networks starting at intake than to WTP and then entire distribution network with focus on junctions and end-user connections.	At all pipeline locations	Quarterly, and as needed	As needed	No marginal cost	NAWASCO / DDSC	NAWASCO
Production of treated	Wastewater	130. Review and clarify wastewater loads generated from	At WTP	Periodically	As needed	No marginal	NAWASCO /	NAWASCO

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
water	production too much for city wastewater management	treated water from Vinh city can be handled by current wastewater collection and treatment systems for Vinh.				cost	DoNRE	
Operation of entire pipeline and distribution network,	Worker and public injury	131. Educate workers in workplace safety of WS system operation according to MoLISA regulations. Prevent public access to all pipeline areas, pits, communication equipment with proper fencing, boxes and appropriate signage. 132. Provide adequate signage informing public of pipelines service routes. 133. Ensure all WS system vehicles in good working order.	All pipeline property          All facilities	Continuously	As needed	No marginal cost	NAWASCO	NAWASCO

#### **H.4 EMERGENCY PLAN**

246. The mitigation measures have been identified. However, risk and accidents can still happen and there an infinity of situation that can occur. So an immediate emergency handling measures at the site is a basic requirement. The solution for reducing negative impact due to unknown causes is presented in Chapter E. The negative impacts on this index are undefined and circumstantial.

247. The main person responsible in these events is the constructor in charge of the area where the problem occur. If the project has more than one constructor, each constructor must have one person in charge of managing this type of issue. The PMU will assist by providing a coordinating role amongst multiple contractors. In the operation phase, the operation unit will handle accident.

248. Constructors will need to determine their safety program in the bid documents and describe how they will handle it, Example of safety issues are:

- All worker injuries, all public injuries caused from construction-related activities requiring immediate first aid, or hospital care
- The accidents from the pipe trench what haven't still restore situation, causing the local flooding or accident.
- Spilling of hazardous substances (e.g., gasoline, oil, chlorine, soda, PAC, paint) on land into surface waters (rivers, lakes, reservoirs), or into drinking water source
- Emergency scenarios: Traffic accidents, fire, Detection of historical, Breaking of exist structures, Drowning ...

249. All pipelineS should be laid under the pavement or road, away from cultural property and values, including cemeteries and pagodas. Still, undetected cultural find could be present underground. If it does happen:

- It's necessary to anticipate chance find of cultural interest and in those locations the presence of a site supervisor should be arranged.
- Upon a chance find all work has to stop immediately, the find has to be left untouched, and the PMU and CPC notified. If find deemed valuable, provincial cultural authorities must be notified.
- Work at find site will remain stopped until authorities allow work to continue.

250. Determining and mine clearance work has been done in other component. However, during the construction process, if UXO's are detected the constructor needs to:

- Stop working and notify to PMU and local PC.
- Depending on actual situation and evacuating workers. Implement site protect solution to protect human and animals avoid fire explosion.
- Implement first aid and bring fire victims to hospital.

251. During digging pipe trench, if contractor detects an hazardous material spill:

- Stop working and evacuating workers and local people out the site construction and implement site protect solution.
- Notify to related agency (DONRE, DOH, ambulance, hospitals)
- Begin to stop spill and contain contaminated area if it can be done safely
- All exposed persons to be taken to hospital to assess exposure damage.

## **H.5 ENVIRONMENTAL MONITORING PROGRAM**

252. The environmental monitoring requirements identified in the IEE were carried forward and expanded with more detail into a comprehensive monitoring plan (Table H-3) that addresses both environmental effects and performance monitoring (Table H-4). The monitoring plan focuses on all three phases (pre-construction, construction, post-construction operation) of the project and provides environmental indicators, the sampling locations & frequency, method of data collection, responsible parties, and the estimated costs.

253. The purpose of the monitoring plan is to determine the effectiveness of the impact mitigations, and to document any unexpected positive or negative environmental impacts of the subproject. The PMU will be required to oversee the implementation of environmental monitoring plan by the EMA. Similar to the mitigation plan, the monitoring plan will need to be updated at the detailed design stage to ensure it meets the monitoring needs of the detailed designs of the subproject.

254. The implementation budget of mitigation measures of the construction phase has been included in the contract of Contractor.

255. The budget for the salary and environment management activities of PMU staffs has been included in the project management cost.

256. The EMP implementation budget of Construction management consultant has been included in the contract of DDSC.

257. Determining the location and the clearance of the UXOs has not been determined due to the volatility of the possible costs.

258. The involvement of the community in the implementation of the EMP is voluntary. Although not compensated monetarily, the community benefit by way of better infrastructure and improvements in environment. Nevertheless, to encourage the participation of community, equipment and selected items used for project monitoring are retained as gratuity for the individuals in the community voted in to take on voluntary task of project monitoring.

259. According to decision in No. 80/2005/QĐ-TTg dated 18/4/2005 from the Prime Minister's Office on regulations of community investment monitoring and the joint circular for guidelines of decision implementation No. 80/2005/QĐ-TTg

260. Cost of one time of monitoring are estimated in 46/2011/QĐ-UBND dated 23/09/2011 of the Nghe An PPC issued the unit price analysis environment surrounding air, gas wastewater, surface water, ground water in the province of Nghe An. All costs will be updated on the detailed design stage.

261. Environmental monitoring program is carried out in 2 phases; construction phase (proposed in 3 years); operation phase (first year of project operation).

### **Compliance Monitoring & Reporting**

262. Regular reporting on the implementation of mitigation measures, and on monitoring activities during construction phase of the project is required as indicated in Table 9.

263. Construction contractors are required to submit brief monthly reports on environmental issues and mitigation activities to the PMU. The PMU must prepare quarterly reports on the EMP to the EA which include input from regular meetings with public stakeholders. The EA must prepare biannual reports on activity and effectiveness of EMP to ADB.

264. Environmental monitoring reports will be prepared in parallel quarterly for the PMU/EA by the monitoring agency. The reports will table all indicators measured from the monitoring plan of EMP, and will include relevant GoV environmental quality standards (i.e., QCVN & TCVN).

265. A template for monitoring process is presented in Annex 2.

### H-3. Environmental Monitoring Plan

Environmental Indicators	Location	Means of Monitoring	Frequency	Reporting	Responsibility		Estimated <sup>7</sup> Cost (USD)
					Supervision	Responsibility	
Pre-construction Phase – Update Baseline Conditions							
Air quality (dust, CO, NOx, SOx, noise, wind, and vibration levels) to supplement baseline air quality data collected during PPTA and reported in IEE	Representative sites of heavy civil & earthwork including along truck routes	Using field and analytical methods described in QCVN and TCVN standards for ambient air and surface water quality sampling & analysis.	One day and one night measurement	One baseline supplement report before construction phase starts	DDSC & PMU	EMA	tbd
Inventory of present and past land uses that could cause contaminated soil.	At all excavation sites, including borrow pits	Survey methods described in QCVN and TCVN standards for land use.	Once	Once	DDSC & PMU	EMA	tbd
Analysis of soil quality if required from above (heavy metals (As, Cd, Pb, oil & grease, hydrocarbons).	Possible contaminated lands all sites	Use field and analytical methods described in QCVN and TCVN standards for soil quality sampling & analysis.	Once if needed	Once	DDSC & PMU	EMA	tbd
Presence of UXO	Potentially located throughout project area	Military to survey and sweep affected areas of UXO	Once	Once	NAWASCO	military	tbd.
Updated community stakeholder comments & concerns of subproject	Public consultation sites with same stakeholders consulted during IEE	Same format used in IEE for obtaining stakeholder input to subproject	At least once & in conjunction with GRM	For each event	PPC / NAWASCO	PMU	tbd
Construction, Rehabilitation, Replacement and Expansion of the Treated Water Pipeline and Distribution Network							
A) Noise: Leq, L50, Lmax  B) Air quality: dust, CO, NOx, SOx, HC,noise, wind, and vibration levels  C) Surface water quality: TSS, heavy metals (As, Cd, Pb,) oil and grease, total & E. coliform, pH, DO, COD, BOD <sub>5</sub> ,	A) For Project items under construction during monitoring time, at the baseline environmental monitoring locations; and other environmentally sensitive points as proposed by EMA  B-C The location of monitoring the environment (map the environmental sampling) for the construction and operation of sensitive positions at the time of the DDSC's proposed)	A – C: Using field and analytical methods described in QCVN and TCVN standards for ambient air and surface water quality monitoring.  Include visual observations of dust and noise from contractor & public reports.	A) Quarterly. 1 location/day. 3 times/h. Measure noise only one hour per day  B-C): Quarterly	A) Quarterly  B-C)Twice per year	(A - F): DDSC/PMU	(A - F): EMA	A) \$2,570. /yr  B) \$6,430. /yr  C) \$6,860. /yr

<sup>7</sup> Estimated costs to be updated at detailed design stage

**Document : Initial Environmental Examination Report**  
**MFF0054-VIE: PFR3 – Vinh Water Supply Subproject – Vinh City, Nghe An province**

Environmental Indicators	Location	Means of Monitoring	Frequency	Reporting	Responsibility		Estimated <sup>7</sup> Cost (USD)
					Supervision	Responsibility	
					(A - F): DDSC/PMU	(A - F): EMA	
					G & H) & daily observations:		
					PPC / DAWACO	PMU / contractor	
Operation of the Pipeline Network							
Worker & public injury associated with pipeline network	Pipelines and distribution network	Regular record keeping	Continuously	For each event	NAWASCO		No marginal cost
A) Noise: Leq, L50, Lmax B) Air quality: dust, CO, NOx, SOx, HC,noise, wind, and vibration levels C) Surface water quality: TSS, heavy metals (As, Cd, Pb,) oil and grease, total & E. coliform, pH, DO, COD, BOD <sub>5</sub> , temperature, NH <sub>3</sub> , and other nutrient forms of N & P. D) Ground water quality monitoring:	A) For Project items under construction during monitoring time, at the baseline environmental monitoring locations; and other environmentally sensitive points as proposed by EMA  B-C The location of monitoring the environment (map the environmental sampling) for the construction and operation of sensitive positions at the time of the DDSC's proposed)  D): along all component of the Network	A – C: Using field and analytical methods described in QCVN and TCVN standards for ambient air and surface water quality monitoring.   D) Information transferred by telephone hotline number	A) Twice a year. 1 location, 3 times/h.  B-C): Twice per year  D) Implementation of suspected and / or in case of problems or complaints	A) Quarterly  B-C)Twice per year   D) Automatic report	NAWASCO		A) 430\$/y  B) 1,070\$/y  C) 1,140\$/y  D) Depending on the occurrences
Public complaints of operation such as drinking water availability & quality, and malfunctions with pipelines (e.g., leaks).	At all sites	Regular record keeping	Continuously	Biannually	NAWASCO		No marginal cost

**Table H-4 Contents of environmental monitoring**

No.	Item	Construction phase	Operation phase
I	Noise		
	1. Monitoring indicators	Leq, L50, Lmax	Leq, L50, Lmax
	2. Frequency	Once a quarter 01 location/day. 03 times/h. Measure noise only one hour per day	Once every 6 months. Measure noise only in one hour; 03 times/h
	3. Location	For Project items under construction during monitoring time, at the baseline environmental monitoring locations; and other environmentally sensitive points as proposed by EMA	
	4. Standard and code:	QCVN 26/2010/BTNMT	
II	Air quality monitoring		
	1. Monitoring indicators	TSP, CO, NO <sub>2</sub> , SO <sub>2</sub> , HC	TSP, CO, NO <sub>2</sub> , SO <sub>2</sub> , HC
	2. Frequency	Once a quater	Once time per 6 months
	3. Standard and code:	QCVN 05 :2009/BTNMT, QCVN 06:2009/BTNMT	
	4. Location	The location of monitoring the environment (map the environmental sampling) for the construction and operation of sensitive positions at the time of the DDSC's proposed.	
III	Surface water quality monitoring		
	1. Monitoring indicators	pH, temperature, DO, TSS, BOD5, COD, DO, Oil, Coli-form	pH, temperature, DO, TSS, BOD5, COD, DO, Oil, Coli-form
	2. Frequency	Once a quater	Once time per 6 months
	3. Standard and Codes:	QCVN 08:2008/BTNMT	
	4. Location	The location of monitoring the environment (map the environmental sampling) for the construction and operation of sensitive positions at the time of the DDSC's proposed.	
IV	Ground water quality monitoring: Implementation of suspected and / or in case of problems or complaints		

## **H.6 TRAINING PLAN FOR IMPROVEMENT OF CAPACITY IN ENVIRONMENTAL MANAGEMENT**

266. PMU and EMA need to collaborate on training courses to strengthen knowledge and experiences in environmental monitoring and management. In TOR of EMA, detailed plan and training documents for relevant objects in environmental monitoring and management need to be included in TOR of EMA. These documents are prepared in the early stage and are approved by PMU and WB.

267. Participants in these training courses are coordinators of packages, environmental staffs, and social community of PMU, construction monitoring consultant, assembly consultants, local authorities and community representatives from the various project areas.

268. The training content focus in two thematic items determine by: 1) Principle of environmental assessment and focused management in the potential impacts to the natural environment and social. 2) Required environmental safeguard of ADB and Viet Nam Government with specific focus. Time and the contents of training course, depending on each class, will be discussed with the PMU to match the sizes, extent and schedule of project.



**I. COMMITMENT OF PROJECT OWNER**

269. Commitment to undertaking the measures for waste treatment and minimizing other impacts is outlined in the agreement: During project implementation, the Project Owner is committed to fully implementing the measures for handling waste, mitigating the negative impact on the natural and eco-social environment in the town, specifically as follows: (i) commitment to building wastewater treatment facilities such as BASTAF tanks and portable toilets, ensuring that water quality after going through the treatment system meets the discharge limits for domestic wastewater, preventing surface water and groundwater from being polluted by wastewater; (ii) Commitment not causing air pollution due to transport activities and excavation, not allowing rock and soil spillage into the street, not allowing dust carried by movement of dump trucks on the street causing dust contamination for the HHs residing along the transport routes; (iii) commitment to collecting and handling solid waste in accordance with the provisions of the Decree No. 59/2007/ND-CP dated 09/04 2007 04 on solid waste management; collecting, storing, transporting and handling hazardous wastes in accordance with the Circular No. 9/2012/TT-BTNMT dated 14/4/2011 of the MoNRE on hazardous waste management; (iv) commitment to good management of worksite and network staff, not allowing conflicts with the local people; (v) commitment to working closely with the local authorities in using water, ensuring security and order, and environmental sanitation.

270. Commitment to achieving the current treatment standard requirements and technical regulation on environment: during construction, the Project Owner is committed to ensuring compliance with the Vietnamese and International standards and regulations on environment, ensuring air quality, surface water, groundwater, sediment and soil, including: (i) QCVN 08:2008/BTNMT National Technical Regulation on Surface Water Quality; (ii) QCVN 09:2008/BTNMT National Technical Regulation on Groundwater Quality; (iii) QCVN 14:2008/BTNMT National Technical Regulation on domestic wastewater; (iv) QCVN 05:2009/BTNMT National Technical Regulation on Ambient Air Quality; (v) QCVN 40:2011/BTNMT National Technical Regulation on Industrial Wastewater; (vi) QCVN 26:2010/BTNMT National Technical Regulation on Noise ; (vii) QCVN 27:2010/BTNMT National Technical Regulation on Vibration.

271. Commitment to undertaking the other measures for environmental protection under the provisions of the current law of Vietnam: The Project Owner strictly committed to the Environmental Protection Law adopted by the National Assembly on 29/11/2005 and Decree No. 80/ND-CP dated 09/08/2006 of the Prime Minister guiding the implementation of environmental protection law; Decree No. 21/ND-CP dated 28/02/2008 of the Prime Minister on revision and supplement of some articles of Decree 80/ND-CP dated 09/08/2006 and Decree No. 29/2011/ND-CP dated 18/04/2011 of the Government on strategic environmental impact assessment, environmental impact assessment and commitment to environmental protection; Circular No. 26/2010/TT-BTNMT dated 18/7/2010 of the Ministry of Natural Resources and Environment guiding the implementation of articles of Decree No. 29/2011/ND-CP dated 18/4/2011 of the Government on environmental impact assessment, environmental impact assessment and commitment to environmental protection and Decree 201/2013/ND-CP on stricter regulations for effective water resource management including associated consultation of communities.

**J. CONCLUSION:**

272. The proposed project will produce significant benefits for the population of Vinh, specifically by enabling HHs that are currently not served or only partially served by NAWASCO to shift from reliance on wells as a source of water (which has to be boiled or filtered) to more secure and safe piped water source. It will also help the authorities and the water consumers (payer) to have a more reliant infrastructure and to diminish the urgency of an increase of the WTP and a reduction in recurring repairs due to leaks.

273. The potential adverse environmental impacts of the project are the consequence mainly of construction activities, in particular the potential impairment of water and air quality in areas near the pipeline and distribution network construction corridor, and nuisance and safety hazards posed to nearby HHs and businesses. However, these impacts are temporary and can be mitigated.

274. Project construction will not have a significant impact on the flora and fauna, as the piping construction work will take place mostly in existing /urban areas. No historical relics will be demolished or relocated by the pipeline and distribution network construction.

275. HHs that will be affected by construction activities, either because of dislocation or damage to property, will be relocated and/or compensated in accordance with ADB guidelines. These measures are presented in a separate report focused on the project's resettlement and compensation aspects, i.e., Appendix 16 of the Draft Final Report.

276. For purposes of compliance with ADB environmental assessment guidelines, no additional study or full environmental impact assessment is needed to further assess the potential environment impacts of the project.

## Annex

**Annex 1: Minutes of Public Consultation**

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

**MINUTES OF MEETING**

**VINH CITY WATER SUPPLY NETWORK  
REHABILITATION AND UPGRADING PROJECT, PHASE I**

**I. GENERAL INFORMATION**

Time: Start at 10 a.m, 02<sup>nd</sup> August 2013

Finish at:.....

Location: Hung Binh ward PC office

**II. PARTICIPANTS**

1. Project owner:

- Mr/Ms:.....	Position :.....
- Mr/Ms:.....	Position:.....

2. Consultant:

- Mr/Ms: Nguyen Dinh Thanh	Position: Consultant
- Mr/Ms:.....	Position:.....

3. Representatives of local authorities

- Mr/Ms: Nguyen Huu Dac.....	Position: Chairman of Ward.....
- Mr/Ms:.....	Position:.....

**III. CONTENTS OF THE MEETING**

1. The meeting introduced information about the project
2. Community consultation about project
3. Survey/ aggregate socio-economic information in 3 years

**IV. RECOMMENDATION**

Local authorities and residents of Hung Binh Ward agreed with the content of the meetings about investment items of projects, environmental issues and environmental protection measures.

We commit connection to water supply network of the project when the project is done.

**PROJECT OWNER**

**LOCAL AUTHORITIES**

**CONSULTANT**

**Nguyen Huu Dac**

**Nguyen Dinh Thanh**

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

**MINUTES OF MEETING**

**VINH CITY WATER SUPPLY NETWORK  
REHABILITATION AND UPGRADING PROJECT, PHASE I**

**I. GENERAL INFORMATION**

Time: Start at 14h30 p.m, 29<sup>th</sup> July 2013

Finish at:.....

Location: Vinh Tan ward PC office

**II. PARTICIPANTS**

4. Project owner:

- Mr/Ms:.....	Position :.....
- Mr/Ms:.....	Position:.....

5. Consultant:

- Mr/Ms: Nguyen Dinh Thanh	Position: Consultant
- Mr/Ms:.....	Position:.....

6. Representatives of local authorities

- Mr/Ms: Nguyen Hoang Manh.....	Position: Deputy Chairman of Ward
- Mr/Ms:.....	Position:.....

**III. CONTENTS OF THE MEETING**

1. The meeting introduced information about the project
2. Community consultation in Vinh Tan ward
3. Survey/ aggregate socio-economic information

**IV. RECOMMENDATION**

Local authorities and residents of Vinh Tan Ward agreed with the content of the meetings about investment items of projects, environmental issues and environmental protection measures.

We commit connection to water supply network of the project when the project is done.

**PROJECT OWNER**

**LOCAL AUTHORITIES**

**CONSULTANT**

**Nguyen Hoang Manh**

**Nguyen Dinh Thanh**

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

**MINUTES OF MEETING**

**VINH CITY WATER SUPPLY NETWORK  
REHABILITATION AND UPGRADING PROJECT, PHASE I**

**I. GENERAL INFORMATION**

Time: Start at 9h20 a.m, 29<sup>th</sup> July 2013

Finish at:.....

Location: Nghi An Commune PC office

**II. PARTICIPANTS**

7. Project owner:

- Mr/Ms:.....	Position :.....
- Mr/Ms:.....	Position:.....

8. Consultant:

- Mr/Ms: Nguyen Dinh Thanh	Position: Consultant
- Mr/Ms:.....	Position:.....

9. Representatives of local authorities

- Mr/Ms: Pham Huy Thong.....	Position: Chairman of the Commune.
- Mr/Ms: Pham Thi Huong.....	Position: Statistical office

**III. CONTENTS OF THE MEETING**

1. The meeting introduced information about the project
2. Community consultation in Nghi An commune
3. Survey/ aggregate socio-economic information in Nghi An commune

**IV. RECOMMENDATION**

Local authorities and residents of Nghi An Commune agreed with the content of the meetings about investment items of projects, environmental issues and environmental protection measures.

We commit connection to water supply network of the project when the project is done.

**PROJECT OWNER**

**LOCAL AUTHORITIES**

**CONSULTANT**

**Pham Huy Thong**

**Nguyen Dinh Thanh**

**SOCIALIST REPUBLIC OF VIET NAM**  
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**MINUTES OF MEETING**

**VINH CITY WATER SUPPLY NETWORK  
REHABILITATION AND UPGRADING PROJECT, PHASE I**

**V. GENERAL INFORMATION**

Time: Start at 9h00 a.m, 1<sup>st</sup> August 2013

Finish at:.....

Location: Nghi Phu Commune PC office

**VI. PARTICIPANTS**

**10. Project owner:**

- Mr/Ms:.....	Position :.....
- Mr/Ms:.....	Position:.....

**11. Consultant:**

- Mr/Ms: Nguyen Dinh Thanh	Position: Consultant
- Mr/Ms:.....	Position:.....

**12. Representatives of local authorities**

- Mr/Ms: Nguyen Thi Thu Hien...	Position: Deputy Chairman of
- Mr/Ms: .....	Commune.

**VII. CONTENTS OF THE MEETING**

1. The meeting introduced information about the project
2. Community consultation in Nghi Phu commune
3. Survey/ aggregate socio-economic information in Nghi Phu commune

**VIII. RECOMMENDATION**

Local authorities and residents of Nghi Phu Commune agreed with the content of the meetings about investment items of projects, environmental issues and environmental protection measures.

We commit connection to water supply network of the project when the project is done.

**PROJECT OWNER**

**LOCAL AUTHORITIES**

**CONSULTANT**

**Nguyen Thi Thu Hien**

**Nguyen Dinh Thanh**

**SOCIALIST REPUBLIC OF VIET NAM**  
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**MINUTES OF MEETING**

**VINH CITY WATER SUPPLY NETWORK  
REHABILITATION AND UPGRADING PROJECT, PHASE I**

**IX. GENERAL INFORMATION**

Time: Start at 8h30 a.m, 31<sup>st</sup> July 2013

Finish at:.....

Location: Nghi Duc Commune PC office

**X. PARTICIPANTS**

**13. Project owner:**

- Mr/Ms:.....	Position :.....
- Mr/Ms:.....	Position:.....

**14. Consultant:**

- Mr/Ms: Nguyen Dinh Thanh	Position: Consultant
- Mr/Ms:.....	Position:.....

**15. Representatives of local authorities**

- Mr/Ms: Nguyen Hong Vy.....	Position: Chairman of the Commune.
- Mr/Ms: Pham Duc Vinh.....	Position: Administration staff

**XI. CONTENTS OF THE MEETING**

1. The meeting introduced information about the project
2. Community consultation in Nghi Duc commune
3. Survey/ aggregate socio-economic information in Nghi Duc commune

**XII. RECOMMENDATION**

Local authorities and residents of Nghi Duc Commune agreed with the content of the meetings about investment items of projects, environmental issues and environmental protection measures.

We commit connection to water supply network of the project when the project is done.

**PROJECT OWNER**

**LOCAL AUTHORITIES**

**CONSULTANT**

**Nguyen Hong Vy**

**Nguyen Dinh Thanh**



VINH CITY PEOPLE'S  
COMMITTEE  
No.: 31/TB-UBND

SOCIALIST REPUBLIC OF VIET NAM  
Happy- Independence- Freedom

*Vinh, 05<sup>th</sup> December 2011*

**NOTIFICATION OF**  
**Re: Accepting Registration of Environmental Protection Commitment**

VINH CITY WATER SUPPLY NETWORK  
REHABILITATION AND UPGRADING PROJECT, PHASE I

Dear Nghe An Water supply one member limited company

After reviewing the dossier dated 28/09/2011 of Nghe An Water supply one member Ltd. Co's registration of environmental protection commitment of project "Vinh city water supply network rehabilitation and upgrading project, phase I". People's Committee of Vinh city following message:

1. The environmental protection commitment of project "Vinh city water supply network rehabilitation and upgrading project, phase I" was registered at the People's Committee of Vinh city.
2. Nghe An Water supply one member Ltd. Co is responsible for correct and full implementation of the contents of the environmental protection commitment and reported to the communes, wards where the project is implemented on the content of the environmental protection commitment of the project that has been approved and this notice.
3. The environmental protection commitment has been registered and this notice is the basis for the state management agency about environmental protection monitoring, testing, and inspecting the environment protection implementation in the process of implementation project "Vinh city water supply network rehabilitation and upgrading project, phase I".

Nghe An Water supply one member Ltd. Co must notify the People's Committee of Vinh city when there are changes, adjust the content of the environmental protection commitment and is only done when there is acceptance in writing of the People's Committee Vinh City

Cộng hòa Xã hội Chủ nghĩa Việt Nam  
Độc lập - Tự do - Hạnh phúc

## BIÊN BẢN LÀM VIỆC

DỰ ÁN CẢI TẠO MẠNG GIẢM THẤT THOÁT NƯỚC THÀNH PHỐ VINH GIAI ĐOẠN 1

### I. THÔNG TIN CHUNG

Thời gian:

Bắt đầu: 10h 00 ngày 02 tháng 08 năm 2018.

Kết thúc: .....h .....ngày .....tháng .....năm .....

Địa điểm: UBND Phường Hưng Khánh.....

### II. THÀNH PHẦN THAM GIA

1. Đại diện Chủ đầu tư:

- Ông/ Bà:..... Chức vụ:.....

- Ông/ Bà:..... Chức vụ:.....

2. Đại diện đơn vị tư vấn:

- Ông/ Bà: Nguyễn Đức Thanh..... Chức vụ: Cán bộ kỹ thuật.....

- Ông/ Bà:..... Chức vụ:.....

3. Đại diện chính quyền địa phương:

- Ông/ Bà: Nguyễn Văn Đức..... Chức vụ: Chủ tịch Phường.....

- Ông/ Bà:..... Chức vụ:.....

### III. NỘI DUNG

1. Họp giới thiệu dự án.....

2. Xem xét ý kiến của địa phương về dự án.....

3. Lấy số liệu thông tin cơ sở của địa phương trong ba năm.....

### IV. Ý KIẾN

Chính quyền địa phương và người dân Phường Hưng Khánh đều nhất trí.....

với nội dung của hợp về các hạng mục đầu tư của dự án, các.....


việc để một đồng các bên pháp luật và công nhân.....

Chúng tôi cam kết đầu tư với mức liên cấp quốc gia của dự án.....

khi dự án được thực hiện.....

ĐẠI DIỆN CHỦ ĐẦU TƯ

ĐẠI DIỆN ĐƠN VỊ TƯ VẤN

  
Nguyễn Đình Thành

Ngày.....tháng.....năm 2013

ĐẠI DIỆN CHÍNH QUYỀN ĐỊA PHƯƠNG

TM ỦY BAN NHÂN DÂN  
CHỦ TỊCH  
  
NGUYỄN HỮU ĐẮC



Cộng hòa Xã hội Chủ nghĩa Việt Nam  
Độc lập - Tự do - Hạnh phúc

## BIÊN BẢN LÀM VIỆC

DỰ ÁN CẢI TẠO MẠNG GIẢM THẤT THOÁT NƯỚC THÀNH PHỐ VINH GIAI ĐOẠN 1

### I. THÔNG TIN CHUNG

Thời gian:

Bắt đầu: 14h 30 ngày 22 tháng 07 năm 2018.

Kết thúc: .....h .....ngày .....tháng .....năm .....

Địa điểm: UBND phường Việt Tân.....

### II. THÀNH PHẦN THAM GIA

1. Đại diện Chủ đầu tư:

- Ông/ Bà:.....

Chức vụ:.....

- Ông/ Bà:.....

Chức vụ:.....

2. Đại diện đơn vị tư vấn :

- Ông/ Bà: Nguyễn Đức Thanh.....

Chức vụ: Cán bộ kỹ thuật.....

- Ông/ Bà:.....

Chức vụ:.....

3. Đại diện chính quyền địa phương:

- Ông/ Bà: Nguyễn Hoàng Nam.....

Chức vụ: P. Chủ tịch xã.....

- Ông/ Bà:.....

Chức vụ:.....

### III. NỘI DUNG

1. Họp giới thiệu về dự án.....

2. Tham vấn ý kiến phường Việt Tân.....

3. Lập hồ sơ kỹ thuật ở mức của phường.....

### IV. Ý KIẾN

Chủ quyền địa phương và người dân phường Việt Tân đều nhất trí với  
nội dung các loại vẽ các hạng mục đầu tư của dự án, các vấn đề  
môi trường, các biện pháp bảo vệ môi trường.....  
Chúng tôi cam kết đầu tư với mong muốn cấp nước của dự án  
khi dự án đạt được hiệu quả.....

This image shows a blank sheet of white paper designed for handwriting practice. It features a series of horizontal blue dashed lines spaced evenly down the page. A single vertical red line runs parallel to the left edge, creating a margin. The paper is otherwise empty of any text or markings.

ĐẠI DIỆN CHỦ ĐẦU TƯ

ĐẠI DIỆN ĐƠN VỊ TƯ VẤN

②  
Nguyễn Đình Thanh

Ngày.....tháng.....năm 2013

ĐẠI DIỆN CHÍNH QUYỀN ĐỊA PHƯƠNG

Nguyễn Hoàng Mạnh



Cộng hòa Xã hội Chủ nghĩa Việt Nam  
Độc lập - Tự do - Hạnh phúc

\*\*\*\*\*

## BIÊN BẢN LÀM VIỆC

DỰ ÁN CẢI TẠO MẠNG GIẢM THẤT THOÁT NƯỚC THÀNH PHỐ VINH GIAI ĐOẠN 1

### I. THÔNG TIN CHUNG

Thời gian:

Bắt đầu: 9h 20 ngày 29 tháng 07 năm 2018.

Kết thúc: .....h .....ngày .....tháng .....năm .....

Địa điểm: UBND xã Nghi An.....

### II. THÀNH PHẦN THAM GIA

1. Đại diện Chủ đầu tư:

- Ông/ Bà:.....

Chức vụ:.....

- Ông/ Bà:.....

Chức vụ:.....

2. Đại diện đơn vị tư vấn :

- Ông/ Bà: Nguyễn Đình Thanh.....

Chức vụ: Cán bộ tư vấn.....

- Ông/ Bà:.....

Chức vụ:.....

3. Đại diện chính quyền địa phương:

- Ông/ Bà: Phạm Huy Thông.....

Chức vụ: Chủ tịch xã.....

- Ông/ Bà: Phạm Thị Hương.....

Chức vụ: Phó thống kê.....

### III. NỘI DUNG

1. Họp giới thiệu dự án.....

2. Xem xét ý kiến của xã.....

3. Lấy số liệu thống kê về tình hình của xã Nghi An.....

### IV. Ý KIẾN

Chính quyền địa phương xã Nghi An đồng nhất với nội dung của

báo về các hạng mục đầu tư chi phí, các rào cản vướng mắc.

Bản báo cáo về môi trường.

Chúng tôi cam kết đầu tư và xây dựng cấp nước của dự án

phục vụ dân sinh thực hiện.





Cộng hòa Xã hội Chủ nghĩa Việt Nam  
Độc lập - Tự do - Hạnh phúc

## BIÊN BẢN LÀM VIỆC

DỰ ÁN CẢI TẠO MẠNG GIẢM THẤT THOÁT NƯỚC THÀNH PHỐ VINH GIAI ĐOẠN 1

### I. THÔNG TIN CHUNG

Thời gian:

Bắt đầu: ..9...h 00...ngày ..01...tháng ..08...năm ..2013..

Kết thúc: .....h .....ngày .....tháng .....năm .....

Địa điểm: ..UBND xã ..Nghị Phú..

### II. THÀNH PHẦN THAM GIA

1. Đại diện Chủ đầu tư:

- Ông/ Bà:.....

Chức vụ:.....

- Ông/ Bà:.....

Chức vụ:.....

2. Đại diện đơn vị tư vấn :

- Ông/ Bà: ..Nguyễn Đình Thanh.....

Chức vụ: ..Can bộ kĩ thuật.....

- Ông/ Bà:.....

Chức vụ:.....

3. Đại diện chính quyền địa phương:

- Ông/ Bà: ..Nguyễn Thị Thuý Hiền.....

Chức vụ: ..L. Chủ tịch xã.....

- Ông/ Bà:.....

Chức vụ:.....

### III. NỘI DUNG

1. Họp giới thiệu về dự án.
2. Tham vấn ý kiến của xã.
3. Thu thập thông tin về dự án.

### IV. Ý KIẾN

Chủ quyền địa phương và người dân xã Nghị Phú đều nhất trí với nội dung về các hạng mục đầu tư của dự án, các vấn đề môi trường, các biện pháp bảo vệ môi trường. Chúng tôi cảm ơn các đơn vị với mong muốn xây dựng của dự án khi xã đã được thực hiện.



## Annex 2: Template for Safeguards Monitoring Report

### I. Summary:

**(to be included as part of the *main* Report)**

- **Summary of EMP/RP Implementation**
- **Description of monitoring activities** carried out (e.g. field visits, survey questionnaire, public consultation meetings, focus group discussions, etc.)
- **Key issues**, any **corrective actions** already taken, and any **grievances**
- **Recommendations**

### II. Safeguards Monitoring Report

**(to be included in the annex/appendix of the *main* Report)**

#### 1. Introduction and Project Overview

<b>Project Number and Title:</b>		
<b>Safeguards Category</b>	Environment	
	Indigenous Peoples	
	Involuntary Resettlement	
<b>Reporting period:</b>		
<b>Last report date:</b>		
<b>Key sub-project activities since last report:</b>	<p>This section can include, among others, the following:</p> <ul style="list-style-type: none"> <li>• Activities of Proponent</li> <li>• Progress of Work (% physical completion)</li> <li>• Changes of Surrounding Environment</li> <li>• Status of Permits / Consents</li> </ul>	
<b>Report prepared by:</b>		

#### 2. Environmental Performance Monitoring

##### a. Summary of Compliance with EMAP Requirements (Environmental Performance)

EMAP Requirements	Compliance Status (Yes, No, Partial)	Comment or Reasons for Non-Compliance	Issues for Further Action
Use environmental impact as main heading and EMAP as listing (see example below)	Use EMoP list as basis for rating/evaluating compliance (see example below)		
Rise of employment opportunities: <ul style="list-style-type: none"> <li>• Job openings of the project should give priority to local communities.</li> <li>• Recruitment of local laborers should be stipulated in the contract for construction</li> </ul>	<ul style="list-style-type: none"> <li>• Field inspections and interviews with communities - DONE</li> <li>• Note each complaint case in the field – 3 COMPLAINTS RECEIVED</li> <li>• Set up grievance centre and report as part of monitoring action plan – NOT DONE</li> </ul>		

##### b. Issues for Further Action

Issue	Required Action	Responsibility and Timing	Resolution
<b>Old Issues from Previous Reports</b>			
List of EMoP measures or activities not completed (last column of previous table)			
<b>New Issues from This Report</b>			

**Document : Initial Environmental Examination Report**  
**MFF0054-VIE: PFR3 – Vinh Water Supply Subproject – Vinh City, Nghe An province**


c. Other activities

- Other issues not covered by EMAP/EMoP
- Environmental monitoring as required by GOI (e.g., air quality, water sampling)

**3. Involuntary Resettlement Performance Monitoring**

a. Summary of Compliance with RP Requirements

RP Requirements	Compliance status Yes/No/Partial	Comment or Reasons for Compliance, Partial Compliance/Non-Compliance	Issues for Further Action <sup>8</sup>
Establishment of personnel in PMU/PIU			
Public consultation and socialization process		Provide information on: <ul style="list-style-type: none"> <li>• Public consultation, participation activities carried out</li> <li>• Inclusive dates of these activities</li> </ul> To be elaborated on in Item 5	
Land area to be acquired is identified and finalised			
Land acquisition completed			
Establishment of Resettlement Site(s)		Please state: <ul style="list-style-type: none"> <li>• Number of AHs to be relocated as per agreed RP</li> <li>• Number of AHs already relocated</li> <li>• Number of houses built</li> <li>• Status of installation of community facilities to be provided as per agreed RP</li> </ul>	
Compensation payments for affected assets is completed		Please state: <ul style="list-style-type: none"> <li>• Total Number of Eligible AHs and APs (as per agreed RP)</li> <li>• Number of AHs and APs compensated as of this monitoring period</li> <li>• Total Budget allocation as per agreed RP</li> <li>• Total budget disbursed to AHs as of this monitoring period</li> </ul>	
Transport assistance for relocating affected HH		As above	
Additional assistance to vulnerable affected household		Please state: <ul style="list-style-type: none"> <li>• Total Number of vulnerable AHs and APs (as per agreed RP)</li> <li>• Agreed forms of assistance as per RP</li> <li>• Number of AHs and APs assisted as of this monitoring period</li> </ul>	
Income Restoration Program		Please state progress per income restoration feature/activity and actual period of implementation	
Temporary impacts have been addressed (affected properties restored to at least pre-project conditions)		Please state: <ul style="list-style-type: none"> <li>• Total Number of AHs affected by temporary impacts as per agreed RP</li> <li>• Actual Number of AHs and total area affected by temporary impacts (if this differs from the projected number, such as in cases of unforeseen project impacts)</li> <li>• Status of restoring affected property</li> </ul>	

<sup>8</sup> To be elaborated further in table 3.b (Issues for Further Action)

**Document : Initial Environmental Examination Report**  
**MFF0054-VIE: PFR3 – Vinh Water Supply Subproject – Vinh City, Nghe An province**

Capacity building activities			

**b. Issues for Further Action**

Issue	Required Action	Responsibility and Timing	Resolution
<b>Old Issues from Previous Reports</b>			
List of RP activities not completed (last column of previous table)			
<b>New Issues from This Report</b>			

**4. Occupational, Health and Safety (OHS) Performance Monitoring**

**a. OHS for worker**

Issue	Required Action	Responsibility and Timing	Resolution
<b>Old Issues from Previous Reports</b>			
<b>New Issues from This Report</b>			

**b. Public Safety**

Issue	Required Action	Responsibility and Timing	Resolution
<b>Old Issues from Previous Reports</b>			
<b>New Issues from This Report</b>			

**5. Information Disclosure and Socialization including Capability Building**

- Field Visits (sites visited, dates, persons met)
- Public Consultations and meetings (Date; time; location; agenda; number of participants disaggregated by sex and ethnic group, not including project staff; Issues raised by participants and how these were addressed by the project team)
- Training (Nature of training, number of participants disaggregated by gender and ethnicity, date, location, etc.)
- Press/Media Releases
- Material development/production (e.g., brochure, leaflet, posters)

**6. Grievance Redress Mechanism**

**Summary:**

- Number of new grievances, if any, since last monitoring period: \_\_\_\_\_
- Number of grievances resolved: \_\_\_\_\_
- Number of outstanding grievances: \_\_\_\_\_

Type of Grievance	Details (Date, person, address, contact details, etc.)	Required Action, Responsibility and Timing	Resolution
<b>Old Issues from Previous Reports</b>			

<b>New Issues from This Report</b>			

**7. Conclusion**

- Important results from the implementation of EMAP/EMoP and RP monitoring
- Recommendations to improve EMAP/EMoP and RP management, implementation, and monitoring

**8. Attachments**

- Consents / permits
- Monitoring data (water quality, air quality, etc.)
- Photographs
- Maps

[illegible]

Ngày.....tháng.....năm 2013

ĐẠI DIỆN CHỦ ĐẦU TƯ

ĐẠI DIỆN CHÍNH QUYỀN ĐỊA PHƯƠNG



ĐẠI DIỆN ĐƠN VỊ TƯ VẤN

Nguyễn Thị Thu Hiền

Cộng hòa Xã hội Chủ nghĩa Việt Nam  
Độc lập - Tự do - Hạnh phúc

## BIÊN BẢN LÀM VIỆC

DỰ ÁN CẢI TẠO MẠNG GIẢM THẤT THOÁT NƯỚC THÀNH PHỐ VINH GIAI ĐOẠN 1

### I. THÔNG TIN CHUNG

Thời gian:

Bắt đầu: ...h ...v... ngày .../... tháng .../... năm ...

Kết thúc: ...h ...v... ngày .../... tháng .../... năm ...

Địa điểm: ... xã ... huyện ... tỉnh ...

### II. THÀNH PHẦN THAM GIA

1. Đại diện Chủ đầu tư:

- Ông/ Bà: .....  
- Ông/ Bà: .....

Chức vụ: .....  
Chức vụ: .....

2. Đại diện đơn vị tư vấn :

- Ông/ Bà: Nguyễn Đình Thanh .....  
- Ông/ Bà: .....

Chức vụ: Cán bộ kỹ thuật .....  
Chức vụ: .....

3. Đại diện chính quyền địa phương:

- Ông/ Bà: Nguyễn Hồng Vỹ .....  
- Ông/ Bà: Phạm Đức Vinh .....

Chức vụ: Chủ tịch xã .....  
Chức vụ: Cán bộ văn phòng .....

### III. NỘI DUNG

1. Họp giới thiệu đại diện
2. Tham vấn ý kiến của xã về dự án
3. Lấy số liệu kỹ thuật xã hội của xã

### IV. Ý KIẾN

Chủ quyền địa phương và người dân xã Nghi Phúc đều nhất trí  
với việc xây dựng hợp về các hạng mục đầu tư của dự án, các vấn  
đề môi trường và các biện pháp bảo vệ môi trường.  
Chúng tôi cam kết đầu tư với mạng lưới cấp nước của dự án  
phù hợp với điều kiện thực địa.



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Ngày.....tháng.....năm 2013

ĐẠI DIỆN CHỦ ĐẦU TƯ

ĐẠI DIỆN CHÍNH QUYỀN ĐỊA PHƯƠNG

ĐẠI DIỆN ĐƠN VỊ TƯ VẤN

Nguyễn Đình Thành



Nguyễn Hồng Vy

### Annex 3: Overall Project Implementation Schedule

1. Project schedule includes: project preparation and project implementation phases.
  - Project preparation phase:
    - Preparation of FS report, basic design and support reporting for ADB's appraisal, PPC approval. Loan negotiation and signing is planned by the end of 2014.
  - Project implementation phase:
    - Geological Survey, topographic surveys, connection status;
    - Detailed designs, cost estimate, prepare construction and equipment supply bidding documents.
    - Update of UMP by the PMU and compliance with GoV regulations;
    - Organization of contractor selection and sign contract;
  - Overall Project Implementation Schedule is presented in the table below:

	Works Contents	Project implementation time schedule																							
		2013				2014				2015				2016				2017				2018			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
A	Project preparation phase																								
1	Preparation of FS, basic design and supporting reports																								
2	Appraisal FS and supporting reports by ADB																								
3	FS, basic design and supporting reports are approved by Nghe An PPC																								
4	Appraisal of VDB Bank																								
5	Negotiation Loan Agreement ADB and GoV																								
6	Establishment of PMU and preparation of project implementation plan																								
B	Project implementation phase																								
1	Topographical surveys, geological survey for designing construction drawing																								
2	Detailed design, cost estimate, bidding documents and bids evaluation																								
3	Update EMP and conduct consultation with downstream communities;																								
4	Coordinate with the Environment Protection Center on regulatory compliance issues																								
5	Civil construction and installation equipment, supervision and handed over using																								
6	Technical Assistance for project implementation																								
7	Technical Assistance for enhancement of O&M																								