

Initial Environmental Examination

September 2014

VIE: Viet Nam Water Sector Investment Program –
Thai Nguyen Water Supply Subproject

Prepared by Thai Nguyen Water Supply Company for the Asian Development Bank.

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THAI NGUYEN PROVINCIAL PEOPLE' COMMITTEE
THAI NGUYEN WATER JOINT STOCK COMPANY

THAI NGUYEN CITY WATER SUPPLY SYSTEM
DEVELOPMENT PROJECT – THAI NGUYEN PROVINCE

REPORT ON INITIAL ENVIRONMENT EXAMINATION & ENVIRONMENTAL MANAGEMENT PLAN



CONSULTANT:



VIETNAM WATER SANITATION AND ENVIRONMENT JSC.



Asian Development Bank

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**THAI NGUYEN WATER SUPPLY SUBPROJECT
THAI NGUYEN CITY, THAI NGUYEN PROVINCE**

FINAL REPORT

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INITIAL ENVIRONMENTAL EXAMINATION REPORT

September 2014

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ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
BOD	Biological oxygen demand
DDSC	Detailed Design Supervision Consultant
COD	Chemical oxygen demand
DO	Dissolved Oxygen
DOC	Department of Construction
DOF	Department of Finance
DONRE	Department of Natural Resources and Environment
DPI	Department of Planning and Investment
DPs	Displaced Persons
EIA	Environmental Impacts Assessment
IEE	Initial Environmental Examination
IEMC/EMC	Independent Environmental Monitoring Consultant
EMP	Environmental Management Plan
EPA	Environmental Protection Association
FS	Feasibility Study
FTA	Federal Transit Administration of United States of America
GoV	Government of Vietnam
GW	Ground water
HC	Hydrocarbons
LIP	Livelihood Improvement Plan
LSC	Labor Safety Committee
MEDP	Minority Ethnic Development Plan
NWL	Normal Water Level
PAHs	Project Affected HHs
PC	People's Committee
PDO	Project Detail Outline
PM	Particulate matter
PMU	Project Management Unit
PPC	Provincial People's Committee
QCVN	Vietnam National Regulation
RoW	Right of Way
RP	Resettlement Plan
RWQM	River Water Quality Model
SC	Steering Committee
TCVN	Vietnam National Standard

TN	Total nitrogen
TNWSJSC	Thai Nguyen Water Supply JSC
TOR	Terms of Reference
TP	Total phosphorus
TSP	Total suspended particles
TSS/ SS	Total suspended solids
URENCO	Urban Environmental Company
VIWASE	Vietnam Water, Sanitation and Environment JS Company
VND	Vietnam Dong
WHO	World Health Organization
WSP	Water Supply Plant
UXO	Unexploded Ordnance

EXECUTIVE SUMMARY

Origin and Main Contents of Project

1. The project, classified as Environment Category B, is judged to have some potential adverse environmental impacts, particularly in relation to pipeline construction activities and, to a lesser degree, the disposal of sludge from the water treatment process. The unavoidable construction impacts are temporary and can be mitigated, whereas adverse impacts related to sludge disposal have been avoided by incorporating sludge dewatering in the design of the water treatment facility.

1. With a fast increasing demand for clean water, there will be a clean water shortage of about 120,000 m³ per day per 2020 for Thai Nguyen city and its neighborhood. However, due to the actual development that was not achieved as plan, Thai Nguyen Water Supply Joint Stock Company reported this problem and was agreed by Thai Nguyen Provincial People's Committee to implement a major project: 'Development of water supply system for Thai Nguyen city until 2025' that include two phases aimed at upgrading the supply capacity with an additional 100,000 m³ of clean water per day splitted in 2 phases of 50,000 m³.. Thai Nguyen Provincial People's Committee signed Decision No. 3050 QĐ-UBND dated December 3rd 2008 on adjustment of the detailed plan on construction of the tourism area in the South of Nui Coc Lake in general and at Voi Phun Hill in particular in order to build a water supply plant with a capacity of 100,000m³ per day. The project presented in this IEE report will be for phase I of the abovementioned big project.

2. The direct beneficiaries of this project are customers who use clean water for purposes of daily living, production and business activities. They include local residents, government officers, students and production as well as business units that use clean water in Thai Nguyen city, in the South of Dai Tu and Phu Luong districts and in the tourism area in the North of Nui Coc Lake.

3. In addition, this project will create temporary jobs for local people through the process of project implementation and expanding plan. Once the project completed, it will expand the clean water company's capacity in production and business and attract more technical engineering job possibilities as well as enhance the company's market competitiveness. Furthermore, the project will contribute considerably to the province's socio - economic development.

4. During the period 2013-2018, main works of the project to be constructed includes:

a) Raw water intake facility and water treatment plant:

- Construction of South Nui Coc Water Supply Plant with a capacity of 50,000 m³/day, including:
- Water intake facility; raw water pumping station; raw water pipeline DN800 to provide 55.000m³/day.
- Reaction tank; Settling tank; Filter tank; Storage tank
- Sludge pond;
- Clean water pumping station;
- Administrative and chemical testing building;
- Guard house;
- Costs of leveling, constructing bulkheads, building roads and plant fence;
- Transformer station and power system: install two 250 KVA machine for the water treatment plant area and install one 560 KVA and one 250 KVA machine for raw water pumping station

- Plant fence; yard, internal roads;
- Internal water supply pipeline system ;
- Drainage system.

b) New installation of pipelines and distribution network:

- Transmission pipeline DN 800: 1000 m;
- Transmission pipeline DN 700: 4710 m;
- Transmission pipeline DN 600: 5550 m
- Transmission pipeline DN 400: 6050 m;
- Transmission pipeline DN 300: 5000 m;
- Transmission pipeline DN 200: 7090 m;
- Transmission pipeline DN 150: 9330 m;
- Transmission pipeline DN 100: 3900 m;
- Service pipelines DN 50, DN 63: 62010 m;
- HH connections: 4134

Negative Impacts and Mitigation Measures

5. The table below presents the main anticipated negative impacts and the associated mitigation measures.

Phase	Impacts	Mitigation measures
<i>Construction of the water supply plant (including supporting works such as raw water pumping station, raw water pipeline, and sludge pond)</i>		
Construction	Impacts on air environment <ul style="list-style-type: none">- Dust from transportation and construction.- Noise, vibration from transportation and construction machines during excavation and filling activities.- Emission gases from transportation and construction activities.	<ul style="list-style-type: none">- Transportation trucks must be tank-covered and regularly washed after each working day.- Do not let machine run in idle mode.- In hot and dry days, regularly spray water on transportation routes on construction sites to suppress dust.- Sites of soil excavation and filling for ground leveling must be stabilized as soon as possible to reduce dust generation.- For the part of the construction site, which is close to the temporary transit reception station for treated drug users, it is necessary to set up the fence to minimize impacts caused by dust and noise.- Transportation is not allowed from 21h-6h to not affect the sleep time of local residents living along the transportation routes leading to the construction site of the water supply plant (Road 267 and 270)- Do not use heavy machines for construction in the parts close to the temporary drug addiction

Phase	Impacts	Mitigation measures
		<p>treatment center during 21h-6h.</p> <ul style="list-style-type: none"> - Provide containers in assembly sites for construction materials and wastes. - Construction machines needs to have registration certificate on environmental protection. Regular maintenance of construction machinery to operate smoothly and reduce emission gases and noise.
	<p>Water and soil environment:</p> <ul style="list-style-type: none"> - Domestic wastewater from worker's construction camps. - Wastewater from machines washing contains oil and solid particles - Flooding on construction site in case of heavy rains 	<ul style="list-style-type: none"> - Domestic wastewater (shower, washing and cooking) of workers must be completely collected, the primarily treated (through rakes and filter) before discharging into the existing combined drainage system at the foot of Voi Phun Hill. - To save water, parts of the domestic wastewater mentioned above (after primary treatment) can be reused for spraying to suppress dust on construction sites. - Wastes from toilets are not allowed to discharge into the surrounding environment. Sign a contract with a professional organization (e.g., URENCO) to provide mobile toilets and collect wastes. - Do not wash trucks and machines outside the designated washing areas - Construct a specialized washing area, which is equipped with traps to collect oil and solid particles. - Because of high ground level of the construction site (+ 79 m to + 80 m on Voi Phun Hill), it is necessary to construct an efficient temporary drainage system, stabilize taluses and reduce disruption to vegetative cover in order to minimize landslide and soil erosion. - Prepare stand-by pumps to pump rainwater in case of floods (especially when constructing the sludge pond). - Timely implement construction plan, avoid delay or elongation in construction time (especially during the rainy season from June to October)

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Phase	Impacts	Mitigation measures
	<p>Solid waste:</p> <ul style="list-style-type: none">- Domestic solid waste- Construction spoils: excavated soil, concrete pieces, sand...	<ul style="list-style-type: none">- Daily collection of solid waste on construction sites, designate assembly places for domestic solid waste to encourage workers not to dump garbage indiscriminately.- Contract with a professional organization (e.g. URENCO) to collect and transport domestic solid waste to a sanitary landfill site.- Construction spoils, mainly demolition wastes, need to be collected, and classified into different categories for treatment.- Used oil from trucks and construction machines need to be collected into specialized container for subsequent treatment or reuse. The oil must not be discharged in the environment.- Improve awareness on environmental protection of workers; Make regulations on waste disposal on construction site.
	<p>Impacts on ecological system: construction activities as well as worker, if not managed well, can disrupt trees and water environment of Nui Coc Lake nearby</p>	<ul style="list-style-type: none">- Construction activities must be restricted inside the boundary of the construction site.- Hunting, fishing and keeping as well as buying and selling wild animals must be strictly prohibited
	<p>Social impacts:</p> <ul style="list-style-type: none">- Conflict between local residents and workers.- Disruption on production activities of local residents- Because of high concentration of workers on construction site, social security in the area needs to be considered.	<ul style="list-style-type: none">- Avoid delay or elongation in construction time.- Coordinate with local administration to implement legal management on immigrated workers.- Set-up regulation on working time at construction site. Workers need ID card to enter the construction site, making it easy to manage them.- Disclose progress and time schedule for construction activities, logistics of construction materials at construction sites.- Set up lightning system on construction sites when needed.- Coordinate with local police or contract a private security guards agency in securing construction sites, especially at construction material assembly sites. This is to prevent thieves entering the site and minimize losses.
	<p>Impacts on traffic system:</p> <ul style="list-style-type: none">- The traffic on the route used to serve the main construction site of water supply plant at Voi Phun Hill (road 267 and 270) will be disrupted during the construction	<ul style="list-style-type: none">- Place sign boards on the access road to the construction sites- Set-up speed limit signs on the construction sites.- Clearly mark up the boundary of construction sites

Phase	Impacts	Mitigation measures
	time. - Risk of traffic accidents	- Divert traffic flow - Limit the speed of transportation trucks in sensitive spots (e.g. Phuc Xuan market, Phuc Xuan and Quyet Thang primary school, etc.), - Arrange the transportation time not to coincident with rush hours (especially on road 270, which has a bus route and a number of offices and schools) - Ensure that the brake, horn and lighting systems on the trucks are in good working condition. - Educate drivers to obey traffic laws
	- Labor safety: risks of accidents for workers working on construction sites	- Equipped full protection gear for workers working on construction sites. - Provide training on labor safety for workers. - Prepare first aid equipment and staff on construction sites - Ensure reasonable living conditions for workers: provide them with camps, which are supplied with electricity, clean water and fire extinguishers. - Periodically check safety equipment and their operation manuals on construction site. - Safety-equipment operating staff and construction workers must be trained to react promptly in case of accidents. - Set-up regulations and warning with regard to safety on construction sites. - Establish a full lightning system for night shifts on construction sites. - Regularly perform health check for workers on construction sites.
Operation	- Waste sludge from settling and filtration equipment of the water supply plant could contaminate their aquatic environment	- Pipeline that conveys waste sludge from water supply plant to sludge pond must be regularly checked to find any signs of damage. - Sludge pond must also be maintained periodically to prevent risks of leaking or overflowing (especially in case of heavy rain). - Sludge from sludge pond must be transported and discharged into a designated disposal site according to the relevant provincial regulations. - Transportation trucks must be covered tightly and carry a weight under the allowable tonnage in order to prevent leaking and spilling on transportation routes.

Phase	Impacts	Mitigation measures
	<ul style="list-style-type: none"> - Risks during operation of water supply plant: power blackout, chemical spills. 	<ul style="list-style-type: none"> - Maintain an electric generator in operating condition. - Chemicals should be dosed according to regulations standards and specific jar tests. - Chlorate room must be installed with an automatic leak detecting system, ventilation system, emergency exit system and warning sign boards as well as operation manuals for different equipment - Ensure that staffs operating chlorine-gas disinfectant strictly follow the defined procedure and regulations. Manipulation of tanks and tanks connection procedures should be done while wearing a breathing apparatus. - Regularly check chemical storehouse to prevent leakages to the surrounding environment. - Implement plans to check labor safety, practice fire drill as well as to react in case of chemical spill or leakage - Periodically perform health check for staff operating the water supply plant
	<ul style="list-style-type: none"> - Quality of water produced at the water supply plant 	<ul style="list-style-type: none"> - Regularly control quality of raw water at the input to adjust treatment. - Regularly control quality of the treated water at the output of the plant to make sure that it meets allowable standards.
	<ul style="list-style-type: none"> - Potential impacts by solid waste and wastewater from workers operating the water supply plant. 	<ul style="list-style-type: none"> - Solid waste must be collected regularly and concentrated into a designated place before collection and transportation to the sanitary landfill site of Thai Nguyen City. - Domestic wastewater of workers must be directed into the drainage system of the plant, primarily treated (e.g. by garbage screen, settling and sand filtration) before being discharged into the common drainage system at the foot of the Voi Phun Hill. -
Installation of main water supply pipelines		
Construction	<p>Impacts on air environment.</p> <ul style="list-style-type: none"> - Dust, noise and gas emissions generated from transportation and other on-site construction activities such as channel excavation, back filling and road asphaltting will cause negative health impacts to on-site workers and local 	<ul style="list-style-type: none"> - Construction sites for installation of main pipelines are largely dispersed (on a total length of > 30 km) throughout the territory of different wards and communes. Therefore, it is necessary to install the main pipelines section by section. Whenever a section is completed, the ground has to be back-filled and returned to its initial situation.

Phase	Impacts	Mitigation measures
	<p>residents living on both sides of the roads where the main pipelines will be laid down.</p>	<ul style="list-style-type: none"> - Before starting construction in any ward or commune, there must be official information (in written form) to local administration and residents. - Restrict construction activities during 21h-6h in the road sections with a high population count living on both sides (e.g. the areas on road 270 passing by Phuc Xuan market and areas on the road Z115, especially the roads leading to the city,) - For the pipeline sections passing by the gates of schools (Quyet Thang primary school, Phuc Xuan primary and secondary school on road 270, Thai Nguyen university on road Z115) it is necessary to restrict construction activities during school time especially at the school opening and closing time. - For the pipeline sections that intersect with the access road leading to pagodas (such as Lang Ca, Phu Son and Ba Dong Gio pagoda, which face road 270), it is necessary to arrange the construction activities to avoid festive days, when there are more people going to worship at pagodas. - Other mitigation measure as same as those mentioned above for construction of the water supply plant apply.
	<p>Impacts on water and soil environment:</p> <ul style="list-style-type: none"> - Channel-digging can cause damages to existing drainage system. - Soil, excavated and transported (as well as oil leaking from working machines) can contaminate the surrounding environment especially in case of heavy rain. 	<ul style="list-style-type: none"> - Before starting pipeline installation, it is necessary to contact with relevant authorities to fully understand the present situation of existing underground structure (especially the underground drainage system) in the construction sites. - Soil excavated from channels dug for pipeline installation must be piled up properly so that it does not block nearby existing drainage system. Install pipelines section by section and; after each section, back-fill the dug channel and restore the ground to the original condition as soon as possible. The remaining excavated soil can be used to fill the low-lying, non-natural, areas around to minimize cost and air pollution from transportation activity. - For the pipeline sections that cross a bridge or are situated close to the bank of Nui Coc Lake (specifically, the pipeline connecting the intersection between road 267 and 270 with North Nui Coc Lake Tourism Area), the construction sites must be fenced on the side facing water body. Small construction machinery must be use. This is to prevent excavated soil falling into the water body. Installation in those areas should be done

Phase	Impacts	Mitigation measures
		<p>during the dry season.</p> <ul style="list-style-type: none"> - Impose a maintenance schedule to transportation trucks as well as construction machines to prevent lubricant oil and fuel leaking.
	<p>Solid waste:</p> <ul style="list-style-type: none"> - Domestic wastewater from workers - Construction waste - Hazardous waste: mainly oil leaking from machines, 	<ul style="list-style-type: none"> - As same as the above-mentioned mitigation measures applied for construction of water supply plant.
	<p>Social impacts:</p> <ul style="list-style-type: none"> - Disruption to living and productions activities of local residents (if the construction time is delayed or elongated) - Public security need to be considered due to concentration of a large number of workers on construction sites. 	<ul style="list-style-type: none"> - As same, as the above-mentioned mitigation measures applied for construction of water supply plant complete the pipeline installation section by section; restrict construction activities during night time and especially during rush hours. - Keep up installation progress according to schedule (minimize delay)
	<ul style="list-style-type: none"> - Traffic safety: Traffic flow on the roads proposed for installation of the main water pipelines (see on the diagram of total layout of the project in the Appendix) will be interrupted by construction activities during pipeline installation and transportation of excavated soil. . 	<ul style="list-style-type: none"> - Road 267 and 270 are also used as main transportation routes for construction site of water supply plant. Therefore, when the pipelines are installed on these roads, it is necessary to suitably arrange working schedule to avoid accumulated traffic impacts on these roads. - Implement traffic diversion; set-up warning signs on speed limit and construction sites; Assign traffic guiding staff, especially in the construction site for installation of pipeline alongside the section of national highway Nr. 3. This is because on this road section there are quite a lot of car and trucks running at high speed. - Coordinate with local government and traffic police to control traffic on the roads where pipelines will be laid down. - Require transportation truck drivers to strictly obey the traffic law. - Clean up excavated soil that is excessive from channel digging activities. Re-asphalt carriage way or re-pave the sidewalks after the pipeline installation is completed. - Unload construction materials only at designated assemble sites, so that the traffic flow will not be significantly interrupted.
Operation	<ul style="list-style-type: none"> - Operate and maintenance 	<ul style="list-style-type: none"> - Regularly, maintenance the pipelines (by

Phase	Impacts	Mitigation measures
	<p>pipelines</p> <ul style="list-style-type: none"> - In the case of incident, the pipeline may have to be dug out. This will impact on the traffic - 	<ul style="list-style-type: none"> - washing with high pressurized water) according to the technical procedure - Regularly check pipelines for signs of damage and leaking to timely fix the problem. - Solid particles cleaned from the inside of pipelines must be disposed of at designated dumping sites - Strictly follow regulations on sanitary and labor safety for workers performing pipeline maintenance.

Information Disclosure, Public Consultation, and Grievance Redress

6. As regulation of Vietnamese law, to capacity over 50,000 m³/day to work using raw water like the Thai Nguyen WTP and per ADB Safeguard Policy Statement, it is necessary to conduct public consultation. As such, consultation on option of construction of WTP, technology processes, water supply alternatives, etc. is essential as a part of actual survey in project preparation. Therefore, public information and consultation activities were carried out as part of a baseline survey of local environmental conditions along the projects sites. In February 2012, 7 communes and wards in Thach That, Quoc Oai and Hoai Duc Districts were met to expose the strategy. HHs near the pipeline route and WTP site, were covered.

7. Through environmental consultation, local leaders and some HHs were introduced about project, environmental impact and mitigation measurements, project implementation schedule and relevant environmental issues. Overall, there was no opposition raised against the proposed project.

8. Three-step complaints solving procedure will be established to handle environmental impacts and land occupation. As a guideline, any complaints to any project's aspects will be solved through negotiation to get agreement. Complaints will be submitted toward 3 levels of entities: 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. TNWSJSC will bear all administrative and legal cost arising in such complaint solving processes.

Environmental Monitoring

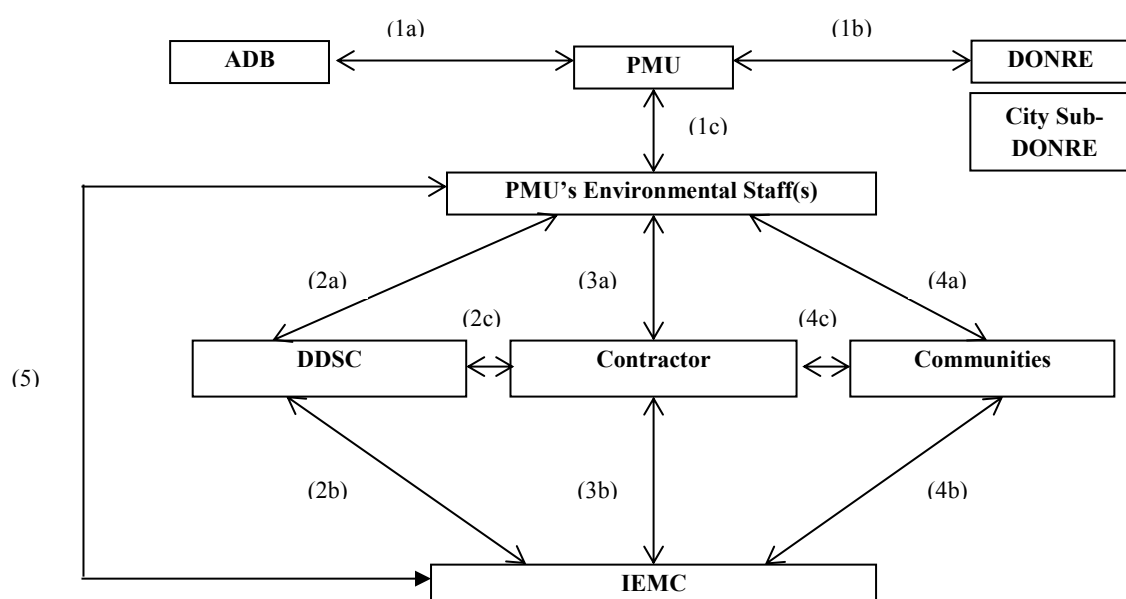
9. Environmental monitoring program will be implemented during three stages of the project, namely, pre-construction (or site clearing), construction and operation stage (for the first year of operation). The following table lists the quantities of surface water and air samples as well as the costs for sampling and analyzing those samples during the abovementioned three stages of the project.

No	Content	Unit	Quantity	Price (VND)	Total (VND)	Total USD)
1	Surface water sample	Sample	45	2,086,333	93,884,985	4463.06
2	Air sample	Sample	45	1,738,412	78,228,540	3718.80
Sum (1+2)					172,113,525	8181.86

Note: exchange rate was 21,036 VND per 1 USD in April 2013

Organization for EMP Implementation

10. The organization is presented in the following diagram



11. Implementation of the project's EMP should comply with the Vietnam's laws and regulations as well as ADB's safeguard policies. Local community has right and should be encouraged to participate in environmental supervision during project implementation.

12. The cost for hiring independent environmental monitoring consultant (IEMC) is estimated at 21,300 USD.

Project Implementation Schedule

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

Tasks	Tentative schedule
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 rd Quarter 2015
Coordinate with the Environment Protection Center on regulatory compliance issues	All duration of the project
Construction duration (24 months)	Start Early 2016

Conclusions

14. The project on development of water supply system for Thai Nguyen city is feasible and in compliance with orientation in master plan for socio-economic development of Thai Nguyen city in particular and Thai Nguyen province in general. The project will upgrade clean water supply and improve economic efficiency as well as reduce losses in water resources caused by indiscriminate exploitation of underground water and leaking in the existing water pipelines.

This environmentally beneficial project will enhance capacity in clean water supply, offering Thai Nguyen city a synchronous and safe water supply system. This will contribute to the improvement of living conditions and meet the local residents demand in using clean water supplied by Thai Nguyen Water Supply JSC. The project will also help increase public awareness on environmental protection.

15. Content of the IEE report complies with present requirements on environmental assessment of Vietnamese Government as well as environmental safeguard policies of ADB.

16. The IEE report has identified and assessed most of environmental impacts from planning/designing stage through construction stage to operation stage. During environmental assessment process, negative impacts were quantitatively assessed based on theoretical and empirical calculation formulas as well as on statistical data and experience with the similar projects that were already completed. However, most methodology is not capable of exactly quantifying impacts, thus most results on impact's quantification is only relatively accurate. As a result, during project implementation, it is necessary to adjust mitigation measures to adapt to real conditions. This should be done based on the expertise of the Environmental Monitoring Consultant (EMC).

17. It is recommended that Thai Nguyen Provincial People's Committee direct local administration and relevant departments to closely collaborate with PMU in the area of environment protection for the entire project implementation from preparation, construction to operation phase of the project components.

9. 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.

Chapter 1. INTRODUCTION

1.1. Origin of the project

1. Thai Nguyen city is the cultural, economic and political centre not only of Thai Nguyen province but also of Viet Bac region. It was founded in 1962 and has been classified by the Government as a member of the urban network of the central cities in the Northern provinces. The Prime Minister signed Decision No. 1645/QĐ-TTg (September 1st 2010) that recognized Thai Nguyen city as the urban city type I, 5 years earlier than the time expected according to the urban upgrading program from 2009 to 2020. The city's construction master plan until 2020 has been adjusted with the goal of developing urban infrastructure in the direction of synchronization and modernization in order to develop economy and society and to make Thai Nguyen become one of the economic, cultural and social centre of the Northern mountainous midland region. The estimated total demand for water supply for the whole city by 2020 is 137.000 m³ per day when the current water supply capability of Thai Nguyen Water Supply Joint Stock Company is only 43,000 m³ per day since an upgrade in 2011. Such huge demand for water is due to the urban expansion, tourism development, construction of industrial parks, and establishment of universities. Particularly in terms of industry, the Prime Minister signed Document No. 1854/-KTN TTg dated October 10th 2009 on adjusting and supplementing the plan on Thai Nguyen industrial zones, including establishment of Chien Thang Industrial Zone, 2000 hectares, in Tinh Dan Ward, Thai Nguyen City. In terms of education, the Prime Minister approved the plan to develop Thai Nguyen university in phase I (Decision No. 600/QĐ –TTg on August 1st 1997). The Prime Minister also agreed to establish Viet Bac university on Document No. 806/TT-KGVX dated May 27th 2008. The project is in the process of land acquisition and site clearance. In addition, there are various universities, colleges and training schools in Thai Nguyen city that annually attract lots of students who have great demand for clean water. The Ministry of Education and Training has planned Thai Nguyen university as the regional university of in the North and the project is being implemented on schedule. In terms of urban development, the city has established the project on infrastructure upgrading and development and has mobilized ODA funds for this project. In terms of tourism: 2/3 of Nui Coc Lake area belonging to the city has become a famous national tourist attraction and it has also been planned by the Ministry of Culture, Sports and Tourism to be one of the national tourist sites.

2. With a fast increasing demand for clean water, by 2020 there will be clean water production incapacity of about 120,000 m³ per day for Thai Nguyen city and its neighborhood. However, due to actual developments not achieved as the plan, Thai Nguyen Water Supply Joint Stock Company reported this problem and was agreed by Thai Nguyen Provincial People's Committee to implement a major project: 'Development of water supply system for Thai Nguyen city until 2025' that include two phases aimed at upgrading the supply capacity with additional 100,000m³ of clean water per day (of the 2 phases, in phase I an additional 50,000m³ per day will be upgraded). Thai Nguyen Provincial People's Committee signed Decision No. 3050 QĐ-UBND dated December 3rd 2008 on adjustment of the detailed plan on construction of the tourism area in the South of Nui Coc Lake in general and at Voi Phun Hill in particular in order to build a water supply plant with a capacity of 100,000m³ per day. The project presented in this IEE report will be for phase I of the above mentioned project for the production of the first 50,000 m³.

3. It is essential to implement a project to meet the households (HH) increasing demand for clean water. The project with the proposal to build a new water supply plant in the South of Nui Coc Lake tourism area will ensure a sufficient supply to nearby districts and towns such as Phu Binh, Pho Yen, Song Cong, Dai Tu, Dong Hy as well as industrial zones under development in the South, South West and North West of the city. The project's aims are to reduce non-revenue clear water from 40% down to 22% by 2017, and to improve water supply service by providing clean water 24 hours per day and extending service to new customers.

4. The direct beneficiaries of this project are customers who use clean water for purposes of daily living, production and business activities. They include local residents, government officers and production as well as business units that use clean water in Thai Nguyen city, in the South of Dai Tu and Phu Luong districts and in the tourism area in the North of Nui Coc Lake.

5. In addition, this project will create jobs for local people through the process of project implementation and expanding the plan. When the project will be completed, it will expand the clean water needs of the company's production capacities and business and attract more technical engineering jobs as well as enhance the company's market competitiveness. Furthermore, the project will contribute considerably to the province's socio - economic development.

1.2. Goals of the IEE

6. This project is classified as Environment Category B because it is judged to have some potential adverse environmental impacts, especially during construction of an on-hill water treatment facility and during installation of water pipelines, and to a lesser extent, the disposal of sludge from the water treatment process. The unavoidable construction impacts are temporary and can be mitigated, whereas adverse impacts related to sludge disposal can be avoided by construction of a sludge reservoir and by dumping the dewatered sludge into a sanitary landfill.

7. The IEE aims to

- Assess the environment status by surveying, observing and measuring the area;
- Identify impacts of the project on the surrounding areas;
- Propose solutions and measures to prevent, reduce and deal with the negative impacts caused by activities of construction and operations;
- Propose environmental management programs for the project.

1.3. Implementation of IEE

8. PMU of Thai Nguyen City Water Supply System Development Project signed a contract with Vietnam Water Sanitation and Environment JSC (VIWASE JSC) to prepare an IEE report for this project. VIWASE JSC has the following details:

- General Director: Le Van Tuan
- Address: No. 5, Duong Thanh Street, Hoan Kiem District, Hanoi, Viet Nam
- Telephone: (084)(4) 38242873
- Fax: (084)(4) 38641564

9. List of key persons participating in preparation of IEE report for the project is as follows:

- | | |
|-----------------------|-----------------------------------|
| - Nguyen Le Phu | MSc. in Environmental Science |
| - Nguyen Viet Hung | PhD. in Environmental Engineering |
| - Bui Thai Bach Duong | Environmental Engineer |
| - Tran Thi Hien | MSc. in Environmental Science |
| - Trinh Anh Duc | PhD. in Chemistry |

10. Thai Nguyen town water supply project is part of the seven water supply subprojects¹ 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 (see Figure 1).

11. This project, classified as Environment Category B, is judged to have some potential adverse environmental impacts, particularly in relation to the intake and pipeline construction activities and, to a lesser significance, the disposal of sludge from the water treatment process. The unavoidable construction impacts are temporary and can be mitigated, whereas adverse impacts related to sludge disposal have been avoided by incorporating sludge settlement in reservoirs in the design of the water treatment facility.

12. This report was prepared by the Thai Nguyen PMU with support from VIWASE JSC. It was prepared in compliance with the ADB Safeguard Policy Statement (ADB SPS 2009). It follows the standard outline for environmental assessments.

13. The scope of this assessment covers: (a) transmission by pipeline of raw water to be abstracted from a reservoir, (b) water treatment facilities, and (c) treated water distribution.

Figure 2: Location of Sub-Projects



¹ 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)

Chapter 2. LEGAL & ADMINISTRATIVE FRAMEWORKS

2.1. Basis of Laws, Legislations and Regulations

14. Vietnam's Law of Water Resources 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.

15. 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.

16. 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.

17. 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.

18. 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.

19. 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. Decree 80/2006 was added in December 2008 by Decree No. 21/2008 of the Government. By June 2011, all provision relating to the EIA of the investment project were replaced by Decree 29/2011 dated 5/6/2011 of the Government. Then, the MoNRE issued Circular No. 26/2011 guiding the implementation of Decree 26/2011. 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. Environmental Impact Assessment is applied to the investment projects as specified in Decree 26/2011, whereby the agencies who appraise and approve the EIA report are MoNRE, Ministries made decision on investment and People's Committee of provinces and cities. The commitment to environmental protection made for small-scale projects is to be implemented in two forms: environmental protection commitment and NVMT commitment, simply with the approval of authorized DPC or commune/ward.

20. 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.

21. 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.

22. 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 Thai Nguyen DoNRE, an Environment Protection Centre 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 governments, through the People's Committees.

23. The Project required GoV approval through the Thai Nguyen 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 Thai Nguyen DoNRE for the Project. The delay for such approvals can take between 2 months to 3 months once the file is complete.

24. 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.

25. 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.

26. 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.

27. The legal framework this project need to observe contains:

- Water resources Law No. 17 approved by the Socialist Republic of Vietnam dated 21st, June 2012.
- Construction Law No.16/²003/QH11^{ap}proved by the 11th term, 4th session Congress of the Socialist ^{Re}public of Vietnam dated 16th, November, 2003 and published under the Order No.26/2003/L/CTN dated 10th, December 2003 by the State President.
- Environmental Protection Law No. 52/2005/QH11approved by Congress of the Socialist Republic of Vietnam dated 29th, November, 2005 and issued by the State President on 12th, December 2005.
- Vietnam Technical Standard and Regulation Law No. 68/2006/QH11 dated 29th, June 2006.
- Law on Amendment and Addition to some points of the laws relating to basic construction investment No. 38/2009.QH12 dated 19th, June, 2009 of 12th term, 5th session Congress of the Socialist Republic of Vietnam.
- Decree No. 179/1999/ ND-CP dated 30th, December 1999 by the Prime Minister about the Regulation on implementation of Water resources Law.
- Decree No. 13/2003/ ND-CP dated 19th, February 2003 by Prime Minister about the Regulation on the terms of harmful/toxic wastes and the transportation of these wastes on the road.
- Decree No. 149/2004/ND-CP dated 27th, July 2004 by Prime Minister about the Regulation on the licensing of exploration, exploitation, water resources use and discharge into water sources.
- Decree No. 140/2006/ND-CP dated 12th, December, 2006 by Prime Minister about the Regulation on the environmental protection in the formulation, appraisal, approval and implementation stages of strategies, planning, plans, programs and development projects.
- Decree No. 59/2007/ ND-CP dated 9th, April 2007 by Prime Minister on solid waste management.
- Decree No. 117/ND-CP dated 11th, July 2007 by Prime Minister on clean water production, supply and consumption.
- Decree No. 174/ ND-CP dated 29th, November 2007 by Prime Minister on environmental protection fees for solid wastes.
- Decree No. 21/ 2008/ ND-CP dated 28th, February, 2008 by Prime Minister on amending, adding some points of Decree No. 80/2006/ND-CP dated 9th, August, 2006 of the Prime Minister on detailed regulations and guiding the implementation of some points in Environmental protection Law.
- Decree No.12/2009/ND-CP dated 10th, February 2009 by Prime Minister on the management of constructional work investment.
- Decree No. 117/2009/ ND-CP dated 31rd, December 2009 by Prime Minister on handling law violations in the environmental protection field.
- Decree No. 29/2011/ ND-CP dated 18th, April, 2011 by Prime Minister about the Regulation on strategic environmental Assessment, environmental impact Assessment and environmental protection Commitment.

- Circular No. 06/2007/ TT-BKH dated 27th, August, 2007 by the Minister of Planning and Investment on guiding the implementation of Decree No. 140/2006/ ND-CP on 22nd, November, 2006 of the Government that regulated environmental protection in the stages of formulation, appraisal, approval and implementation of strategies, planning, plans, programs and development projects.
- Circular No. 02/2009/ TT-BTNMT dated 10th, March 2009 by the Ministry of Natural Resources and Environment about the Regulation on evaluating the possibility of receiving sewages of water sources.
- Circular No. 04/2009/TT-BYT dated 17th, June 2009 by the Ministry of Public Health on the publishing of National technical Regulation on drinking and cooking water.
- Circular No. 05/2009/TT0BYT dated 17th, June 2009 of the Ministry of Public Health on the publishing of National technical Regulation on domestic water.
- Circular No. 16/2009/BTNMT dated 7th, October 2009 by the Ministry of Natural Resources and Environment on the regulation on National technical regulation on the environment.
- Circular No. 26/ 2011/ BTNMT dated 18th, July 2011 by the Ministry of Natural Resources and Environment on the detailed regulation on some points of Decree 29/2011/ND-CP dated 18th, April, 2011 of the Government on the regulation on strategic environmental Assessment, environmental impact Assessment and environmental protection Commitment.
- Decision 256/ QD-TTg dated 2nd, December 2003 by Prime Minister on the approval of National environmental Protection Strategy until 2010 and the orientation to 2020.
- Decision No. 23/2006/ QD-BTNMT dated 26th, December 2006 by the Ministry of Natural Resources and Environment on the publishing of harmful wastes list.
- Decision No. 04/2008/QD-BTNMT dated 18th, July 2008 by the Ministry of Natural Resources and Environment on the publishing of National technical Regulation on the environment.
- Decision No. 16/ 2008/ QD-BTNMT dated 31st, December, 2008 by the Ministry of Natural Resources and Environment on the publishing of National technical Regulation on the environment;

28. Regulations include:

- QCVN 01/2009/BYT - National technical regulation on drinking and cooking water.
- QCVN 02/2009/BYT - National technical regulation on domestic water.
- QCVN 03: 2008/BTNMT- National technical regulation on the permitted limits of heavy metals in soil.
- QCVN 05/2009/BTNMT- National technical regulation on surrounding air quality.
- QCVN 06/2009/BTNMT- National technical regulation on a number of toxic substances in the surrounding air.
- QCVN 26/2010/BTNMT - National technical regulation on noise.
- QCVN 27:2010/BTNMT - National technical regulation on vibration level.
- QCVN 08:2008/BTNMT - National technical regulation on surface water quality.
- QCVN 09:2008/BTNMT- National technical regulation on underground water quality.
- QCVN 14:2008/BTNMT -National technical regulation on domestic sewage.
- QCVN 40/2011/BTNMT – National technical regulation on industrial sewage.

29. Thai Nguyen Province Regulation

- Decision No. 278/2005/ QĐ-TTg dated 02/07/2007 relative to modification and supplement of Master Plan on construction of Thai Nguyen city toward 2020.
- Decision No. 3050/QĐ-UBND dated 03/12/2008 relative to Approval on Modification and Supplement for Detailed Plan on construction of the tourism area in the South of Nui Coc Lake, in which Voi Phun Hill will be reserved for construction of a water supply plant with a capacity of 100,000 m3/ day.
- Decision No. 2009/QĐ-UBND dated September 7th 2012 on approval of the Thai Nguyen City Water Supply System Development Project.
- Decision No. 1802/QĐ-UBND dated 19/07/2011 on approval of cost estimation for monitoring air, surface water, soil, ground water and industrial gaseous exhaust in Thai Nguyen province

ADB Safeguard Policy Statement (SPS) dated June 2009.

2.2. Administration of Project Implementation

30. The project will be managed and implemented in compliance with the regulations of the Government of the Social Republic of Vietnam, Asian Development Bank (ADB) and the Vietnam-ADB signed credit agreement.

31. The project governing organization: Thai Nguyen Provincial People' Committee (PPC) will be the project investor. Thai Nguyen PPC will be the Vietnam side's organization authorizing to approve the project and the relevant documents. The Committee through its relevant departments for example department of planning and investment, department of construction... will direct the implementation of the project from the preparation process for investment to the process of the implementation of the project according to capital loan agreement signed with ADB.

32. Owner: Thai Nguyen Water Supply JSC will be in charge of implementation of the project. The company will be assigned tasks of managing and using the capital of investment and development of the project according to the direction of Thai Nguyen PPC.

33. Project Management Unit (PMU) under Thai Nguyen Water Supply JSC: After authorities' approval on the project and signing of the capital loan agreement, PMU will be the Owner's representative. PMU will directly organise, implement the project until the item works of the project would be tested for acceptance, and put them into operation. Traditionally, PMU has the following function and task:

- Implement the land compensation and the ground clearance according to the responsibilities of Owner.
- Assess the technical design, planning and drawing of building; and estimate volume and size of each item works.
- Select Contractor in the process of construction.
- Manage the quality, volume, schedule and cost of investment of each item works.
- Ensure labour safety and the environmental hygiene at site.
- Set up the ceiling and unit price of building works.
- Check and test the quality of building materials, assess the quality of the works according to the request of Owner.

Document : Initial Environmental Examination Report:

MFF0054-VIE: PFR3 – Thai Nguyen Water Supply Subproject – Thai Nguyen City, Thai Nguyen province

- Assess and recognise meeting the quality standard of the works.
- Test for acceptance, pay and complete the contract; pay and disburse the investment capital of the works.
- Test for acceptance, transfer the works.
- Implement the opening ceremony; propagandize and advertise about the works.
- Implement some other affairs of management.

Chapter 3. PROJECT DESCRIPTION

34. The water supply system of Thai Nguyen City has an actual capacity of 43,000 m³/day with two water treatment plants, one using groundwater (13,000 m³/d) and another one treating surface water (30,000 m³/d). The final goal with this project is to install 100,000 m³, refurbish and implant new pipelines routes and distribution network by 2020 to provided water for the existing and uprising developments.

35. The proposed project consists in:

- Construction of intake, pumping station and 0.17 km D800 raw water pipe
- Construction of a new Water Treatment Plant capacity 50.000 m³/day;
- Construction 2 reservoirs 5,000 m³ each
- Construction of 22 km transmission pipes D300-D800, 20 km distribution pipes D100-D200 and 62 km service pipes D50
- Installation 4,134 house connections.
- Support for the implementation and operation of the project

36. The project will benefit about 50,000 HHs with improved services and an additional 26,000 HHs receiving piped water for the first time. Water supply coverage targets for 2020 are 100% (from 88% in 2012) for the urban population and 40% (from below 10% in 2012).

3.1. Project's Name

Project name: Thai Nguyen City Water Supply System Development Project

Project Executing agency: Thai Nguyen Provincial People's Committee

3.2. Project Owner

37. Project Owner and also Project Operator: Thai Nguyen Water Supply Joint Stock Company is responsible for implementing project steps in the right basic construction order and legal requirements

Address: Ben Oanh Street, Thai Nguyen City, Thai Nguyen Province
Phone number: +84-0280-3857281; Fax number: +84-0280-3852976
Email: nuocsach_tn@gmail.com

38. Project implementing agency: Project Management Unit under Thai Nguyen Water Supply Joint Stock Company.

3.3. Project Location

39. The project will be implemented in Thai Nguyen City (see Figure 2). Main project items include:

- The water intake facility, the raw water pipeline and the water treatment plant are proposed to be located at Voi Phun Hill in the southern tourist region of Nui Coc Lake, Phuc Triu commune, Thai Nguyen city. Figure 3 shows the layout of these works.
- Distribution main pipelines to be constructed in Thai Nguyen City area

3.4. Area of influence of the Project

40. The area of influence of the project includes the water intake area including, the downstream user, the area along the raw water pipe and around the WTP and the area served by the new pipe network. All components are located within of the administrative limits of Thai Nguyen City. Nui Co Lake is also partially within Thai Nguyen City. It includes 19 inner wards and 9 communes of Thai Nguyen city.

41. The Project will not rehabilitate any existing facility. All components under the Project will be new construction.

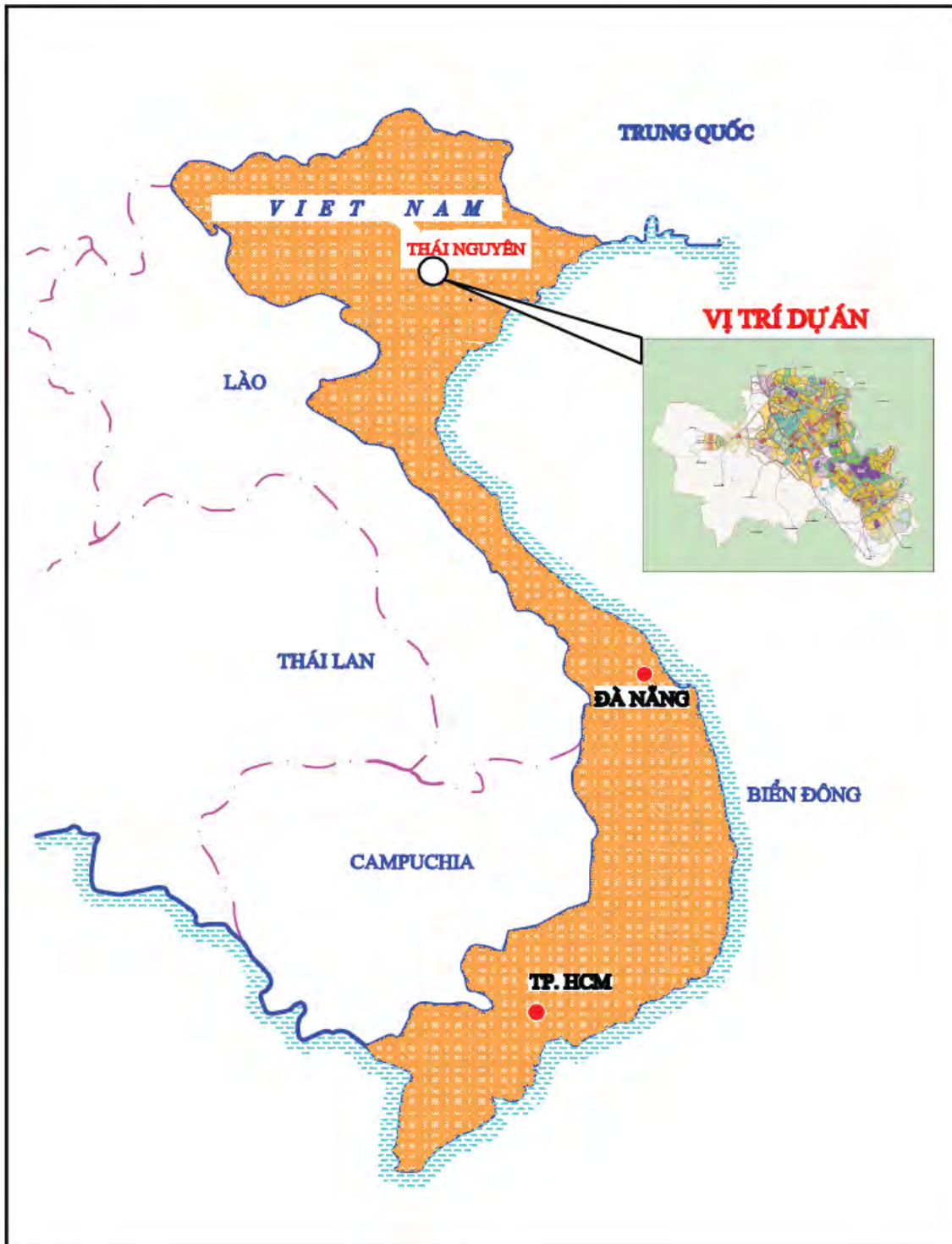


Figure 3: Project location.

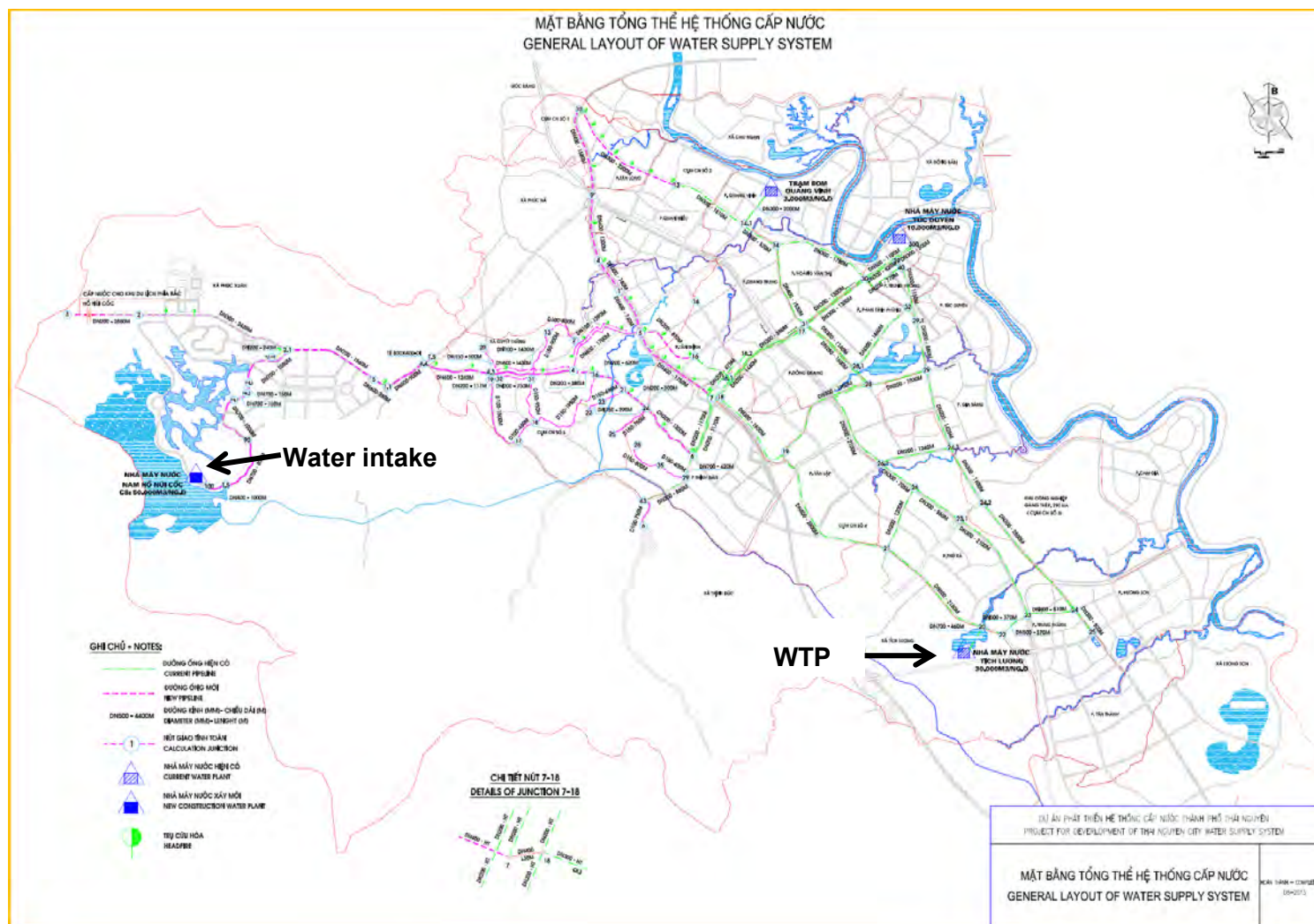


Figure 4: General layout of the project's items

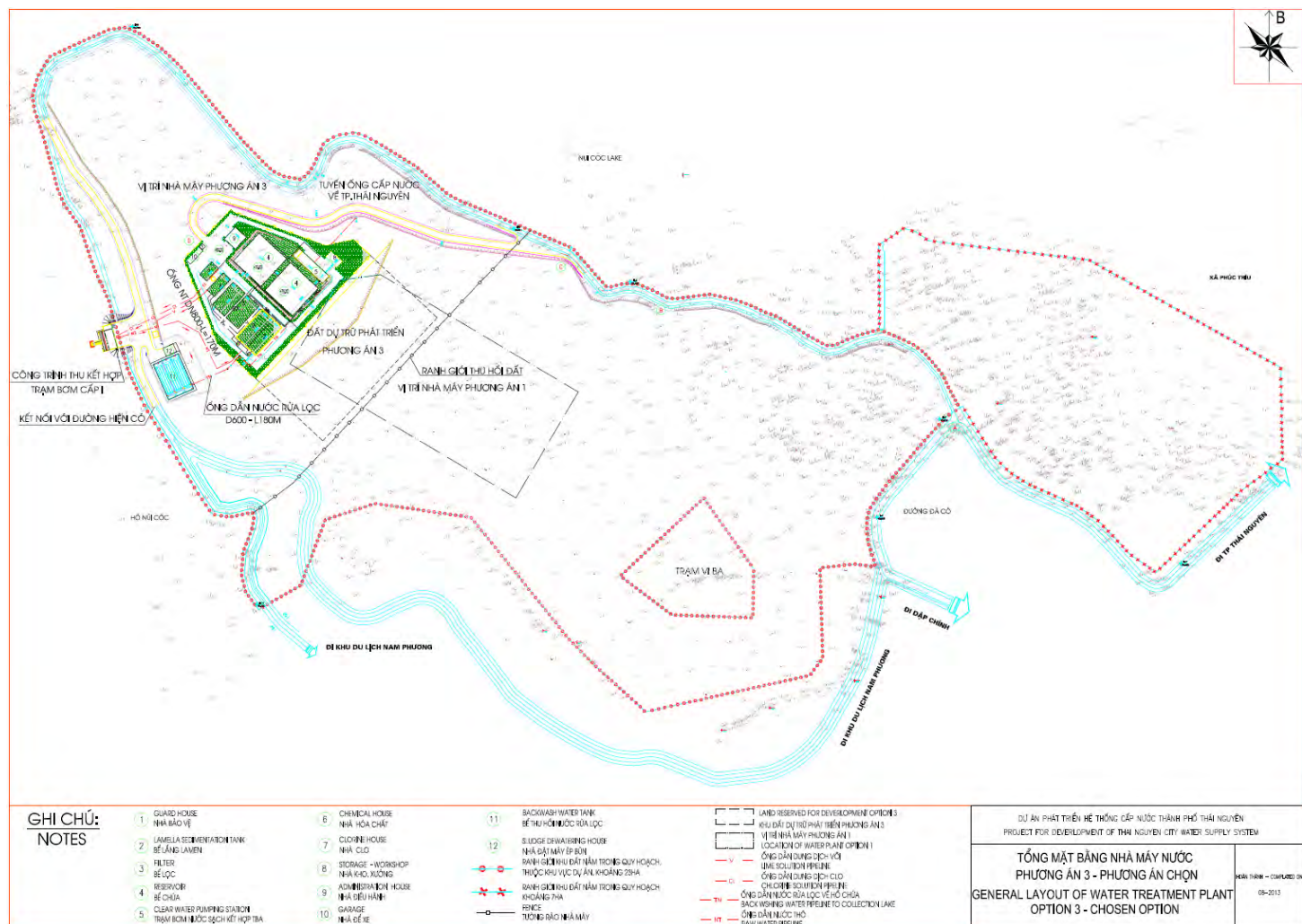


Figure 5: General Layout of the Voi Phun hill WTP facility

3.5. Project's Major Contents (of the selected alternative):

3.5.1. The project's objectives

42. The main objectives of the project are to improve water supply service and to ensure a safe and sustainably developed water supply through improvement of clean-water producing capacity, and expansion of the water supply system. This helps contribute to improving living conditions and public health in Thai Nguyen City.

3.5.2. Volume and scale of project items

43. Project associated with the construction of a new water supply system with the capacity of 50,000 m³/day, including the construction of South Nui Coc WTP, installation of level 1 transmission pipelines, connecting to the Thai Nguyen city's existing water supply network whereby extending the water supply scope, increasing the number of beneficiaries of the clean water supply services, initially meeting the demand for clean water for activities and productions, contributing to the Thai Nguyen's socio-economic development in general.

44. The project includes the following items:

- Level 1 pump station in combination with raw water intake facility
- Raw water pipeline
- Water treatment plant including raw water treatment facility, level 2 pump station, chemical house, water tank, administration house and other ancillary works.
- Transmission water pipeline DN800-DN300
- Connection to water meters at HHs

45. The amount of project investment is as follows:

a) Raw water intake facility and water supply plant:

- Construction of South Nui Coc Water Supply Plant with a capacity of 50,000 m³/day, including:
- Water intake facility; raw water pumping station; raw water pipeline DN800 (170m) to provide 53.000m³/day. Install a number of water pumps to be relevant to the required capacity
- Reaction tank; Settling tank; Filter tank; Storage tank
- Sludge pond (reservoir) ;
- Clean water pumping station;
- Administrative and chemical testing building;
- Guard house;
- Costs of leveling, constructing bulkheads, building roads and plant fence;
- Transformer station and power system:
- Plant fence; yard, internal roads;
- Internal water supply pipeline system ;
- Drainage system.

b) New installation of pipelines system:

- Transmission pipeline DN 800: 1000 m;
- Transmission pipeline DN 700: 4710 m;
- Transmission pipeline DN 600: 5550 m
- Transmission pipeline DN 400: 6050 m;
- Transmission pipeline DN 300: 5000 m;
- Transmission pipeline DN 200: 7090 m;
- Transmission pipeline DN 150: 9330 m;
- Transmission pipeline DN 100: 3900 m;
- Service pipelines DN 50, DN 63: 62010 m;
- HH connections: 4134

46. The Project will only rehabilitate existing facilities (water network). 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.

3.5.3. Description of construction works and production technology, project operation

47. Water treatment plant is proposed to be built on the northwestern side of Voi Phun Hill at an elevation of +79 to +80,0 m. Treatment plant is on the mountain side so a new access of 390 m long need to be built on a gentle slope.

Raw water intake facility and raw water pipeline

48. Raw water from Nui Coc Lake will be taken to the treatment plant located on Voi Phun hillside to be treated. The obtained analytical results on lake water samples indicated that turbidity and suspended sediment content is low. Therefore the water intake will be directly in the lake without having to build a sedimentation processing tank. One 170m long DN800 pipeline will be installed to carry raw water to the treatment plant located on Voi Phun Hill. The layout of the intake and the raw water pipeline is presented in figure 5.



Water Treatment Plant

49. Technological line of water treatment station is as follows (Figure 6.): Raw water goes through mixing equipment to mix with Alum solution and raise ph as needed. Then raw water will flow into the reaction tank where the flocculation will occur. Alum will combine with suspended sediment particles in water to form flocks. The water with the formed flocks will then transfer to the settling tank.

50. In the settling tank, with a low speed water flow and laminar flow regime, the larger weight sediment flocculation will settle to the bottom, water after the sedimentation is collected by surface water collection gutters then flows to the filter. The settling tank here is applied lamella plates technology to direct water flow following bottom up direction, divide it into thin layers that is increasing sedimentation area so the sedimentation impact is high, and reduce settling tank construction area much more than the normal horizontal settling tank.

51. Rapid gravity filter using available manufacturing shaped water collection gutters system will be implemented. Advantages of the water collection gutters are the easiness of installation and adjustment, a shorten execution time, a stable hydraulic operating regime and a high durable floor quality. After filtration, water entering storage tank will be mixed with chlorine solution to sterilize before distributing to the distribution network.

52. Secondary pumping station in the option will use variable speed pump to regulate flow and pressure in the network to ensure adequate water supply during rush hour of water use. Then Clean Water will be provided to the city by combined method using water pumping station II and self-flow from storage tank by gravity flow. Secondary pumping station uses variable speed pump to regulate flow and pressure in the network to ensure adequate water supply during peak water use.

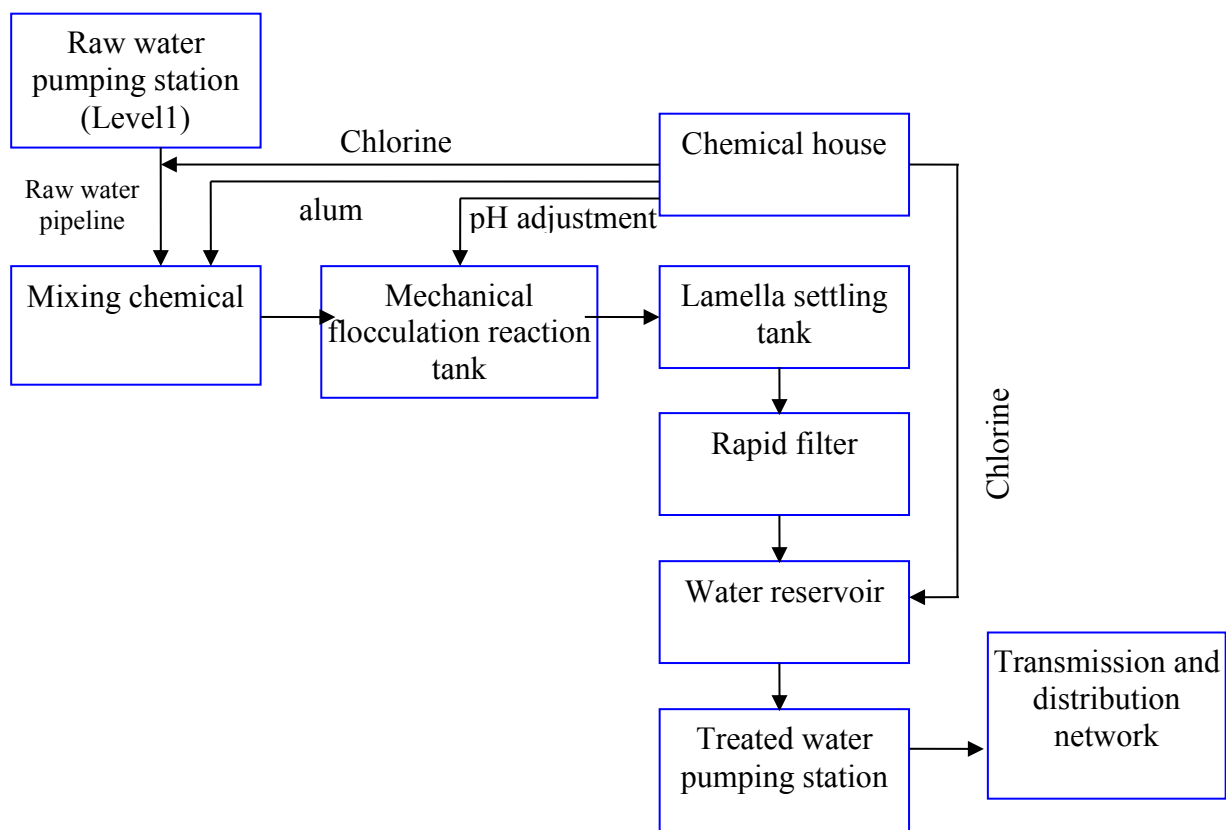


Figure 7: Flow chart of the treatment technology applied in the water treatment plant

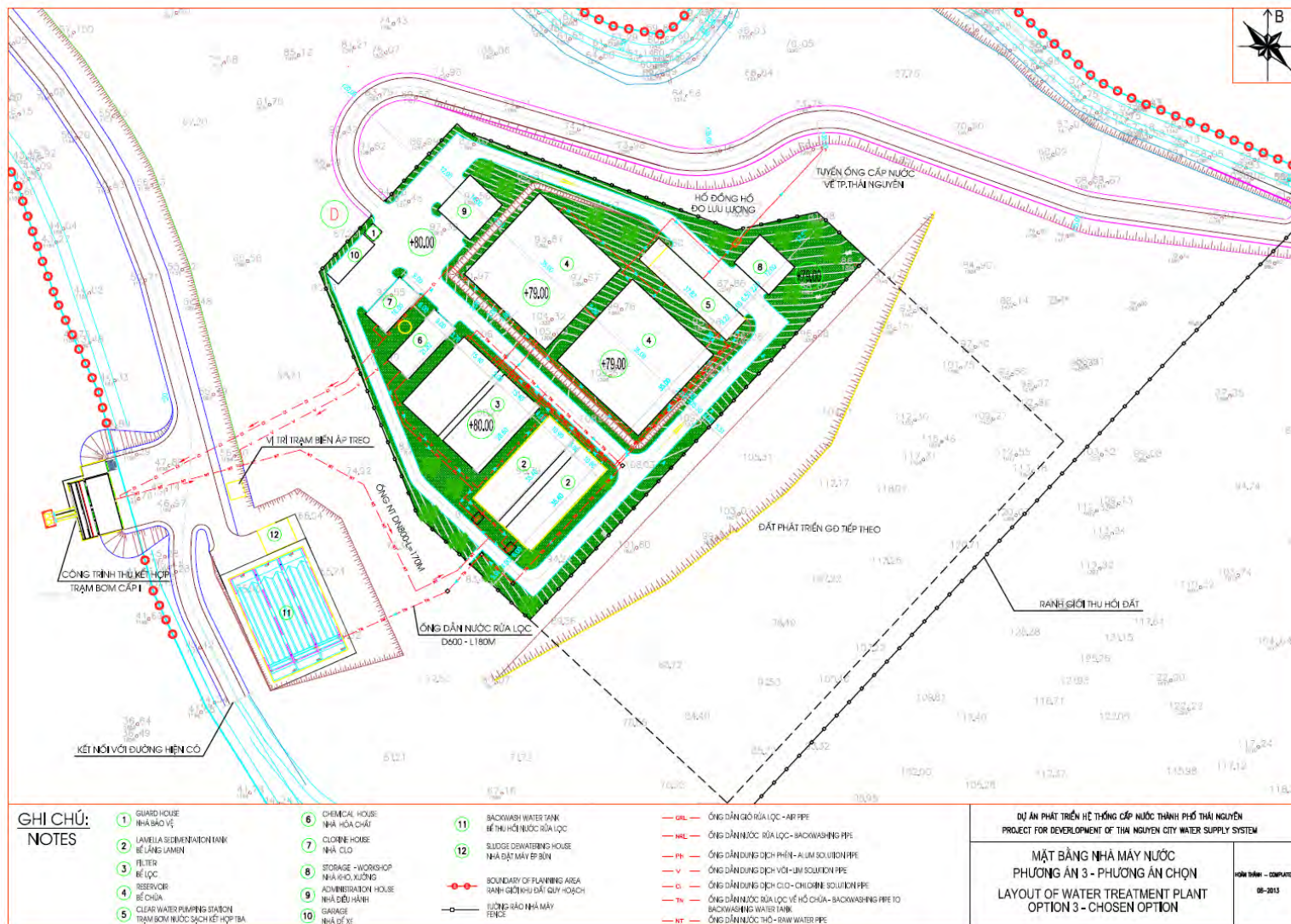


Figure 8: Layout of the WTP infrastructures

The treated water transmission pipeline network

53. The pipelines in the project (shown in Figure 2 above) will be installed along the roads as follows:

- Constructing the DN800-DN600 from the water supply plant to the city along the 267 and 270 roads, passing the Z115 plant to the Sơn Tiến viaduct. From here, there will be two branches: one from the Sơn Tiến viaduct runs along Z115 road to connect to the existing DN200, and the other runs along the national highway 3 to the Orthopedist Centre. At the junction between road 267& 270, it will be arranged a DN300-DN200 pipeline running along the road 267 to supply for the tourism area at the north Nui Coc Lake and the Tea Festival area. On the road 270, which starts from the junction between road 267& 270 to the road Z115, it is proposed to place 2 waiting connectors for DN400 pipelines serving the development of a future water supply system for the new urban areas planned on the both sides of the road.
- A DN800 pipeline (1000m) runs along the Road 267, from the water treatment plant to the intersection point with Road 270 at Km8+100.
- A DN700 pipeline (connected to the DN 800 pipeline) runs from the Km8+100 to Km 6 +540 of Road 270.
- A DN600 pipeline (connected to the DN700) runs along road 270 from Km6+540 to Km2 +700 then runs along road Z115 to Son Tien overpass.
- Another DN 600 pipeline (connected to the above DN 600) runs from Km 2+700 on the road 270 (turnoff the Z115 factory) to Son Tien viaduct
- A DN400 pipeline (connected to the DN600) runs along the National highway No. 3 from Son Tien viaduct to the intersection between the National highway No. 3 and Quang Trung Street (Km65+100 on The National Highway No.3) (the Orthopedist Centre).
- A DN 200 pipeline (connected to the DN 600) runs from the Son Tien viaduct along road Z115 to connect to the existing DN200.
- Developing the water supply to the Northeast of the city: One DN 400 pipeline runs along the National highway 3 from the Son Tien viaduct to the Tan Long Roundabout. From here, runs along the Duong Tu Minh Street and joins the available network of the city.
- Developing the water supply to Thinh Dan and Tan Lap wards: One DN 300-DN200 pipeline runs along Road 270 from Km 2+700 (at the junction leading to the Z115 plant) to Dan junction (Km 0+00).
- Developing the water supply to the tourism area at the North of Nui Coc lake and expected for Phuc Xuan commune, including one DN 300-DN200 pipeline runs along road 270 from the junction between roads 267 and 270 (Km 8+100) to the tourism area at the North of Nui Coc lake.
- Developing the system of distribution pipelines DN150 and DN100 to increase the coverage ratio of piped water in Quyet Thang Commune to 100%
- Install service pipelines, as well as improve HH connections: service water supply network and connection system (include pipelines d = 63 (mm)-20(mm) and flow metered) will be will be installed to each HH for using HHs register within one year of system operation after preparing distribution network. The service network and connection systems will be extended on a yearly basis depending on water demand increases with each year of people. Currently, new water supply network covers about 80% in inner city area Thai Nguyen.

Therefore, contractor's priority service route and connecting water to HH to cover rest of inner urban, the rest will be developed cover for commune.

The electric power system of the project

54. The electricity is sourced from the 35KV Thac Ba – Thai Nguyen line under the management of Thai Nguyen Electricity Company. The 35 KV electric cable will be buried under the ground with minimum depth of 1,0 m.

3.5.4. Progress of Project Implementation

55. The progress of project implementation is expected at 5 years:

- From the end of 2013-2014: Selection of consultants and detailed designs
- From 2015-2018: Construction of project items
- Land acquisition and resettlement of project-affected HHs will be done before project construction.

Table 1. Project Implementation Schedule

Contents	13	2014	2015												2015				2015				2018				2019												
			1	2	3	4	5	6	7	8	9	10	11	12	I	II	III	IV	I	II	III	IV	I	II	III	IV	1	2	3	4	5	6	7	8	9	10	11	12	
Project Detail Plan	■																																						
FS phase	■																																						
Appraisal by National Authorities; Final approval by Thai Nguyen PPC	■																																						
Appraisal by ADB		■																																					
Project finalization		■																																					
ADB Board Appraisal and ADB’s Non-objection Letter		■																																					
Signing Agreement between Vietnam and ADB		■																																					
Cost estimate for preparation of bidding documents surveys, detail design, for approval by Thai Nguyen PPC		■																																					
Bid evaluation, negotiation and signing contract		■																																					
Surveys, detail design, cost estimate		■																																					

Document : Initial Environmental Examination Report:

MFF0054-VIE: PFR3 – Thai Nguyen Water Supply Subproject – Thai Nguyen City, Thai Nguyen province

Contents	13	2014	2015												2015				2015				2018				2019													
			1	2	3	4	5	6	7	8	9	10	11	12	I	II	III	IV	I	II	III	IV	I	II	III	IV	1	2	3	4	5	6	7	8	9	10	11	12		
Approval of detail design by Vietnam Authorities																																								
Update EMP and conduct consultation with downstream communities;																																								
Coordinate with the Environment Protection Center on regulatory compliance issues																																								
Preparation of bidding documents for selection of construction contractor for approval of PPC and of ADB with 2 packages CW1&CW2																																								
Bid evaluation and approval of bidding results, negotiation and signing contracts for packages CW1,CW2																																								
Package CW1: Construction and providing equipment for raw water intake work, raw water pipeline and water treatment plant																																								
Package CW2: Construction of distribution																																								

Document : Initial Environmental Examination Report:

MFF0054-VIE: PFR3 – Thai Nguyen Water Supply Subproject – Thai Nguyen City, Thai Nguyen province

Contents	13	2014	2015												2015				2015				2018				2019													
			1	2	3	4	5	6	7	8	9	10	11	12	I	II	III	IV	I	II	III	IV	I	II	III	IV	1	2	3	4	5	6	7	8	9	10	11	12		
pipelines with D>200mm																																								
Preparation of bidding documents for approval by both PPC and ADB for package CW3																																								
Bid evaluation and approval of bidding results, negotiation and signing contracts for package CW3																																								
Package CW3: Construction of distribution pipelines with D ≤ 200mm. Installation of connections to HHs																																								
Training, operating instruction, testing operation, transferring works to operating units																																								

3.5.5. Investment capital

56. Total investment capital is 30 million USD (exchange rate in April 2013 is 21,036 VND per 1 USD).

57. Of the total investment capital, domestic fund accounts for 15%; the remaining 85% will be borrowed from ADB.

3.5.6. Management and implementation of the project

58. The project will be managed and implemented in compliance with the regulations of the Government of the Social Republic of Vietnam, Asian Development Bank (ADB) and the Vietnam-ADB signed credit agreement.

59. The project governing organization: Thai Nguyen Provincial People's Committee is decision-maker on project investment. The Committee will be the Vietnam side's organization authorizing to approve the project and the relevant documents. The Committee through its relevant departments for example department of planning and investment, department of construction... will direct the implementation of the project from the preparation process for investment to the process of the implementation of the project according to capital borrowing agreement signed with ADB.

60. Project owner: Thai Nguyen Water Supply JSC will be in charge of implementation of the project. The company will be assigned with tasks of managing and using the capital of investment and development of the project according to the direction of the Committee.

61. Project Management Unit (PMU): After authorities' approval about the project and signing the capital borrowing agreement, PMU will be the Owner's representative. PMU will directly organise and implement the project until the item works of the project would be tested for acceptance and put them into operation. Traditionally, PMU has the following function and task:

- Implement the land compensation and the ground clearance according to the responsibilities of Owner.
- Assess the technical design, planning and drawing of building; and estimate volume and size of each item works.
- Select Contractor in the process of construction.
- Manage the quality, volume, schedule and cost of investment of each item works.
- Ensure labour safety and the environmental hygiene at site.
- Set up the ceiling and unit price of building works.
- Check and test the quality of building materials assess the quality of the works according to the request of Owner.
- Assess and recognize meeting the quality standard of the works.
- Test for acceptance, pay and complete the contract; pay and disburse the investment capital of the works.
- Test for acceptance, transfer the works.
- Implement the opening ceremony; propagandize and advertise about the works.
- Implement some other affairs of management.

Chapter 4. DESCRIPTION OF THE ENVIRONMENT

4.1. Situation of physical resources

4.1.1. Conditions of geography, geology, topography

62. Thai Nguyen City is located in the southeast of Thai Nguyen province with geographical location (21.30 N, 105.520 E) and an altitude: 35.62 m.

- The North borders on Dai Tu, Phu Luong and Dong Hy districts.
- The South borders on Song Cong town.
- The West borders on Dai Tu District.
- The East borders on Phu Binh district.

63. **Topography:** Thai Nguyen city is located on the Western area of Northeast North Vietnam, on the Thai Nguyen – Lang Son geological sheet which belong to geological sheet system of Northeast Viet Nam. The city lies on the right bank of Cau River, between the valleys of Lo River and Cau River. Its north is limited by Gam river. The border of the city naturally is formed from the mountain ranges: Phiabiccoc, Ngan Son and Kim Hy

64. **Geology:** Thai Nguyen has the following main soil groups:

- Alluvial soil: 32,548 ha, about 9.23% of the province natural area, include narrow chains locate along the rivers and the streams of the province as Cau River, Cong River and their branches in Pho Yen district , Dong Hy district, Cong River town and Thai Nguyen City.
- Gray and infertile soil: 6,442 hectares, about 1.83% of the province natural area, mainly locate in Dai Tu , Pho Yen, Phu Binh districts and scatter in a some other districts
- Black soil: 966 hectares, about 0.27% of the province natural area, mainly locate in Vo Nhai district.
- Reddish and yellow soil: 264,739 hectares, about 75.08% of the province natural area, found on all district of the province.
- Yellow reddish humus on the mountains: 2540 hectares, about 0.72% of the province natural area, created from acid magmatic rocks at the elevations above 900 m, found on high mountainous terrain of the Dai Tu, Dong Hy and Vo Nhai Districts.
- Valley alluvial deposits: 24,658 ha, about 6.99% of natural land area of the province. This kind of soil is the result of alluvium in the un-drainable valleys, which are surrounded by closed hills and stagnant.
- In the project area: rocks and soils formed from Quaternary sediments locates along main traffic axis. The small stones and gravel, small stones mixing in gravel layers, large stones at a depth of 70m help water circulate easily.

65. **Geo-engineering:** Rock and soil have origin from carbonate sediment so that it can stand high magnitude stress, from 1.6 to 2 kg/cm².

4.1.2. Meteorological conditions

66. Climate characteristics in Thai Nguyen divides into two distinct seasons, rainy season from May to October and dry season from November to April of next year.

67. In general, Thai Nguyen has temperate climate. However in rainy season the high rainfall often leads to erosion, landslides and flash floods in mountainous areas of Cau River and Cong River. All monthly data can be observe in Appendix 2 of the present document

68. **Temperature;**The average temperature differ about more than 10°C from the hottest month - June (about 28.1 to 29.5 ° C) to the coldest months-January (about 14.4 - 17.7°C).

69. Because topography lowers from the north to the south, winter climate in the province divides into three distinct areas:

- The coldest area locates on the North District Vo Nhai
- The cold area locates on Dinh Hoa district, Phu Luong district and the southern Vo Nhai
- The warm area locates on Dai Tu, Dong Hy, Pho Yen, Phu Binh districts, Cong River town and even in Thai Nguyen City.

Annual average sunshine

70. Total hours of sunshine in a year range from 1300 to 1750 hours and distribute equally in months of the year.

Rainfall

71. The total annual rainfall is about 1,500 to 2,500 mm, the highest rainfall is in August and lowest one is in January. But rainfall distributes unequally over the time and the positions. Over positions, higher rainfall concentrates in cities and Dai Tu district, Thai Nguyen and lower one focuses in some small districts Phu Luong, Vo Nhai... Over time, the rainfall concentrates in the rainy season about 87%

Humidity

72. Humidity changes seasonally but the difference between seasons is low. The average annual humidity is about 81-82%.

Wind regime

73. Wind regime in Thai Nguyen significantly changes seasonally. In winter, northeast winds are predominant and it turns to Southeast winds in summer.

4.1.3. Hydrological conditions

Surface water:

74. Because of heavy rainfall and water resistant porous lava soil, Thai Nguyen province has a thick network of rivers, the two largest rivers are Cau and Cong Rivers, with the North - Northeast and West North – East direction. The unequal distribution of seasonal rainfall leads natural water varying seasonally. The precipitations in rainy season accounts for (70-80) % in total. It creates a great influence to the water levels and supply of the City. Beside the network of rivers and streams, Thai Nguyen City also has a system of lakes, such as Nui Coc Lake, Thien Nga Lake, and Tich Luong Lake.

75. Cau River: flows through Thai Nguyen City from mountainous Bac Can province, 250 km long, join with **Cong River at Da Phuc district and then join with Thai Binh River.**

- Cau River basin F = 6030 Km²
- The length of Cau River (the part flowing through Thai Nguyen province) L = 206 Km.

- Cau River, (the part passes Thai Nguyen city) L = 19 Km. Cau River basin at Thai Nguyen city area F = 2220 Km²
- Minimum flow volume : Q min = 5.5 m³ / s
- Flood flow volume: Qmax = 3.620 m³/s with the highest water level of 27.9 meters (measured at Gia Bay Bridge)
- Average of dry season flow volume: Q tbkiet= 6.5 m³/s
- Average of flood flowing volume: Q tblx = 620 m³/s

76. Nui Coc Lake created by a retaining Dam on the Cong River (a branch of the Cau River) at Phuc Trieu village in Thai Nguyen City. Considered as an important surface water resource, Nui Coc lake not only take responsibility of water providing for agriculture and everyday use (40 ÷ 70 million m³ per year) but also significantly regulates the water volume of Cong river in both rainy and dry season, especially by reducing the flood at Cau river in rainy season. The Lake is also a place for tourism and aquaculture.

Ground water:

77. In Thai Nguyen province has two main aquifers: aquifer in the Quaternary sediments and aquifer in the interstices of bedrocks from Jura-Kreta age to Cambri-Ocdovic age. According to the report of planning water supply and Environmental, sanitation of Thai Nguyen province, to the year 2020, estimates of underground water volume, which can be exploited in Thai Nguyen province is 37 million m³ / year.

78. Underground water of Thai Nguyen province matches the usage standard for consumption and everyday activities. According to a report of planning water supply and environmental sanitation by 2020 in Thai Nguyen province and analysis results of underground water samples collected at six sites in the whole province (including Vo Nhai district, Cong River town, Dai Tu district, Phu Luong district and Thai Nguyen City) it is indicated that underground water quality is good. Two samples are an exception, the ones at Dai Tu and Phu Luong that have a manganese (Mn) level above the permitted standards (10.8 times higher at the Phu Luong and 2, 7 times higher at Dai Tu). The water quality can generally be used on everyday needs, but it must be treated with a Mn sand filter.

4.1.4. Present quality status of physical environment at the project area

Table 1. Environmental situation and impact scope at the project's proposed locations

Table 2.

Item	General Description	Environmental Situation	Environmental hot spots
Construction of a water supply plant and supplementary works	A water intake facility and a raw water pumping station will be built close to the lake's bank. A raw water pipeline from the station to the plant. A water supply plant on Voi Phun Hill A pond (reservoir) used to contain waste sludge from the water supply plant will be built	The area is hilly with low hills and replanted trees Fresh air and clean water place	Nui Coc Lake presently is being used for irrigation, tourism and residential purposes.

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Installation of main water supply pipelines	Constructing the DN800-DN600 from the water supply plant to the city along the 267 and 270 roads, passing the Z115 plant to the Sơn Tiến viaduct. In addition, here, there will be two branches: one from the Sơn Tiến viaduct runs along Z115 road to connect to the existing DN200, and the other runs along the national highway 3 to the Orthopedist Centre. At the junction between road 267& 270, it will be arranged a DN300-DN200 pipeline running along the road 267 to supply for the tourism area at the north Nui Coc Lake and the Tea Festival area. On the road 270, which starts from the junction between road 267& 270 to the road Z115, it is proposed to place 2 waiting connectors for DN400 pipelines serving the development of a future water supply system for the new urban areas planned on the both sides of the road.	<p>The road 267 outside areas has few public work that serves Tea Festival, there is thinly populated and so that the environment is still good. To Nui Coc road, two side of the road although has residential area but the environment is still good. For road Z115, this is the area of Z115 plant and some Schools and residence is quite crowded. On the Highway 3, the stretch from the intersection with Z115 to the intersection with Quang Trung Street is a highway stretch, which was built far away from residential areas. However, the pollution from traffic activity here is significant because it is a main and important route. To Nui Coc road (road 270), the two side road area is thinly populated, the environment is still keep good.</p> <p>On highway 3, the stretch from the intersection with road Z115 to the one with Duong Tu Minh road is far away from residential area, however environment (especially air environment) is affected partially due to high traffic density as saying above. On the Duong Tu Minh road and the road to Goc Bang market, both sides have a lot small business HHs. Especially air environment at crossroad of Highway 3 and Duong Tu Minh road is affected significantly due to high traffic density.</p>	<p>Phu Son pagoda 100 meters from Phuc Xuan Market, Phuc Xuan Primary School and Phuc Xuan Secondary School.</p> <p>Market Z115, Plant Z115, Pre-School Z115, Viet Bac Highland High school, Thai Nguyen Communication Technology University.</p> <p>Goc Bang Market, Viet Bac-Vinacomin Vocational School.</p> <p>Ba Đông Gio Pagoda (500 meters from the street)</p> <p>Ca pagoda (200 m From the street) Thai Nguyen Tea plant</p>
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79. To evaluate the status and environmental quality of the project area, the consulting part referred to document and secondary figures from government agency and concerned parties. Beside the consulting part has investigated and got sample (sample of air and water) from the date 07 to 08/02/2012. The sample positions are showed in sample map (refer to appendix). Information of sample point is presented in the following table:

Table 3. Sampling points for analyzing baseline environmental quality in the project area

Sample	Quantity	Description	
Surface water samples	5	W1	The sample was taken near the Amusement Park in North Nui Coc Lake tourism area.
		W2	The water sample taken in the northern corner of Nui Coc Lake near the main water input stream of the lake.
		W3	The sample was taken at main Dam of Nui Coc Lake
		W4	This sample was taken near the proposed position of raw water intake facility at Nui Coc Lake.
		W5	Sample of tap water was got at a HH near Quang Trung road.
Air – Microclimate samples	5	A1	At the foot of the hill on the access road to the water treatment plant construction site
		A2	At the junction of road 267 and road 270. In front of a residential house, opposite to Festival Tea welcome Gate, Cao Khanh - Phuc Xuan Hamlet - Thai Nguyen City Here will be the setting place of the pipelines installed in the project. In addition, here will be also on the axis of the building material transporting road of the water plant.
		A3	At the junction between road 270 and road Z115. In front of a residential house, opposite to the Quyet Thang secondary school. Here will be the setting place of the pipelines installed in the project. In addition, here will be also on the axis of the building material transporting road of the water plant.
		A4	At the foot of the fly-over bridge at the intersection of National Highway 3 and Quang Trung Street. Here is setting place of the project pipeline.
		A5	In front of a HH next to Tan Long Roundabout at the intersection of Highway 3 and Duong Tu Minh Street leading to Goc Bang, market. Here is setting place of the project pipeline.
Noise samples	5	Same positions as those for sampling air samples	

80. The various sites are also located in forested, rural and urban surroundings as seen in the following photos (See Figure 8).

Figure 9: Photos of proposed construction sites

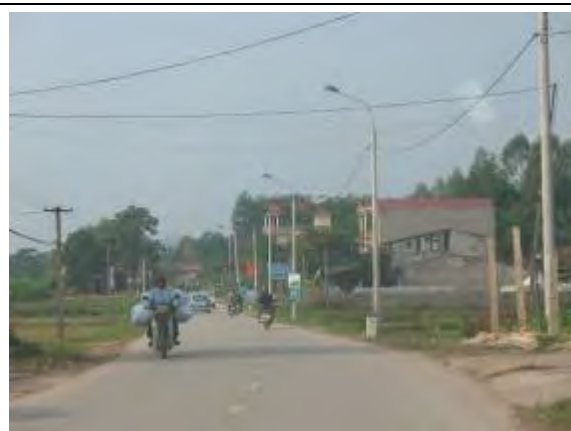
	
Voi Phun Hill – Area for water treatment plant	Voi Phun Hill – Area for water treatment plant
	
Voi Phun Hill – Area for water treatment plant	Nui Coc Lake – Area for water intake
	
Nui Coc Lake – Area for water intake	Nui Coc Lake – Area for water intake



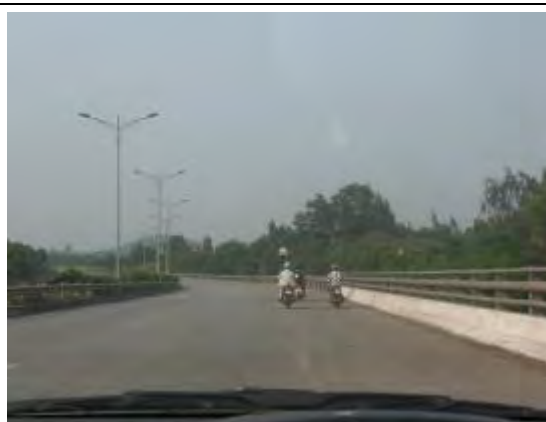
Transmission pipeline (the Z115 road)



Transmission line (road to Nui Coc Lake)



Transmission pipeline (road to Nui Coc Lake)



Transmission pipeline(Highway No. 3)



4.1.5. Present situation of raw water quality

81. Nui Coc Lake is a large lake at national level, used for irrigation, tourism and aquaculture. According to the analytical results (see in the Appendix) obtained by measuring water samples collected from the main water gate of Nui Coc Lake by Center for Environmental Monitoring and Protection (belonging to Thai Nguyen DONRE) from 2/2009 to 12/2010, water quality monitored at this place has the following parameters: pH, DO, COD, TSS, NH₄-N, NO₂⁻, NO₃⁻, PO₄³⁻, Fe, Pb, Cr, Zn, As, Cd, Cu, CN⁻, phenol and Coliform, meeting allowable limits of the national technical regulation QCVN 08:2008/BTNMT column A2— relative to surface water that can be used for producing drinking water but needs to be treated by relevant technology. BOD₅ parameter slightly exceeded the allowable limit in 4/2009 (BOD₅=6.5), in 12/2009 (BOD₅=6.3), in 2/2010 (BOD₅=6, 2) and in 10/2010 (BOD₅=6.5) in comparison to BOD₅ allowable limit of 6 (stated in the national technical regulation QCVN 08:2008/BTNMT column A2). However, this exceedance can be caused by the fact that BOD₅ measurement usually has a relatively large error. Oil and grease parameter considerably exceeded the allowable limit in 8/2009 (total oil and grease = 0.12) and in 2/1010 (=0, 26), compared to the limit of 0.02 (stated in QCVN 08:2008/BTNMT column A2. Oil and grease are likely to come from activities of tour boats operated in the lake.

82. Besides data obtained by literature review, a sampling campaign was performed from 07-08/2/2012 to analyze samples and evaluate present situation of environmental quality in the project area. Analytical results are shown in the following table:

Table 4. Analytical results for surface water quality

No	Parameter	Unit	W1	W2	W3	W4	W5	QCVN 08:2008/BTNMT
								(column A2)
1	pH	-	6.80	6.89	6.76	6.86	7.80	6-8.5
2	Temperature	°C	18.5	18.6	17.6	19	18.4	NA
3	EC	mS/cm	0.08	0.073	0.069	0.07	0.085	NA
4	DO	mg/l O ₂	5.6	5.96	6.76	5.55	6.45	≥5
5	BOD ₅	mg/l O ₂	3	2	3	2	< 2	NA
6	(TSS)	mg/l	18	9	< 5	8	< 5	30
7	Oxidation level KMnO ₄	mg/l O ₂	1.6	1.5	1.6	1.6	1.2	15
8	Cl ⁻	mg/l	7.09	5.31	5.31	5.31	7.52	400
9	NO ₃ ⁻	mg/l	2.35	1.24	1.95	1.92	1.94	5
10	NH ₄ ⁺	mg/l	0.11	0.05	0.04	0.04	0.06	0.2
11	Cu	mg/l	0.033	0.034	0.027	0.006	0.01	0.2
12	Zn	mg/l	0.05	0.05	0.05	0.04	0.03	1.0
13	As	mg/l	ND	ND	ND	ND	ND	0.02
14	Pb	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	0.02
15	Total Fe	mg/l	0.12	0.40	0.11	0.05	ND	1
16	Total Mn	mg/l	0.02	0.03	0.002	0.004	ND	NA
17	Coliforms	MPN/100ml	63	56	75	22	ND	5000
18	Oil & grease	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	0.02

Note: NA: Not available. ND: not detected Column A2: applied for surface water that can be used for the purpose of water supply, but need to apply relevant treatment technology.

83. According to the analytical results shown in the above table, it can be seen that at 4 sampling points around Nui Coc Lake (code-named: W1, W2, W3, W4) selected for analysis of

surface water quality, all analytical parameters meet the allowable limits stated in the column A2 of the National technical regulation QCVN 08:2008/BTNMT. Sampling point W1 and W2 are situated in the North of the lake, where are concentrated main water inputs supplying for the lake. Meanwhile, sampling point W3 and W4 are situated in the South of the lake, where there are mainly water outputs from the lake. For this reason, water samples taken from point W1 and W2 have a greater TSS value than those collected from point W3 and W4 (see in the following Figure). Especially for the sampling point W4, which is close to the proposed site for raw water intake facility, water sample collected here has all important analytical parameters meeting the allowable limits mentioned in the column A2 of the national technical regulation QCVN 08:2008/BTNMT. In combination with the findings obtained by reviewing analytical data of the monitoring survey on water quality at the main water gate of Nui Coc Lake, which was performed by Thai Nguyen Center for Environmental Monitoring and Protection from 2/2009 to 12/2010, it can be concluded that water quality of Nui Coc Lake in general and water quality near the site proposed for installation of the raw water intake facility in particular is suitable for production of drinking water.

84. A sample of tap water W5 was also collected at Tan Thinh Ward to study present situation of tap water quality prior to the connection of the newly built water supply pipeline under the project to the existing water supply system. Obtained results showed that all analytical parameters meet the allowable limits mentioned in the national technical regulation QCVN 08:2008/BTNMT, column A1—the column applied for surface water that can be used directly as drinking water (see in the above table).

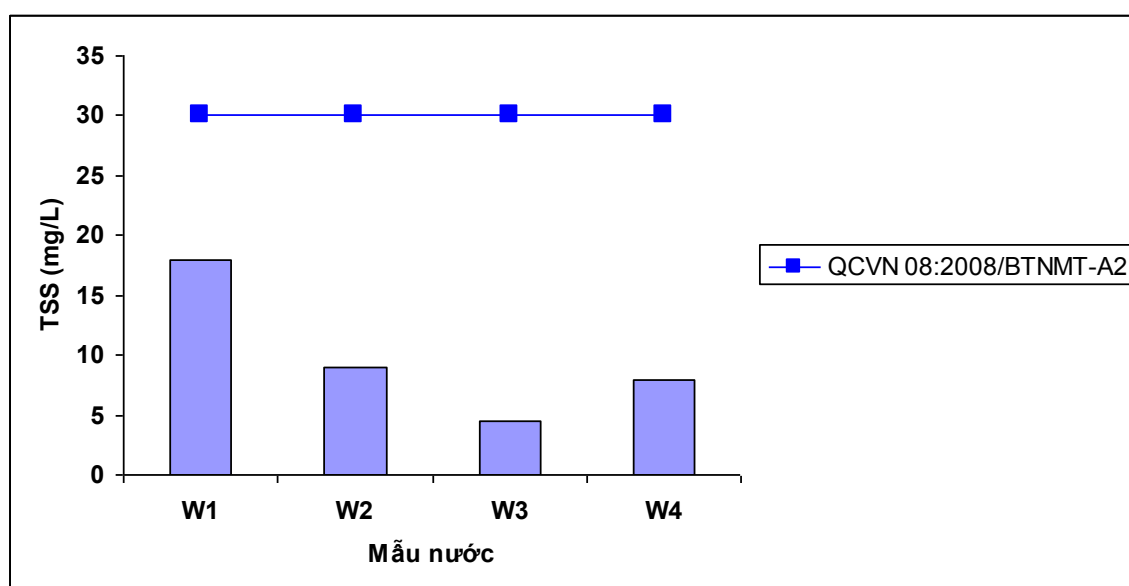


Figure 11: Results of TSS measurement for water samples collected from Nui Coc Lake.

4.1.6. Present situation of air quality:

85. Obtained analytical results of the sampling and monitoring campaign from 07-08/2/2012 were shown in the following table.

Measurement on noise level

86. For the sampling point A3 in front of the main gate of Quyet Thang primary school (classified as special area due to its school's nature), noise level measured here is 54.5 dBA,

which is very close to the allowable limit (55dBA) defined for special areas according to the national technical regulation QCVN 26: 2010/BTNMT (see in the following table). This indicates that in the presence of working construction machine for pipeline installation, the noise level will immediately exceed the allowable limit. Thus, for this and other sensitive sites (such as Phuc Xuan primary and secondary schools on road 270, Thai Nguyen university on road Z115), which has boundary adjacent to the roads proposed for pipeline installation, Contractors must make sure that construction time will not overlap with school time.

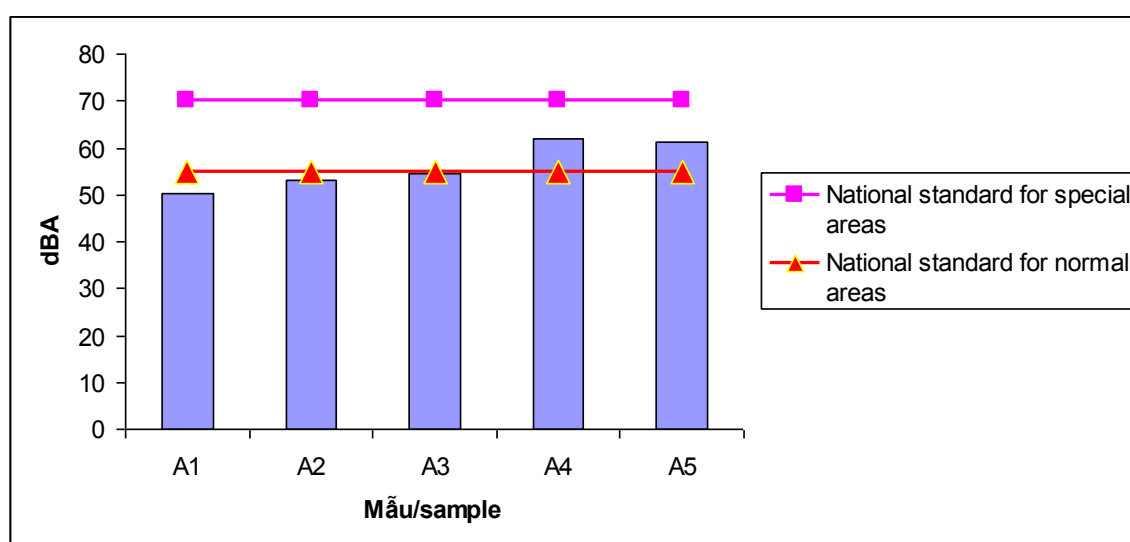


Figure 12: Noise levels measured at different sampling points (A1-A5) in the project area

87. Noise levels measured at other sampling points (A1, A2, A4, A5) all meet the allowable limit (70 dBA) defined for normal areas. Of these points, A5 is at the foot of the fly-over bridge, where National Road No 3 intersects with Quang Trung Road; and A4 is at Tan Long roundabout on National Road No.3. Although, these roads are all main roads with cars and trucks running frequently, the obtained noise levels (62.1 and 61.2 dBA for A4 and A5 respectively) are still lower than the allowable limit (70 dBA) mentioned in the national technical regulation QCVN 26: 2010/BTNMT. Noise level at A1(50.3 dBA), which is at the proposed construction site for the water supply plant at Voi Phun Hill in Phuc Triu Commune, is the lowest due to the fact that the construction site is quite isolated.

Measurement on levels of dust and gas emissions (NO₂, SO₂ and CO)

88. Among 5 air sampling points, A5 and A4 have the highest air pollution levels because these 2 points are situated on different intersections of main traffic roads (namely National Road No.3, Quang Trung Road, and Duong Tu Minh Road). However, levels of dust and gas emission measured at A4 and A5 are still lower than the allowable limits (stated in the national technical regulation QCVN05:2009/BTNMT).

89. Sampling point A2 is situated close to the intersection between road 270 and road 267; and point A3 is adjacent to the intersection between road 270 and road Z115. These roads are smaller in size and traffic density in comparison to the above-mentioned main roads. Therefore, levels of air pollution at A2 and A3 are also smaller.

90. Sampling point A1 is at the proposed construction site for water supply plant. This site has bushes and trees and is quite far from the areas of intense human activities, thus, air pollution

level is lowest. The following figure clearly shows the variation of dust levels at sampling points (from A1-A5) in the project area.

91. Briefly, for the whole project, at both the construction site for water supply plan and that for installation of main water supply pipelines, it is enough to implement all mitigation measures mentioned in Chapter 5 for air pollution (application of extra measures is not necessary).

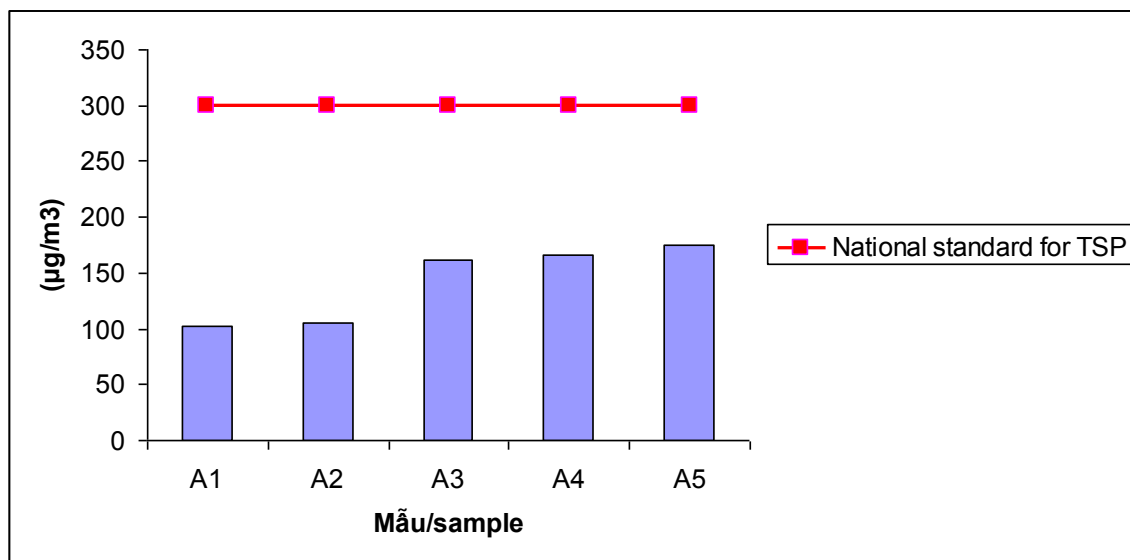


Figure 13: TSP values measured at different sampling points (A1-A5) in the project area

Table 5. Analytical results of noise levels and air samples taken from project areas before project implementation

No.	Parameter	Results					QCVN05: 2009/BTN MT	QCVN26:2010/BT NMT
		A5	A4	A3	A2	A1		
Time of sampling		11h00	12h00	14h00	15h00	16h00		
Coordination of sampling sites		21 ⁰ 34'36,58" 105 ⁰ 48'49,99"	21 ⁰ 37'22,37" 105 ⁰ 47'29,75"	21 ⁰ 34'51,95" 105 ⁰ 47'26,08"	21 ⁰ 35'0,29" 105 ⁰ 44'34,66"	21 ⁰ 33'55,37" 105 ⁰ 43'50,93"		
1	Temperature (T ⁰)	23,4	24,1	25,2	23,6	23,2	NA	NA
2	Humidity (%)	65,5	65,4	62,4	67,6	67,6	NA	NA
3	Wind speed (m/s)	1,2	0,7	0,7	0,5	0,5	NA	NA
4	Wind direction	North East	North East	North East	North East	North East	NA	NA
5	Noise level (dBA)	61.2	62.1	54.5	53.1	50.3	NA	From 6h-21h 70 (Normal areas) 55 (Special areas)
6	TSP (µg/m ³)	175	166	162	105	102	300	NA
7	NO ₂ (µg/m ³)	51.2	48.6	27.4	32.3	15.5	200	NA
8	SO ₂ (µg/m ³)	42.1	31.7	26.3	38.2	25.7	350	NA
9	CO (µg/m ³)	7013	6176	2457	3163	1214	30000	NA

Note: - NA: Not available

Climate change

92. Expected climate change impacts in the North of Vietnam include a potential increase in frequency and/or intensity of tropical cyclones; an observe constant increase in rainfall since 1960 and the run-offs that comes with them; an expansion in flooded areas and a rise in annual flood levels. Although the intergovernmental panel for climate change (IPCC) does not forecast any great changes in the timespan of the project 2025 but more in the years 2060 to 2090, punctual events due to climate change, notably recurrent flashfloods could affect the infrastructures. As such, climate change impacts will be considered during detailed design, especially the water intake section laying in the river and in the flood plain. In addition, drought events aggravated by climate change could also occur during the same period but the source of the project being a reservoir, chances of drought for the intake are very low.

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

94. 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).

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

96. 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 was not any earthquake of magnitude larger than 5.5. Earthquake. A Seismological Station is located in nearby in Vinh.

Competition for water resource

97. The competition for the water resource has a low potential of creating conflicts. There is a certain risk regarding the regulation of the reservoir and the minimal flow that must be kept in the Cau river. If a long drought would occur to the extent that the reservoir managers would need to lower the level so the river would still have a flow, the intake could be in danger. As such, the depth of the intake will be set so the flow of raw water become unaffected.

4.2. Situation of ecological resources:

Flora:

98. Total forest area in Nui Coc Lake is 11,494.5 hectares, of which 3683.5 hectares of artificial forest, 339.3 ha of natural forests and remaining area is treeless land, bushes and grasslands. Structure of artificial forest in Nui Coc Lake is very monotonous with low quality and limited diversity. Most of the trees in the project area are bushes and other popular trees such as Acacia, Eucalyptus, and black cassia and there are no endangered species. There are some tea land and rice land in and near the project site area.

Fauna:

99. Fauna in the project area consists mainly of small species, such as mice, frogs, snakes and common birds as sparrows, sturnidae, oriolidae, timaliidae, parrots (*Loriculus vernalis*) ... There is no rare animals or animals referred to the Red book living here.

100. Aquatic ecosystems and fisheries resources (for the Nui Coc Lake) consist mainly of blue-green, silica algae, shrimp and fish....

4.3. Situation of economic development

101. According to the report on results of implementing the tasks of socio-economic development year 2012, and key socio-economic development tasks in 2013 of the Thai Nguyen City People's Committee, GDP development speed of the city reached 12% in 2013. GDP of 2012 is 12,543 billion VND, in which, the sector of trade and services takes 6,050 billion, equally 48.24%; the sector of industry and construction meets 5,983 billion VND, equally 47.7%; the sector of agriculture and forestry is 510 billion, equally 4.06%. Average income reached 42 million VND/person/year; increasing by 5 million VND to compare with the year 2011. Percentage of poverty HHs decreased to about 3% in the last years.

4.3.1. Trade and service sector

102. In 2012, trade and service activities in the city remained stable. Volume of goods sold on the markets met the local demands. The unit prices of some types of goods had been slightly increased, however there were no goods that had a unit price that suddenly changed during the study. Total retail and social services in 2013 reached about 10,146 billion VND, increased by 18.18% in comparison with the year 2011.

103. The city has implemented the action program of improvement of provincial competitive indicators (PCI). In 2012, the city delivered 2,059 business register certificates for individual HHs with total registered investment budget of 600 billion VND. This has resulted in an increase up to 23,667 individual business HHs. Establishment of 228 new companies/enterprises, resulted in an increase of companies/enterprises to 2,491, with a total registered budget of more than 10,000 billion VND.

4.3.2. Industrial and handicraft sector

104. Industrial sector of the city faced many difficulties in 2012, with high inventory values. Unit price of some goods were not stable. Although the bank interest rate was decreased, access to bank loans still remained difficult. It was very common in 2012 for business to lack financial liquidity for manufacturing and doing business. There were about 30% of the local enterprises without turnover value in 2012.

105. To create favorable conditions for the industrial sector, the city had implemented the Government's resolution 13/NQ-CP dated 10 May 2012 on some measures to resolve difficulties for enterprises, assistance to market, organizing meetings to discuss about methods of resolving difficulties for enterprises; guiding on postponing/reducing taxes, appraising loan for projects, instructing the process of hiring lands, delivering business register certificates, environmental assessment report to encourage investment in construction of industrial clusters, development of projects of investment on construction of industrial clusters and traditional goods manufacturing villages.

106. Value of industrial production of the city in 2012 was 7,410 billion VND, increasing by 2.5% in comparison with 2011. In which, the central government public sector reached 3,924.4 billion VND, equally 94.4% in comparison with the result of 2011; the sector of locality reached 3,010 billion VND, increasing by 14.6% comparing to 2011; the sector with foreign capital investment had a result of 411.6 billion VND, increasing by 4.4% comparing to 2011.

107. Implementing the Decision 1271/2011/QĐ-TTg dated 27 July 2011 of the Prime Minister about overall investigation of economic and administrative units in 2012, the city implemented surveying a total of 350 administrative units and 1,149 enterprises and 18 thousands individual business HHs.

4.3.3. Agriculture and forestry

Cultivation:

108. Agricultural production in 2012 suffered of many unfavorable impact such as negatives climatic changes , meat prices, material, fertilizers, pesticides increase and the shrinkage of arable land. All of those affected the results of agricultural and forestry production in the province. The city has focused on directing the implementation of production plan, supply adequate materials, new breed with high yield for agricultural production, regularly d trainings about caring techniques, preservation and prevention of disease in crops to ensure seasonality.

109. Food crops in 2012 in the city occupied 6885.64 ha, an increase of 1.39% (an increase of 94.64 ha) compare with the plan and increased by 0.08% (an increase of 5.42 ha) compare to 2011. Cereals for grain yield all in 2012 reached 31,187 tons by 102.57% (up 782 tonnes) compared with plans and 96.77% (down 1,041 tons) compare to 2011.

110. In 2012, the agricultural sector of the city has planted and restored 85 hectares of tea, up 6.25% compared to the plan. Up to the present time in the city area is 1,256 ha of tea tree, of which 1,154 ha are harvested, average yield is estimated at 145 kg / ha of fresh bud tea yield in 2012 is estimated at 16,780 tonnes (equivalent to 3,356 tons of dried bud tea).

Livestock:

111. Livestock situation in 2012 in the city has been facing many difficulties. Livestock feed price has been increasing continuously and selling price has been decreasing significantly affecting the results of the livestock production. In the area, in the first months in this year also appear a poultry flu. The phenomenon of sick pigs caused by infected cholera, pasteurellosis, lung disease reappeared in some wards. The city has focused on directing the sector control, avoid the spread of epidemic disease in a large scale and strengthen disease prevention measures, monitor regularly and closely epidemic disease situation in the local, the business slaughter concentrated cattle, poultry; closely manage the transportation of cattle and poultry in the area. Currently, the cattle and poultry development is stable in the area. Meat yield in 2012 is estimated at 8,903 tons, an increase of 2.33% compared with plans and up 0.19% over the same period in 2011

New rural building work:

112. Continue implementation of the Resolution No.26-NQ/TW dated 05/8/2008 of the Party Central Committee (Xth) on agriculture, farmers and rural areas and conference summarizing the new rural building work in 2011, deployment tasks in 2012.

113. Until now, there have been 09/09 communes which approved the plan, appraisal production development scheme to improve income for the people and the new rural building scheme of communes in the province, co-organized 09 training courses to propagate documents, guidelines and policies of the State on new rural building, introduce point model on new rural building for more than 1,000 members director board, new rural building board of hamlets of 09 communes in the city.

4.3.4. Traffic system

114. The traffic system in Thai Nguyen is variety, including roads, waterways and railways.

Road:

115. The province of Thai Nguyen has 4545 km of roads. Among the number, 184.6 km is national highways, 248.8 km is inter - province roads , 865.6 km is inter - district roads (of which 472.1 km of roads have been asphalted) , 3180.6 km of communal and inter-communal road and the remaining is 65.3 km of urban roads. All highways and urban roads have been asphalted. New provincial road system 128.5 / 248.8 km has been also asphalted; the remaining 120.3 km of roads has been paved with macadam, gravel and pathway. Overall, the percentage of asphalted road is still low, only reached 20.4%. Especially for the inter-commune

road, inter-ward road this item is only 11% in total, the rest is rock paved roads and pathway (among the number pathway makes up 67.1%). Roads with bad surface are at high percentage (54.5%).

116. For the City of Thai Nguyen in particular, the total land area for building roads in the area is 1.305 ha, representing 22% of total natural land area of the city.

117. In general, urban transport infrastructure investment of the city is comprehensive construction. However, in recent years, Thai Nguyen City population has grown rapidly. In addition, the City each year receive a large amount of immigrants of university and college students in the area, this leads to traffic jam at some location in the rush hour such as: the crossroads of Dong Quang, Hoang Van Thu, Luong Ngoc Quyen, Chu Van An Streets (carriage way of the streets are too narrow and the number of vehicles during the rush hours is extreme high).

118. Thai Nguyen City is an intersection point of three national highways passing through includes National Highway 3 (south to Hanoi, north to Bac Can province), National Highway 37 (west to Tuyen Quang, east to Bac Giang province) and National Highway 1B (to Lang Son). The City has a bus station in downtown area. Expected in the future, cities will have three bus stations: the central bus station, the north bus station and the South Bus Station. The recent central bus station will be converted into a bus transfer stations.

Waterways:

119. Waterways in Thai Nguyen are plentiful and widely distributed. A total of 430 km waterway, including two major rivers connecting with provinces outside: the line Da Phuc – Hai Phong with 161 km length and the line Da Phuc- Hon Gai with 211 km length. Ship routes in the province: Thai Nguyen – Phu Binh route with 16 km length and Thai Nguyen - Cho Moi route with 40 km length.

120. Waterway system of the province has not been exploited much. In the future, economy exchanges and trade between Thai Nguyen province with other provinces is expanded, this type of traffic should be more exploited.

Railways:

121. The system of Thai Nguyen railway has three main line with a total length 98.55 km, including:

- Quan Chieu - Hanoi line (through Song Cong town, Pho Yen) is 75 km long (in which the Thai Nguyen Trieu Quan - Da Phuc stretch is 34.55 km long)
- Thai Nguyen - Kep (Bac Giang) through Trai Cau, Luu Xa, Khuc Rong is 57 km long , among this the inter Thai Nguyen province stretch is 25 km. In the present, only the section from Luu Xa to Khuc Rong has been hired to transport iron ore to Steel Refining area by the Thai Nguyen Iron and Steel Company.
- Route from Quan Trieu - Hong Mountain with 39 km length through Quan Trieu is used primarily to transport coal

Roads to be affected by construction activities of the project

122. Roads will be affected directly by the construction activities of the project is the roads that digging works and installation of water distribution network to service transmission and transportation of the projects will take place. They include the following:

- Road 267 linking Nui Coc (former name line 270) from Tea Festival main entrance three – way crossroad to the southern resorts of Nui Coc Lake
- Road 270 leading to the resorts of the north Nui Coc Lake
- Road Z115 connecting from Nui Coc Lake under-pass National Highway 3 to Thai Nguyen University

- National Highway 3
- Duong Tu Minh street intersects with National Highway 3 leading to Goc Bang Market

4.4. Situation of social and cultural resources

Population:

123. Population density of the Thai Nguyen province is 320 persons per km² higher than the figures of Northern mountainous and midland (116 people / km²) as well as national figures (260 people / km²). This is the main factor affecting the economy and social development in general and water supply and environmental sanitation in particular.

124. For Thai Nguyen city in particular, in recent years (from 2005 to 2009), the growth rate of the city's population is around 2.1% - 2.4%. Due to the city's high industrial development and rapid urbanization, the city's population growth rate is relatively high. Therefore, the expected rate of population growth in the period up to 2020 is 2.5% on average

125. The project areas include the following areas: All urban areas of Thai Nguyen city and 9 communes on the outskirts. The status of the population and population forecast of water supply areas in the project are presented in the following table.

Table 6. Population forecast for Thai Nguyen city

District/	Population 2003 (people)	Population 2009 (people)	Population forecast	
			Year 2015 (people)	Year 2020 (people)
Urban Area				
Tan Long	5882	7210	9360	9959
Quan Trieu	8582	10520	13656	14530
Quang Vinh	5465	6699	8696	9252
Hoang Van Thu	12486	15306	19869	21140
Tuc Duyen	6715	8232	10685	11369
Gia Sang	9910	12149	15770	16779
Trung Thanh	12100	14833	19254	20486
Trung Vuong	7019	8604	11169	11884
Phan Dinh Phung	13851	16979	22040	23451
Cam Gia	10542	12923	16775	17849
Phu Xa	7909	9695	12585	13391
Huong Son	10729	13152	17073	18165
Tan Thanh	4436	5438	7059	7510
Tan Lap	6806	8343	10830	11523
Đông Quang	7078	8676	11263	11983
Quang Trung	15075	18479	23987	25522
Tan Thinh	4866	5965	7743	8238
Thinh Đan	7886	9667	12548	13351
Tích Lương	10716	13136	17051	18142
<i>Total 19 wards</i>	<i>168,053</i>	<i>206,008</i>	<i>267,413</i>	<i>284,526</i>
Suburban Area				
Tan Cuong	4803	5753	7388	7946
Phuc Triu	5078	6082	7811	8400
Phuc Xuan	4457	5338	6855	7373
Thinh Đức	8012	9597	12324	13255
Phuc Ha	4045	4846	6223	6692
Luong Son	10996	13170	16913	18190
Cao Ngan	6182	7404	9509	10226
Dong Bam	5460	6540	8399	9033
Quyet Thang	12503	14971	19226	20678
<i>Total</i>	<i>61536</i>	<i>73,702</i>	<i>94648</i>	<i>101793</i>
Total of the whole city	229,589	279,710	362,061	386,319

Source: FS report.

126. Ethnic structure: There are 8 ethnic groups living in Thai Nguyen province in which Kinh group accounts for about 75.5%, Tay 10.7%, Nung 5.1%, Dao 2.1%, San Diu 2.4% and other ethnic groups such as Cao Lan, H Mong and Chinese origin is about 4.2% of the population of the province. This shows the variety of customs, habits, lifestyle and production experience. The peoples also have the different levels of economic development and education.

Education and training

127. For the province of Thai Nguyen City, according to 2010 provincial statistical yearbook, number of teaching staff is 693 people, 703 people and 656 people corresponding to primary school, secondary school, high school level, technical and university level.

Public health service

128. According to 2010 statistics, the province of Thai Nguyen city totally has 43 state-owned health care centers, including eight hospitals, a regional clinic, a maternity home and 26 commune health stations agencies and enterprises. Number of medical staffs working in these establishments is 556 doctors, 96 doctors, 879 nurses and 62 midwives. Pharmacy staff at these facilities is 44 Senior Pharmacist, 168 pharmacists and 73 of assistant intermediate.

Cultural history

129. Thai Nguyen City is an important tourist center of Thai Nguyen province and the northern mountainous provinces. In Thai Nguyen city, there are Nui Coc Lake known with many beautiful landscapes, the Museum of Culture and the peoples of Vietnam, Tan Cuong village-a famous tea village, Phu Lien pagoda, Temple of Doi Can and other 91 cultural heritage sites.

Historical and cultural monuments near to the project area (see in the following table).

130. They are the structures that are nearby the project area, but will not be affected by the project.

Table 7. The pagodas situated near to the transportation route of the project

Name of pagoda	Remarks
Lang Ca pagoda	About 2 km from Nui Coc Street axis (other name Road 270). Between the road and the pagoda is a treeless field. This is a big pagoda, which locates on the hilltop and can be seen from the street.
Ba Dong Gio pagoda	500 meters from Nui Coc street, Between the road and the pagoda is a residential area.
Ca Pagoda	200 meters from Nui Coc Street. Between the road and the pagoda is a residential area.
Phu Son pagoda	100 meters from Nui Coc Street, Between the road and the pagoda is Phu Son market. This is a small pagoda locating on a small hill behind the market.

Unexploded ordnances

131. More than 35 years after the war ended, Vietnam is still contaminated with hundreds of thousands of tons of UXOs scattered all over the country. During earthwork and especially for the pipeline excavation corridor, survey for UXOs prior to construction work has to be conducted by a specialized agency.

Results of socio-economic survey implemented in the representative locations of the project area in July 2013

132. In Thai Nguyen City Water Supply System Development Project, Nam Nui Coc Water Treatment Plant will be constructed; and a new water supply system will be connected to existing water supply network of the City. By which, water supply range will be widen, increasing the number of people are provided with clean water supply services. The survey on economy and society, connection commitment and demand to construct/improve water supply system as stated above is implemented in 7 wards and communes representing the areas in the beginning, the middle and the end of water supply system currently used. Total selected communes/wards are 7 communes/wards as follows: Quyet Thang Commune (new water

supply from Ho Nui Coc system), the wards currently using running water: in the beginning of water system (Tich Luong, Phan Dinh Phung), in the middle of water supply system (Thinh Dan, Tan Lap), and in the end of water supply system (Tan Long and Cam Gia). Secondary information and economic and social reports in recent 3 years are collected. (In addition, Consultant also chooses Phuc Triu commune (not supplied with water) but this is the place where water supply plant is built to collect the information (see Table 8).

Table 8. Results on living condition of surveyed HHs

TT	Commune s/ wards	No. of HHs	Poor/Nearly poor HHs			Medium HHs			Better-off HHs		
			Average per capita income (person/month)	No. of house holds	Rate	Average per capita income (person/month)	No. of house holds	Rate	Average per capita income (person/month)	No. of house holds	Rate
1	Quyet Thang	2,240	≤650.000	95	4.2	651.000-1.200.000	694	31.0	>1.500.000	1,451	64.8
2	Tich Luong	2,650	≤650.000	154	5.8	651.000-1.200.000	1,325	50.0	>1.200.000	1,171	44.2
3	Phan Dinh Phung	5,563	≤650.000	91	1.6	651.000-2.000.000	3,803	68.4	>2.000.000	1,669	30.0
4	Thinh Dan	2,391	≤650.000	88	3.7	651.000-2.000.000	868	36.3	>2.000.000	1,435	60.0
5	Tan Lap	2,264	≤650.000	89	3.9	651.000-1.500.000	1,609	71.1	>1.500.000	566	25.0
6	Tan Long	1,827	≤650.000	183	10.0	651.000-4.000.000	1,023	56.0	>4.000.000	621	34.0
7	Cam Gia	2,905	≤650.000	275	9.5	651.000-1.800.000	1,743	60.0	>1.800.000	887	30.5
8	Phuc Triu	1,682	≤650.000	153	9.1	651.000-1.500.000	856	50.9	>1.500.000	673	40.0
	Total	21,522		1,128	5.2		11,922	55.4		8,472	39.4

Present situation of water usage at the surveyed HHs

133. In most communes/wards, people have 3 water sources (except Tan Lap ward where people can use only 2 water sources that are drilled well water and running water). Most HHs directly use dug and drilled well water without any mean of filtration. According to organoleptic evaluation of local leaders and people, the quality of well waters is different depending on the areas. For example, in-group 10 of Tan Long Ward, the well water quality is mediocre with yellow color and scum when being pumped. In other areas, dug well are contaminated because of pesticides from the field where the teas are planted like in Phuc Triu Commune.

134. The proportions of HHs using dug well water in Cam Gia and Quyet Thang are approximately equal, as 60% and 55% respectively. Meanwhile, 20% of HHs use dug well water in Tich Luong; this proportion in Thinh Dan and Tan Long is as half as that the proportion in Tich Luong. Only 1% of HHs in Phan Dinh Phung currently using dug well water, but the proportion of HHs using this water in Phuc Triu is 100%. Thus, we can see that the number of HHs using dug well water is higher in Quyet Thang, Phuc Triu communes and Cam Gia ward.

135. A few HHs in Phan Dinh Phung and Cam Gia use drilled well water; the proportions are 4% and 5% respectively. The difference is not much in Tan Long and Phuc Triu; the proportions are 25% and 20% respectively; the numbers are doubled in Thinh Dan, Tan Lap and these

percentages are the highest among communes/wards with 45% and 40% respectively. The rate of HHs currently using drilled well water is 30% in Quyet Thang and Tich Luong. Drilled well water is mainly used for washing and breeding in HHs having running water source, but it is the main water source for HHs having no running water source. The depth of the well is often 30-40 meters; a few HHs have to drill 60 meters to have water for use. Pursuant to the evaluation of the communes leaders, this water quality does not ensure the health of the people due to the contaminated underground water, especially in the hamlets of Cam Gia Ward adjacent to Thai Nguyen Iron and Steel Factory

136. In surveyed communes/wards, 100% of that locality has water supply system in the area1, but the network of branches of the pipeline have not covered the entire area of groups/hamlets. 39 groups/hamlets in total 169 groups in 8 communes/wards have not had water supply pipeline. The rate of HHs using running water in Phan Dinh Phung is the highest, occupying 97%. In Tan Long, it is a little lower as 68%; the rates in Thinh Dan and Tan Lap are the same - 63%. The difference of the rates in Tich Luong and Cam Gia is inconsiderable. They are 50% and 55% respectively. In Quyet Thang Commune, only 25% of HHs use water supply pipeline

Present situation of toilet at the surveyed HHs

137. 1-compartment latrine and two-compartment latrine are used by most agricultural HHs to use fertilizer for agriculture. In these two forms, only people in 2 localities use 1-compartment latrines. One locality is Quyet Thang with 10% of the HHs and the other is Tich Luong with 3.5%. Two-compartment latrines are used in all surveyed communes/wards. The lowest occurrence at 3% is in Phan Dinh Phung; the second lowest is in Quyet Thang with 15%. This proportion is ranged from 20% to 36% in Cam Gia, Tan Long, Thinh Dan and Tan long. The highest usage for two-compartment latrine is 55% in Phuc Triu. In addition to these two kinds of latrines, latrines dug in the garden are still used in Tich Luong, Thinh Dan and Cam Gia respectively at proportions of 1.5%, 5% and 20%.

138. Septic toilet and semi-septic toilet occupy the highest rate. The rates occupy 80% and over are 80% in Quyet Thang, 90% in Tan Lap and 97% in Phan Dinh Phung. The lowest rate is 45% in Phuc Triu.

Present situation of domestic wastewater and solid waste handling in Thai Nguyen City

139. In recent years, the drainage system of Thai Nguyen City operates with little impact. As heavy rains, many points in urban areas are flooded, causing traffic jams, especially in Tuc Duyen, Quang Vinh, Quan Trieu areas and even on the roads in the City center such as Hoang Van Thu, Luong Ngoc Quyen.

140. According to the City Urban Management, the root cause of flooding, beside the errors in planning and initial design, is the blocking flow of ditch with surface garbage and sediments from 3-5 m high in residential center. In addition, a number of culverts, ditches along roads are of poor construction quality, several sections of exposed surface, form large gaps. When it rains, soil, sand and waste of residential areas drift down and cause stagnation. Moreover, a series of projects of sidewalk paving, optic cable installing, lighting and many other transportation projects simultaneously have been operated in the past lead to rock and soil drift down the ditch and even crippled some drain branches. On the other hand, the high rate of residential house building without attention to design and planning has stopped the natural flows of many ponds and lakes that have been filled for residential housing and narrowed drainage system in residential areas lead to swamping of the roadway. The whole city now has about 50 km urban roads but only about 60% have a functional sewage system. Currently, the wastewater from resident areas is polluting the environment of the City. According to an incomplete statistics, only about 50% HHs in the City have septic tanks for sewage treatment, and the rest is discharged directly into rivers, streams, ponds and lakes. As for the solid waste from residential areas, only about 40% of total are collected and buried at the landfill.

Chapter 5. ANALYSES OF PROJECT's OPTIONS

5.1. Selecting the Water Sources

141. Underground water:

- Currently the demand for clean water in the area is very high but the existing water supply capacity and the exploitation of underground water have reached the limit and only met the demand for a very limited area. In particular, Tuc Duyen underground water plant, one of two water plants currently supplying for Thai Nguyen city has expanded its capacity twice during the last three years from 7,000 m³/day in 2010 to 10,000 m³/day in 2011. Therefore, in the near future, the plant is having the plan to research and drill more wells in order to raise its capacity to 13,000 m³/day.
- Moreover, currently underground-water resources are not encouraged by the Government to use, especially for large water supply needs. Due to over exploitation of underground water will cause land depression, affecting the infrastructure projects.

142. Surface water:

- Nui Coc Lake area has safe reserves. The water level in dry season always ensures to serve enough water for the plant.
- Raw water from Nui Coc Lake is plentiful in quantity and good in quality but it is necessary to build the water intake and treatment systems, and the pipeline network from the water plant to the places of consumption.
- Nui Coc Lake project was built in 1972 with the basic parameters which are described as follows:
 - W_{tb} = 178 million m³ with the code of the water level in reservoir of + 46.2 m.
 - W_{max} = 240.5 million m³, with the code of water level in reservoir of + 48.2m.
 - W_{min} = 75 million m³, with the code of water level in reservoir of + 33.8m.
 - The height of main dam at top is + 50.0m.
 - The height of main dam at bottom is + 24m.
 - Lake's regulatory capacity is 168 million m³.
- Nui Coc Lake system including the headwork and Nui Coc irrigation canal system was put into use in 1983. Nui Coc canal has the flow speed of 15m³/s at the beginning of dam. At present, Nui Coc canal is supplying the water with the flow speed of 30.000m³/day for Tich Luong water plant and supplying water for the agriculture of Thai Nguyen, Bac Giang and Bac Ninh provinces through Cau river canal.
- Due to agricultural cultivation features, the water in Nui Coc lake is only used for agricultural irrigation and almost no industrial wastewater sources discharge directly into the lake, thus the possibility of polluting the water in the lake from chemicals is very low.
- With all the above reasons, Nui Coc lake is the most potential and feasible source of the surface water in Thai Nguyen province.

143. Conclusion on selecting the water source:

- Project's surveyed area has the abundant source of surface water, enough capacity to supply raw water for the water treatment plants, treating into the clean water for urban areas and industrial zones in the short and long term time. Nui Coc lake's water reserving capacity to supply is stable and large. In terms of quality of water, at present, the water in Nui Coc lake is much better than rivers, for example Cong River, especially in the raining season when the water in the rivers carries large amount of aluvia.

- Using the water of Nui Coc Lake at the selected location where it is planned to build the WTP is very convenient and safe. According to Decision No. 3050/QĐ-UBND dated December 3rd, 2008 on the adjustment of the detailed planning to develop the tourism zone in the south of Nui Coc Lake, the planned location to build the WTP is right near the lake. In terms of the quality of water resources, volume, demand for using clean water and convenience in all aspects, the selected location to build the WTP present the highest feasibility features.
- However, the construction of the water intake works in the lake must take into account the fluctuation of water levels in the dry and rainy seasons. according to the design, the fluctuation is very large (MNmin + 33.80; MNmax + 48.20).

5.2. Selecting the Location of Water Treatment Plant

144. After carrying out the survey, calculation, consideration and comparison at Voi Phun Hill area, Consultant proposed three construction options.

Option I: Constructing the plant on Voi Phun Hill, in Phuc Tien hamlet, Phuc Triu commune

145. Height of constructed plant: + 95.00 m (the selected height was based on the results of hydraulic calculation of water supply network of Thai Nguyen city). The option has been put in the planning of South Nui Coc – Voi Phun Hill. The water from Nui Coc lake will be pumped up to the water supply plant located on the top of Voi Phun Hill. Then, the clean water will be supplied to the city by means of gravity due to the altitude difference of the terrains.

146. Option I is to build the plant on the top of the mountain, so it is necessary to building the road to the plant (about 400 m in length).

147. Because the plant is located on the mountain top, the rain water drainage system with high flow speed should be calculated in detail in order to ensure the safety.

Option II: to construct the plant at the location near the area of Voi Phun mountain, behind the lake's sub-dam (on the side of Da Dung Hill, the height of the ground of the plant is from + 65.00 to + 38.00 m)

148. The position is located in the overall planning of the area of South Nui Coc-Voi Phun Hill, but not identical to the expected location of the plant in the planning. Height of constructed plant: + 48.00 m.

149. The water from Nui Coc lake would be pumped up to the treatment plant. After treatment, clean water will be supplied to the city from the secondary pumping station and controlled in the operational modes by inverter system.

150. Advantages of Option II are convenient in transport, no need to build the road to the plant, and easier to build the drainage system because the height of the ground of the plant is similar to the height of the surrounding area. Also, the selected location to build the plant would be near the provincial Road 267.

Option III: to construct the plant on the west-north side of Voi Phun Hill.

151. Height of constructed plant: + 79.00 m to + 80.00 m. Raw water from Nui Coc lake would be pumped to the WTP. After treatment, the clean water would be supplied to the city by the combined method of using the secondary pumping station II and self-flowing from storage tank at the beginning of network thanks to the terrain altitude difference.

152. The disadvantages of Option III are the necessity to build the road to the plant (about 390 m long) and to calculate in detail the rainwater drainage with high flow speed in order to ensure the safety.

Table 9. Summary of investment contents in the 3 options

Investment items	Op I	Op II	Op III	Specific features of each option
Intake works– Raw water pumping station	X	X	X	
Raw water pipeline network	X	X	X	Option I: 300m long to the top of Voi Phun Hill, Option II: 1450m long past through Phuong Nam resort; Option III: 170m long to the side of Voi Phun Hill.
Leveling the ground	X	X	X	Option I and III: mainly digging up then transporting away
Mixing tank – flocculation - sedimentation	X	X	X	
Filtration tank	X	X	X	
Clean Water tank	X	X	X	
Secondary pumping station	X	X	X	Op.I: Self –flow to the city, without installing clean water pumping station Op.II: uses inverter pumping station, supplying water to the city Op.III: supplies water to the city by combined using pumping station II and self-flow from head of network and from storage tank in the plant.
Chemical house	X	X	X	
Chlorine house	X	X	X	
Yard, internal road	X	X	X	
Gate, wall and fence	X	X	X	
Administrative building	X	X	X	
Tanks of collecting the water after Washing and filtration	X	X	X	Op.I and III: builds the mixing tank/sedimentation tank
Sludge drying yard		X		Op.I and III: do not have sludge drying yards
Guard house	X	X	X	
Garage	X	X	X	
Technical pipeline, drainage network	X	X	X	
Outside drainage system	X	O	X	Op.I and III: necessary to invest the drainage system to discharge into the drainage system at the foot of the hill.
Road to plant	X	O	X	- Op.I: road 400m long to the plant at the altitude of +95.00m - Op.II: short and can be included in the internal road network. - Op.III: road 390m long to the plant at the altitude of +80.00m
Electricity for mechanic machines	X	X	X	
Electricity for controlling	X	X	X	
Transformer station - transmission cable network	X	X	X	

Note: X – Investment; O – No investment

153. Comment:

- Option III and I: necessity to build the drainage system outside the plant much longer, while the II option connected to the drainage system outside the plant.

- In terms of the muddy water collection system: PA I and III do not build mud drying yard, build the water reservoir with large capacity, take advantage of the natural terrain; PA II: necessity to build mud drying yard; water reservoirs is only partly taken advantage the natural terrain and smaller capacity.
- Option I and III: in accordance with the planning of the area of South Nui Coc – Voi Phun Mountain. The selected location to build the plant is convenient to take advantage the natural terrain, having the condition of supplying water to the city by mean of self-flowing. For option III, supplying the clean water to the city through the combination of clean water pumping station and self-flowing, helping actively regulate the clean water and expanding the capacity of supplying the clean water, partly saving the cost of electricity in the time of self-flowing. While, Option II supplies the clean water to the city through totally the secondary pumping station, so the cost of power is higher.

154. The above comparison shows that Option II is the most convenient to construct due to the construction of the plant at the lowest altitude. This reduces considerably the risks of soil erosion and land-slide in the process of construction and operation later. However, due to the low altitude of the plant, supplying clean water completely depends on pumping, so leading to the cost of electricity power, especially in the situation of high price of electricity. In the long term, this make Option II not as advantageous in terms of environmental protection and economic profit as Option I and III, which place the plant at the high altitude, so the clean water can flow itself to the city. Of Option I and Option III, Option III has much more advantage because the plant is located at a little lower altitude than Option I's. this helps reduce the construction costs and the risks of soil erosion and land slide occurring during the torrential rains. Of course, for Option III, it is necessary to design an impactive rainwater drainage system and cover the vegetation on the surrounding areas of the works in order to prevent soil erosion. If this task is well implemented, Option III will be the most favorable option.

5.3. Options of Installing the Transmission and Distribution Pipelines

Option I

155. To build the transmission pipeline DN800-DN300 from the Water supply plant to the city along Road 267, Road 270, Road Z115, and a section of the national highway No. 3 from Dan bridge to Tan Long island.(Figure 3)

Option II

156. To build the pipeline along Nui Coc Lake channel, from the plant to the existing network; connecting point is at the point of the orthopedics centre.

Table 10. Comparison between two options

Comparison Content	Option I (along road 267 and road 270)	Option II (along the main channel of Nui Coc lake)
Connecting point to the city's existing network.	Point No. 7 (Crossroads between QuangTrung Str. and The national Road No. 3) Excessive water pressure at Point 7 is 21.54 m	Point No. 7 (Crossroads of QuangTrung - The national Road No. 3) Excessive water pressure at Point 7 is 26.03 m
Excessive water pressure at the most unfavorable point	At Point 6 (Thin Duc), the pressure is 9.59 m	Point 9 (intersection between National Road No.3 and Viet Bac Roar), the pressure is 8.46 m
Length of the main transmission pipelines from South Nui Coc plant to Point No.7	DN 800 – 1000 m DN 700 – 4710 m DN 600 – 5550 m DN 400 – 6050m Total length: 13010 m.	DN 800 – 1000 m DN700 – 6185 m DN 600 – 5250 m, Total length: 12435 m
Building Stage Division and	Meeting the city's development	does not meet the city's

Comparison Content	Option I (along road 267 and road 270)	Option II (along the main channel of Nui Coc lake)
conformity for the city development.	on North West side.	development to the Northwest.
Terrain and Construction Conditions	Complicated terrain; when designing pipelines along Road 270, it is necessary to take into account expanding the road.	Flat terrain, mainly along the side of channel Nui Coc Lake, not being affected by the traffic planning.

Comments:

157. Option I will have more environmental impacts than Option II, mainly because pipelines in Option I run along roads, so that in the process of construction, the construction will partially or temporarily causes smoke, dust or traffic jams. Option II causes fewer environmental impact because pipelines do not run along roads. However, Option I is suitable for the Project's Detailed Draft which has been approved. Moreover, according to the analyses in the above table, Option I meets the city's development to the West – North side (in the city's this side, lots of urban areas has been planned). In addition, it is more convenient and quicker to construct the pipelines along the existing roads. After the overall consideration in all aspects of the environment, economic interest, and the city's plan, Consultant and experts of Thai Nguyen Water Supply Joint Stock Company agreed to choose Option I.

5.4. Selecting Water Treatment Technology

158. We would like to present two options of the treatment technology as following:

Option I:

159. Option I is the selected option for the project as mentioned in section 1.4.3 (including figure 3)

Option II:

160. Diagram of the technological line of Option II (as the below figure) is basically the same Option I in principle; However, the costs of building the mixing/reacting, sedimentation, filtration tanks and the cost of operation later in Option II is higher than the costs in Option I, because the volume of construction according to Option II is larger Option I, the manner of operation of Option II is more difficult than Option I; and Option II uses more water than Option I. Moreover, the time duration of building of Option II is longer than Option I; and Option II is more difficult to install than Option I; the Option II's stability in operation is lower than Option I's.

Comments:

161. In terms of water treatment, two above options are the same. However, in terms of the terrain, location to build the plant, the quality of input water source and the analyses about the advantages and disadvantages in all aspects, we would like to select Option I for building the South Nui Coc Water Plant.

162. Option I's advantages:

- Due to the high quality of the input water source, the plant's treatment capacity is the most affected. Moreover, the plant operates more stably and the plant's life-time is longer.
- The size of the plant in Option I is smaller, suitable for building the water plant in mountainous areas. Due to the smaller size of the project, the less leveling ground in the process of construction, so that reduces the impacts to the natural vegetation as well as the ecosystem, causing the soil erosion, landslide when the torrential rain.
- Economically, the costs of building the plant is lower.

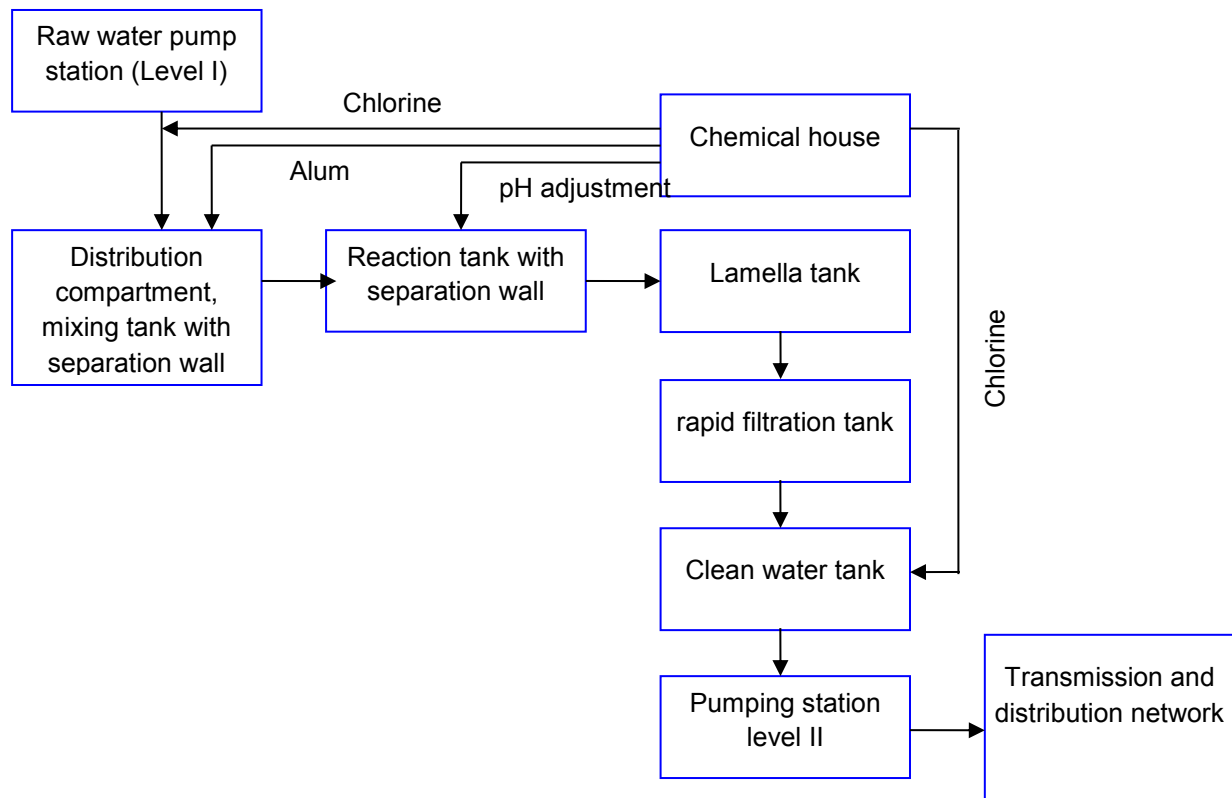


Figure 14: Flow chart of the treatment technology

Climate change in design and location

163. The project has no impact on climate change in the region.

164. Consideration of the problem of natural disasters (storm, floods, and drought): the water treatment plant with capacity of 50,000 m³/day will be located on the side of Voi Phun hill. The levels will be made in two elevations (79m and 80m) so that the works will not be affected by storms or floods. Leveling height will be in compliance with the hydraulic requirements of the process and also ensure that the work foundations will be built on original natural soil. Road pavements will be designed to be suitable to local weather conditions. The surface water sources from Nui Coc Lake is stable an enormous with good quality, capable to provide 50,000 m³/day for the WTP in the stage by 2020, and 100,000 m³/day in the second stage.

Chapter 6. ENVIRONMENTAL IMPACTS ASSESSMENT AND MITIGATION MEASURES

6.1. Environmental Impacts Assessment

The positive impacts:

165. Building South Nui Coc Lake water supply plant will affect positively the socio-economic development in the west area of Thai Nguyen city, improving significantly the local residents health and living condition, affecting positively the development of industry and handicraft industry in the area and will also, attract investors and investment into this area.

166. Water supply project will remarkably improve the local residents' living conditions and reduce the diseases due to using unfit for consumption water, contributing to reducing the public healthcare fees. This is extremely important because the number of cases of disease due to unsanitary water consumption is very high according to the figures from the Ministry of Health.

167. The project will also create more jobs in the processes of construction and operation.

The negative impacts

168. The main negative impacts of each item in project are listed in the table below:

Table 11. Main types of the environmental impacts of the project

Construction Phase
1) Excavation work for the pipeline trenches, intake and distribution network, will produce spoil; heaps of excavated soil beside the trench could drain into the lake, obstruct community access, and erosion from spoil storage areas could silt up nearby streams and drains. Dry heaps could cause dust nuisance. 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">• Local residents could be cut off from the road due to the trench-building;• Increased traffic of dump trucks carrying spoils to and from storage areas;• Air pollution from excavation and transport equipment;• Traffic hazard to pedestrians, especially school children and elderly;• Emergency units could face rerouting delays that could be life threatening for specific cases
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
Operation Phase
5) Hazard created by water treatment process chemicals with chlorine being the most hazardous.
6) Disposal of water treatment sludge and wastes from WTP operation.
7) Noise and vibration affecting the surrounding area.
8) Increase in the volume of municipal wastewater generated.
9) Breakage and leakage from damaged pipes and joints.

6.1.1. Environmental impacts in land clearance phase

Impacts on the society

169. Experience shows that land compensation and clearance are always a serious problem. Therefore, there is the cooperation between the authorities and the relevant agencies in solving the issues of land compensation and clearance. The processes of land evaluation and compensation are in the project's implementation procedure. The land recovery and compensation need to be solved timely. If land negotiation lasts too long, the progress and

completion of the project will be delayed. The land recovery and compensation must comply with the regulations of the existing Law on Land of Vietnam.

170. In this project, the land compensation will only be conducted for the land areas to build the water supply plant at Voi Phun Hill in Phuc Triu commune. Building the clean water distribution pipelines will not require land acquisition as it is under public management. The option of installing the clean water distribution pipelines along the roadsides will be prioritized. In case of no or too narrow pavement, the pipelines will be installed underground, avoiding impacts on the existing works and structures.

171. According to the design, it is estimated that about 100,000 square-meter of land will be acquired to build the WTP and its ancillary construction works on Voi Phun Hill. 9 entities, including 8 HHs, and Nui Coc Lake Irrigation and Exploitation Centre in this area will be affected due to the permanent land acquisition (forest land). Surrounding the affected HHs there is only affected specie of plant (acacia) that will be affected because these HHs are contracted to plant and protect forests, land is owned by the state. A temporary house for custodian's forest is affected. The project will have no impact on any local cultural works (for example, temples, and shrines) or any historic relic. No cultural site is located close to project activities. The options of land compensation for the local affected residents will be covered by another document (Resettlement Plan).

Impact on health

172. In addition to the land clearance process, it is necessary to pay attention to the risks of UXOs. Since excavation related infrastructure development is one of the main causes of the sudden explosion UXO in Vietnam, and habits of pipe installation roadwork closed to densely populated areas, it is needed to be vigilant to ensure that the pipeline construction area was surveyed for the presence of UXOs before any excavation takes place. although the risk is very low, the contractor will be responsible for ensuring the safety for the construction and can hire the army to disarm the bombs and mines before the land clearance activities. If such explosives are detected and verified, the demining work would need to be made, and be subject to the procedures established by the competent bodies, before performing any civil work.

Impacts on the natural environment (land, water and air)

173. Because the location to build the raw water intake works from Nui Coc lake, the raw water pipelines DN800 and the location to build the water plant on the side of the Voi Phun hill locate separately from the residential areas, the dust and vibration that cause the environmental pollution coming from the construction process impact will partially impact the local residents. On another hand, because the number of houses to pull down and trees to cut down is low, amount of dusts and vibration coming from the land clearance process is also low, affecting slightly air environment. It can be said that the impacts on the natural environment in this phase is of low level. However, there is a need to pay attention to Voi Phun hill location adjacent to Nui Coc Lake because of the necessity to take measure to prevent soil, rock and vegetation to fall down in Nui Coc lake causing sedimentation and reducing the lake's water quality.

6.1.2. Environmental impacts during the construction phase

a) Environmental impacts during construction of water supply plants

Impacts on air environment

174. The main environmental impacts during the construction process of the WTP mainly come from the activities of leveling the ground and transporting materials into the WTP area. Factors causing air environment pollution are :

- Dust coming from the activities of digging, leveling and banking the ground, transporting and gathering materials due to vehicles running and winds.

- Dust and noise coming from construction activities of pipelines from HH to the connection points.
- Exhaust fumes coming from the transportation vehicles, construction machines, smoke coming from asphalt burning which all contain harmful gases and dust such as SO₂, CO₂, CO, NO₂ and excessive hydrocarbons (HC).
- Noise and vibration coming from the construction machines and transportation vehicles.

175. However, the environmental pollution present during the construction phase mostly affects workers on the construction site. They are the subjects working and getting in contact directly with the sources of pollution in the labor process. Therefore, they should be equipped with the protective equipment on the construction site in order to limit the impact on their health.

176. regarding HHs and the residential areas, because the construction area locates in the northwest side of Voi Phun hill, there is no HH living adjacent to the construction area, the air pollution coming from leveling the ground, improving the code and constructing does not impact local residents.

177. Dust, exhaust fumes and noise coming from transporting construction materials, pipes, equipment and solid wastes and construction wastes on the roads within the residential areas, schools and markets close by, for example road 267, Road 270, Quang Trung Street, ... will surely impact the local residents. However, because these roads are rather small (only about 9 m in average width) and the number of the transportation vehicles running on these roads is low, these impacts light. Moreover, the pollution is interruptive and temporary, the level of environmental impacts on the local residents are light as well.

178. Levels of noise pollution are forecasted as follows:

The noise spread is calculated by the formula:

$$Leq = E.L + 10 \log (U.F) - 20 \log (D/D_1) - 10 G \log(D/D_1) [1]$$

Where: Leq: Noise at distance D

EL: Noise at the measuring position (D1 m far from the coming sources)

G: Coefficient of terrain

D: The distance to be calculated

D1: Distance from the coming source

U.F: Coefficient of useful utility of the engine

179. Because most engines are operated at the maximum capacity, coefficient U.F = 1; and we supposed that there is no stubling-block in the construction case, coefficient G = 0.

180. As a result, the noise spread is calculated by the formula:

$$Leq = E.L - 20 \log (D/D_1).$$

Table 12. Levels of the noise pollution coming from construction machines and transport vehicles

No	Name of engines and equipments	Noise at 15,24 m*	Spreading the noise (dB)					
			50 m	80 m	100 m	120 m	150 m	200 m
1	Crane	88	77.68	73.60	71.65	70.08	68.14	65.64
2	Bulldozer	85	74.68	70.60	68.66	67.08	65.14	62.64
3	Elevators	85	74.68	70.60	68.66	67.08	65.14	62.64
4	Pile stuffing machine	98	87.68	83.60	81.66	80.08	78.14	75.64
5	Tiller	83	72.68	68.59	66.66	65.08	63.14	60.64
6	Roller	74	63.68	59.59	57.66	56.08	54.14	51.64
7	Truck	88	77.68	73.60	71.65	70.08	68.14	65.64

8	Cutting machine	93	82.68	78.60	76.66	75.08	73.14	70.64
QCVN 26- 2010/ BTNMT								
6h – 21h		70	70	70	70	70	70	70
21h – 6h		55	55	55	55	55	55	55

Sources: * The U.S. Federal Transit Administration (FTA). Transit Noise and Vibration Impact Assessment. 2006

181. According to calculations, the use of trucks transporting materials will generate noise beyond the regulations in the National Regulated standards QCVN 26-2010/BTNMT. In particular, according to the regulation on the permitted noise levels for residential areas from 21h-6 in the standards, the use of the construction machines in this period will generate noise beyond the permitted levels within the distance of 200m. Hence, in the process of construction, Contractor should minimize the construction time duration at night, especially not to let the trucks run on the roads within the residential areas like Road 270 and Road 267 in the range of this time.

182. The table also shows that workers at the construction site will be constantly exposed to high-intensity noise. According to calculations, within the range of 15m, the intensity of noise is higher than 85dB. This threshold of noise will make people feel tired when exposed continuously the noise; the threshold of 90dB or higher will affect hearing. So, the workers at the construction site should avoid to be exposed too long to the noise with high intensity a restriction of the use of the construction machines at the construction site and use the labor protection tools.

183. The location to build the water treatment plant with a capacity of 50,000 m³/day.night locates in the north-west side of Voi Phun Hill; the ground is levelled into 02 levels/codes: Code +79 m and code +80 m.

184. According to the technical report, volumes of digging and banking are as follows: For the construction area of the WTP is about 2.5 hectare, the volume of land to dig is about 141,137 m³. Density of soil is about 1.4 ton/m³. Therefore, the weight of soil to dig and transport is about 197,592 tons. If using the 15-ton truck, there will be about 13,173 transport. The dug soil is the clean soil, so that it can be used for leveling the ground for the sunken areas. This will help reduce the transportation costs and reduce the environmental pollution and accidents caused by the transportation activities. Supposed that the distance from the digging point in the construction site to the land disposal location is 5 km; according to the technical documentation, a 15-ton truck consumes about 0.0025 to 0.003 tons of oil to transport materials for 10 km (out and in), the volume of oil that trucks will consume is between 32.93 to 39.52 tons.

185. Currently, Vietnam does not have the standardized data on the levels of harmful gas emission of vehicles, so we have based on the documents of the World Health Organization (WHO) using the method of quickly determining harmful gas emission sources through "the coefficient of air pollution" in order to calculate the amount of pollutants to the air environment due to the transportation of materials and wastes, as follows:

Table 13. #Calculations of the amount of harmful gases emitting

Pollutans	Pollution coefficient (kilogram of waste/tons of oil consumption)	Volume of emissions (kg)
Dust	4.3	141.6-169.94
SO ₂	20S	658.6S-790.4S
NO _x	55	1811.2-2173.6
CO	28	922-1106.6
VOC	12	395.2-474.3

Note: S: the percentage rate of sulphur in fuel (accounts for 0.2-0.4 % in oil and petrol).

186. In general, the amount of waste as calculated in the above table, is not great during the construction, mainly generate in the ground leveling to build the treatment plant and subordination projects. However, due to the construction site at the altitude of (+79 to +80 m on Voi Phun Hill, the exhausts (especially dust) can cause not much impact on the tea or rice fields of the local residents. Moreover, the transportation of excavated soil from the site has gone through Road 267 and Road 270 with a number of the residential areas on its sides. Contractor and the construction units should seriously take the impact reduction measures such as watering on the transport routes through residential areas, collecting the solid waste dropping such as soil, sand to minimize the amount of dust generated by transport activities.

Impacts on the surface water environment – problem of landslide at the construction site

187. The wastes generating from the operation of the workers working at the construction sites is likely to cause surface water pollution. The volume of solid waste and wastewater depends on the number of workers working at the site. However, for this project, most workers are seasonal workers or local people, so these workers will not be present at the site and will go back home after their day of work. Hence, the impact from the workers' wastewater and solid waste is not considerable. The impact source can be eliminated by the measures in managing and raising the awareness of the environmental sanitation for the workers at the construction site, arranging temporary latrines and collecting daily the solid wastes. The wastewater of the small number of workers, doorkeepers or security guards working permanently at the site will be low. However, it is necessary to collect and treat this waste (sedimentation, filtration through sand) before being led into the sewer system at the foot of Voi Phun Hill, not allowing the wastewater to flow into Nui Coc Lake.

188. The main area to build the WTP locates at the altitude of (code +79 m to +80 m) of the northwestern side of Voi Phun Hill. Thus, it is necessary to take into account the phenomenon of spilling soil, solid wastes, wastewater drainage down to Nui Coc Lake, causing environmental impacts. It is necessary to build the tali to avoid landslides when heavy rains. It is also necessary to design the temporary drainage system from the site to the foot of the hill safely. When building, it is important to protect the vegetation covering on the side and at the foot of the hill in order to reduce soil erosion and landslide when heavy rains occur to avoid sedimentation and reduction of water quality of the Nui Coc Lake.

189. Because the location to build the raw water intake project (including pumping stations) located close to the lakeside, it necessary to build a reasonable barrier to prevent excavated soil and sand from falling into the lake. The altitude of the water intake project must be the same the altitude of the top of the dam of Nui Coc Lake in order avoid the possibility of flooding the project during the construction phase and the operation phase later. Moreover, the water intake pipes must be appropriately designed to ensure that aquatic fauna and flora of the lake will not be sucked into the intake.

190. Finally, the location to build the mud reservoir/pond locates in a small and respectively deep valley at the foot of Voi Phun Hill, so the side/bank of the pond/reservoir must be consolidated firmly to prevent the soil erosion and landslide. In general, it is necessary to limit to construct the project in the rainy season because the project locates at rather high ground.

Solid wastes and hazardous wastes

191. The process of building the water plant will generate a large amount of the construction wastes such as soil, sand, crushed stone, cement, concrete debris, etc. The volume of these wastes is very difficult to control, if not well managed, it will be a source causing the environmental pollution. These wastes will be used mainly for leveling the ground in the sunken areas in order to save costs of transport and limit the pollution due to the transportation. The rest amount of the wastes should dump at Tan Cuong solid waste dumping ground of the city.

192. In addition, the workers at the construction site or the WTP always generate a certain amount of wastes. This volume depends on the number of workers working and living at the site. According to the estimation, there will be about 150 workers working permanently at the construction site of the plant. If each person eliminates about 0.5 kg of solid waste and wastewater, the amount of wastes generated by workers at the site will be about 75 kg. Although this amount of wastes is not much, if it is not collected and treated appropriately, it would also be a source of environmental pollution, potentially affecting the workers' health.

193. The hazardous wastes at the construction site mainly are leaking oil and lubricants. It is necessary to manage the amount of the leaking oil and lubricants in order to avoid polluting the environment due to the workers' spills, especially in the water of Nui Coc Lake.

Impacts on the social environment in the area and its surrounding areas

194. The workforce flocking in the area during the construction process increases the risks of arising the issues of the public order and security, the social evils, diseases and other complicated social problems. Therefore contractor and the construction units should coordinate closely with local authorities to manage the workforce at the site.

195. Moreover, it is necessary to reduce the risks of traffic accidents to the local residents living along both sides of Road 267 and Road 270 in the process of transporting the construction materials and wastes due to Road 267 and Road 270's narrow widths and some residential areas high population densities, for example the area of Phuc Xuan market. For the activities of transport by trucks, it is necessary to arrange the persons in charge of leading the traffic build the signs of the construction site, the signs of the speed limit, install the lights at night.

196. In addition, the transport process can also arise the risks of damaging the roads or the residential projects for example the walls, fences, etc. In that case, Contractor should deal in the compensation to the impacted residents.

Labor safety during the construction process

197. Although the areas to build the water plants and subordinate works locate in areas with low population density and the ground to gather materials and the construction machines at the foot of the hill is relatively wide, it also is necessary to take into account the possibilities of the labour accidents due to the high location to build the plant. Moreover, the workers' flocking at the construction area also increases the possibility of breaking out the contagious diseases. It is necessary to prepare the first aid and medical equipments at the construction site, equip the labor protection equipment for workers, call the workers to order the labour principle in industrial safety and hygiene, and frequently propagandize the healthy living ways for the workers.

b) Environmental impacts during the construction of the water pipelines

Impacts on the air environment

Sources of impacts:

198. **Sources of emitting the dusts and noise are the activities of transporting and gathering the construction materials** such as PVC and pig-iron pipes DN300 to DN 800, digging and banking the ditches to build the water pipelines. The materials falling on the roads in the process of transportation pollute the environment and affect the landscape.

199. Because the clean water pipelines run along the roadside of the Road 267, Road 270, Road Z115, and the National Road No. 3 where many residential areas, schools and markets are present. The impact due to the materials' falling on the road is rather considerable. The harmful gases for example SO_x, NO_x and CO, and the noise generating from the material transport vehicles and the ditch digging machines will be the factors of causing the environmental pollution and affecting the health of the local residents living near the construction of the pipelines. However, because the pipeline construction process will be

implemented section by section and the number of the construction machines is not so many, the impact on the air environment is not much and partial.

200. the noise coming from the construction machines during the construction of the water pipelines, according to the table 13 above, will also affect the residential area within the 200 m corridor along the axes of the pipelines, especially for the narrow roads with a significant density of population as Road 267, Road 270, Road Z115, Duong Tu Minh Road and at the section of Goc Bang market. Therefore the construction near the high populated residential areas for example Phuc Xuan Market, Phuc Xuan Commune People's Committee,... must be implemented out of the time period from 21.00 - 6.00.

Impact levels:

201. Most of that amount of land will be used to level the ground after putting the pipes. The excessive amount of land that needs to transport is estimated to be about 5535 m³, that amount of land requires about 369 of 15-ton trucks to transport. To save the costs of transport and reducing the environmental pollution and accidents occurring in the transport of waste, that amount of land waste would better be used to levelling the sunken areas near the digging areas, if permitted. If not, the excessive amount of land will be transported to Tan Cuong solid waste dumping ground. Supposed that the institutions or individuals having the demand for leveling the depression ground locate within the radius of 5 km from the site, the volume of oil consumption for transporting this amount of land waste is estimated to be about 0.92 - 1.11 tons. The amount of the waste emission is estimated as follows:

Table 14. Calculation of the volume of waste emissions

Pollutants	Pollution coefficient	Emissions volume
Dust	4.3	3.96 - 4.77
SO ₂	20S	18.4S - 22.2S
NO _x	55	50.6 - 61.05
CO	28	25.76 - 31.08
VOC	12	11.04 - 13.32

202. According to the above estimation, the number of trucks to transport the land waste is rather small. Although the length of the total pipelines is about 42.63 km (and about 62 km of Service pipelines), the scope of the construction is wide, the density of trucks travelling on the roads is low because the construction will be implemented section by section and the time duration to build the pipeline network will last from 2012 to 2020. Hence, currently, the amount of dust and the exhaust fumes coming from the activities of building the pipelines will be distributed equally in the total time duration of the construction, not concentrating at a special time or in a special area, this reduces the environmental pollution levels. Only taking some measures such as shielding, not transporting over the load of the vehicles can help to minimize the amount of dust and gas generating from this operation.

203. For some special areas where the pipelines run through for example Quyet Thang primary school, Phuc Xuan primary school, Phuc Xuan secondary school adjacent to Road 270, Thai Nguyen University adjacent to Road Z115), it is necessary to arrange to construct in the reasonable times, avoiding the rush hours to reduce the environmental impact of air and noise to students and pupils. The building time should be at night.

Impacts on the traffic system

204. The activities of transporting and gathering materials (mostly water pipes), digging the soil and land, installing pipelines and transporting the excessive soil are the causes of traffic problems on the roads. The affected sections of roads have been mentioned above, especially the section of the pipeline running along the National Highway No. 3. This is a big road and vehicles often run at the high speed, so it is necessary to have the warning signs of ahead working site and the persons leading the traffic at the construction site. The section of Road 270

towards the city and especially Road 267 will also be used to transporting the materials to build the water plant at Voi Phun Hill. Therefore, the construction of the pipelines along these sections of the roads must be arranged at reasonable hours to avoid the traffic jam.

205. The traffic impacts mentioned above can generally be controlled and Contractors will implement some methods such as managing, splitting the traffic lane, erecting the speed limit signs, warning signs in order to minimize the risks of the traffic problems.

206. Moreover, the distance between the ditches to install the pipes and the local residents' walls, fences, houses and works must be far enough (from 3 to 5 m) in order to avoid damaging. Collapsing the houses can cause the traffic jam. For the section of building the pipeline along Road 115, it is necessary to pay attention to the depth of the pipelines in case of expanding the road.

Impacts on the water environment

207. The construction of the water pipelines requires digging the trenches with the depth of from 1.5 m to 2 m depending on the diameter of the pipes. This digging can cause to damage the existing wastewater pipelines on both sides of the road, causing environmental pollution. Road 267 and Road 270 locate in the city outskirts, so the possibility of having underground works for example the wastewater, electricity lines or communication lines is very low. However, in Road Duong Tu Minh and especially in Road Z115 at the city – in head, the possibility of having underground works is very high.

208. In the section of Road 270 leading to the tourist area of t North Nui Coc Lake, there are some sections running close to the lake or over bridge. When constructing in this area, it is essential to take the measures to prevent the dugout soil from falling or sliding into the lake, especially when it rains heavily, affecting the surface water quality of the lake. The construction of this works should be implemented in the dry season in order to avoid affecting the surface water quality of the lake.

Solid wastes from living and construction, and hazardous wastes

209. The volume of the solid wastes generating by the workers working at the site will be negligible due to building the pipelines section by section. The number of workers working at the site at a time will be not more than 100, so the amount of wastes according to the estimation will be less than 50 kg (each worker's average amount of wastes generating is 0.5kg per day). However, the scope of the construction site of building the pipelines is large and the time duration to build the pipeline is long, so it is essential to regularly collect the solid wastes of the construction workers.

210. The process of building the pipelines mainly includes digging and refilling the ditches. However, some sections require to dig the concrete layer on the pavements or the asphalt layer then refill the same ground. This requires all kinds of building materials for example sand, stone, cement, asphalt..., and obviously causing environmental pollution, so it is necessary to gather appropriately the materials in order to avoid spreading into the environment.

211. Hazardous wastes: the hazardous wastes in the construction process are mainly the waste oil and lubricants discharging from engines, machines, especially from the material transport trucks and the construction machines. According to technical documents, the average amount of waste oils and lubricants discharging from the construction machines are about 3 – 7 liters after the time duration of 3 – 4 months to change the oil. Actually, the volume of the construction is rather large, however, because the construction is implemented section by section, a number of the construction machines is used during the certain construction time is small, the level of the environmental pollution due to waste oils and lubricants at the sites is negligible. Nevertheless, it is necessary to strictly take measures to limit the waste oils and lubricants discharging at the construction sites. It is necessary to change the lubricating oils and

maintain the vehicles and machines regularly at professional garages, not at the construction sites.

Affaires of social security & order and labor safety

212. Gathering the workforces in the construction area in the process of the construction can increase the potential risk of problems about security & order, social evils, epidemics; as well as the disputes in employment among workers or conflicts between workers and the local residents. Besides, due to some kinds of unwholesome services, social evils can arise. Therefore, it is essential to control strictly on the workers in construction areas to avoid the problems on security.

213. During the construction process, many valuable machines, tools, equipments, materials that are gathered at the site will increase the potential risks of thievery, robbery or destruction. Therefore, it is very important to guard closely the construction site; security guards are strong enough, the co-operation with local authorities and residents should be improved to reduce the risk of regrettable losses.

214. Causes of labour accidents during the construction process:

- No training about labour safety for the project site manager, foreman and workers
- Not enough labour safety equipments for workers;
- Workers' not following the regulations on labour safety;
- Lack of the site manager and foreman supervision in the construction process;
- Constructing not in accordance with the technical process.

215. In the construction process, Constructor should pay attention to implement the labour safety regulations in order to minimize the possibility of accidents.

Impacts on the religious works

216. Some pipelines run pass some entrances of several temples (as described in table 11). All these temples are located far from the building site the nearest being Phuc Son Pagoda locating behind Phuc Xuan market on Road 270 which is also about 100 meters from the construction site). Hence, the possibility of depressing the religious work due to the vibrations is zero. However, the construction process may hinder the Buddhists from travelling to pagodas on the 1st and 15th (according to lunar calendar) of every month and in the traditional festivals. Therefore, the schedule to constructing at these sensitive places must be reasonable in order to avoid hindering the pilgrims or Buddhists' travelling to the temples.

217. Working in an urban environment also increases greatly the risk of digging through unrevealed and unknown potential historic and/or religious artefact or remains. However, the sites foreseen for the trenches and the construction site have, for most of them, been worked on before or are in low potential value for historical finds. Nonetheless, chance find could still be possible because the depth of the work to be done is lower than the previous work done. Therefore, if it does happen, work should be stopped at first sight and specialist should be contacted before work could be restarted.

6.1.3. Environmental impacts during the project operation

a) Environmental impacts during the operation of the water plant

Impacts of odors and noises

218. When the plant goes into operation, the noises and exhaust fumes that might emit mainly are from the pumping stations. However, because most pumping stations use electric motors, they will not emit air wastes such as smokes and dust which can cause air environment pollution. In terms of noise problem, at present all kinds of water pumps are manufactured with

recent technology and designed with an anti-vibration system to reduce the noise and all pumping stations will be located far from residential areas, the noise problem is negligible.

219. Waste gases such as carbon dioxide (CO₂), methane (CH₄) and hydrogen sulfide (H₂S) are mainly generated in the operation period of the water treatment plant due to the decay of the organic substances and mud suspension in the sedimentation tanks and the mud reservoirs/ponds. These gases can spread into the air, causing bad odors and polluting the air environment, affecting directly the working environment in the WTP. In terms of the bad odors, because most WTP locate far from the residential areas, the possibilities of bad odors affecting to the local residents, if have, is negligible. Moreover, the problems to control the odor pollution can be solved by applying the treatment technology. On the other hand, according to the results of analyzing and observing the quality of the raw water source of the Department of Natural Resource and Environment, the amount of organic substances and mud suspension in the raw water is very low; the level of the bad smell is negligible.

Impacts of wastewater and solid wastes from the workers operating the water plant

220. Although the number of the worker operating the water plant is small (estimated at about 60) and the amount of wastes from these workers is negligible, the amount of solid wastes and wastewater must be collected and preliminarily treated before discharging into the existing drainage system at the foot of Voi Phun Hill. The Solid wastes are also collected then transported Tan Cuong dumping ground. It is necessary to design and build separately the waste water and rain drainage systems to ensure the waste water not to run into the Nui Coc Lake even in case of heavy rain.

Impacts of sludge

221. The waste mud coming from the process of washing and filtration will accumulate in the sedimentation tanks and mud reservoirs/ponds. The waste mud should be dumped at the solid waste dumping ground located at Tan Cuong dumping ground according to the regulations of Thai Nguyen province. It is necessary to note that substance PACN is used in the process of the water treatment, the waste mud will contain a certain amount of metal especially aluminum, it's main component. In order to prevent the waste mud falling, transport vehicles must be shielded carefully and must not transport overload.

222. Moreover, there could be some potential incidents with the mud reservoir such as cracking, brakeage of the waste mud pipelines;, cracking, brakeage of the mud reservoir/ponds or overflowing of the mud reservoirs/ponds due to the heavy rain which can cause the around environment pollution and accordingly these incidents should and must be taken into account in the process of designing.

Incidents of chemical leakages

223. Alum and chlorine are used in the operation process of the plant. Alum used to coagulate is a harmless aluminum alum. However, in order to keep the environment hygienic, the warehouse of alum must be clean and dry.

224. Chlorine is kept in the liquid form and transformed into gas to use of sterilizing the water. Chlorine is a harmful substance to the environment, especially if leaking; it will harm to fauna and flora and cause the odor pollution in the area. However, a high concentration of Chlorine in water can cause the Chlorine odor in the water. Therefore, the warehouse of chemicals needs regularly to check in order to avoid leaking Chlorine in the operation process.

Impacts on surroundings communities

225. The competition for the water resource does not appear to be of any concern. The water source of Nui Coc Lake is a controlled body of water. At the lowest level of the reservoir, the mean intake will be of 1.16 m³ per second (100,000 m³ per day) when the body of water will still be at 75M m³. Therefore, the risk that the WTP operation, at its full capacity, creates a shortage

to the other users and the environment for the upstream, downstream and on site populations of any sort is nil.

b) Environmental impacts during the operation of the pipelines.

Soil, surface water and ground water environment

226. The water in the supply pipelines has no impact on the natural environment, except its leakage from the joints, welding buttons, or pipe breaking. If these incidents happen, clean water can run onto the road, contaminating the wastes for example oil, lubricants, wastes falling from vehicles can cause to pollute soil, surface and underground water. Besides, there is a risk of the pipe sticking due to CaCo₃ precipitate on the inner side of the pipes, hindering the water circulation. We need regularly check the pressure on the water meter to monitor the water flowing rate/speed, prevent and treat timely the incidents of leaking the water or breaking the pipes. That helps avoid wasting the natural water resource, ensure the local residents well-being and increase company revenue.

227. Thus, in order that the WTP operates well, the quality of the treated water meets the standard to be permitted to supply the clean water, the quality of the raw water and the output of the water must meet the capacity as designed. In order to ensure the quality of the raw water, the Basin of Nui Coc Lake should be protected from all industrial activities that can cause to seriously pollute the water source; limit the agricultural activities that may cause significant pollution. In addition, the tourist activities should also be planned reasonably.

228. In addition to ensuring the quality of input raw water, the output of the clean water should be paid attention, avoiding the phenomenon of only focusing on the revenue but not paying attention to the quality of clean water. If the treatment plant operates normally, no important matter happens; however, if something goes wrong, the station has to temporarily cease the operation. When it occurs, a case easy to occur is that the raw water with no treatment can be pumped into supplying system and delivered to the clean water distribution network. Therefore, when designing, it is necessary to pay attention to the spare options for these important parts such as the pumping stations, storage tanks with the automatic valves.

229. It is necessary to prepare the specific plans on monitoring the quality of the input water in different stages such as at the stages of the raw water, sterilization tanks, in order to take the appropriate measures to solve problems promptly.

6.2. Mitigation Measures

6.2.1. Environmental preventive and mitigation measures during preconstruction (site-clearance)

230. The most important issue in this pre-construction phase is the compensation for affected HH whose lands, houses and jobs are affected by the project. In Project Preparation stage, a separate “Resettlement Plan” report is prepared and approved. The RP will analyze in detail impacts on land acquisition, site clearance, resettlement and compensation, supports as well as income restoration programs for DPs, aiming at minimizing social impacts caused by the project. The project will ensure the full compensation and support policies applied for affected lands and assets with replacement cost.

231. During compensation for PAHs, it is necessary to implement the following:

- Widely propagate economic development and compensation policies of the project in the community. Propagate the enforcement of obligations, rights and laws set by the State.
- Disclose compensation prices (detailed regulations on each type of compensated assets) to affected HHs
- Publicize and accurately inform compensation amount for each affected HH

- Apply support policies intended for poor HHs and HHs under preferential treatment policies

6.2.2. Mitigation measures for environmental impacts during construction

a) Mitigation measures for negative impacts during construction of the water supply plant.

Mitigation Measures for Dust, Exhaust Gases, Noise and Vibration Pollution

232. Due to the fact that the construction site of the water supply plant will be situated on a quite high ground level (from +79 to +80 m) in the North Western side of Voi Phun Hill, impacts from noise, dust and gas emissions will be significant, especially on windy days. Although the location of this construction site is far from the nearest residential area, it is quite close (few hundred meters) to the temporary transit reception house for drug addicts. Furthermore, transportation routes (road 267 and 270), which serve the construction site of the water supply plant, pass by some populated residential areas, lying on both sides of these roads. Therefore, noise, dust and gas emissions generated from construction activities will mainly impact on health and working efficiency of workers and to some extent on the people at the temporary transit reception house, meanwhile, those generated from transportation activities will mostly impact on local HHs living along the transportation routes. Contractors must implement all necessary mitigation measures to control noise, dust and vibration from the construction site. The construction activities that generate much noise and vibration must comply with Vietnam's technical regulations (QCVN). For serious areas, Contractors should measure noise and vibration levels in a close consultation with local community and apply necessary measures to control noise and vibration levels. Other measures are proposed as follows:

- Before starting construction activities on any construction site, Contractors must inform local government and residents on construction plan and potential noise as well as vibration that can be generated from construction activities. Mitigation measures for these impacts should also be disclosed.
- During hot and dry weather, regularly spray water on the transportation routes (3 times/day in the morning and evening) and construction sites to humidify soil, increase the adhesion of soil, and minimize dust and soil spreading into ambient air due to winds.
- Fully cover truck tanks during transportation of construction materials (sand, soil, cement and rock...) to prevent dust emission. Means of transportation and machines should be cleaned at the end of each working day.
- The truck involved in transporting materials must be inspected to meet technical and environmental standards; the trucks should always transport their regulated load capacity and run on designated transportation routes.
- The assembly sites for construction materials and waste during the construction phase must be carefully covered.
- Limit construction activities in the period from 21:00 to 6:00 in order not to affect the nearby temporary transit reception house for drug addicts and the residential areas along the transportation roads.
- Do not proceed with the construction and transportation in adverse conditions (heavy rain or strong winds) to reduce the possibility of emitting pollutants.
- During transportation through populated areas and through sensitive areas such as hospitals, schools, and sites of religion transportation means are absolutely not allowed to rapidly accelerate speed and use big horn.
- Providing training courses for truck drivers and construction machines operators on labor and traffic safety as well as on environmental protection.
- Implement the construction management and field supervision.

- Regularly monitor air pollution, noise and vibration to adjust and supplement impactive mitigation measures during construction.

Control of Pollution by Workers' Domestic Wastes

- In order to collect and treat wastewater from work camps impactively, whenever possible, Contractor must apply measures to reduce volume of wastewater to be treated, e.g. wastewater from bathrooms can be collected and reused for spraying to suppress dust on the construction site. Contractor should ensure that any wastewater from work camps will be collected and primarily treated (through a mechanical screening and a settling tank) before being discharged into the existing wastewater drainage system. It is not allowed to let wastewater flow into the water column of Nui Coc Lake.
- Control wastewater by minimizing the quantity of resident workers on the construction site. Work force should be appropriately organized during construction phase
- Construction should not be elongated in one area. Complete the construction work part by part. When one part is finished, its construction ground should be cleaned up. Work force should be optimized in quantity and appropriately organized during construction.
- Request workers not to discharge wastes directly into environment after daily meals.
- All domestic wastes must be collected and put in containers with capacity of 500-1000 liters. Project owner will hire a public service company or Urban Environment Company (URENCO) to collect and transport wastes every day to Tan Cuong landfill site.
- Raise workers' awareness in environmental protection; remind them not to indiscriminately throw garbage on the construction site.

Rainwater Drainage and Flood Mitigation:

- Construct drainage system for construction site and prepare water pumps to pump out stormwater, helping protect construction site against floods. Drainage system for construction site must be designed impactively against stagnation that can create odor and bad sanitation. As mentioned above, the construction site for water supply plant is situated on Voi Phun Hill with a quite high ground level. For this, the drainage system designed for this construction site must have a good capacity in storm water drainage, thus protecting against soil erosion and landslide, especially during rainy season.
- Ensure on-time construction, avoid delaying construction, especially into heavy rain period.

Construction Solid Waste:

- Construction wastes are mainly wooden beam, formworks, damaged construction materials that will be collected and classified into groups for treatment.
- During construction, carefully calculate and supervise the preparation of steel in order to cut steel scabs, saving materials, cut costs and waste disposal into the environment.
- Other wastes such as paper bags (cement bags), plastic tanks and wires are separated to be sold for recycling facilities.
- Used lubricant oil from machines must be collected and put in separate containers and must not be discharged into the environment. Containers that hold lubricants oil and fuel at construction sites (especially the construction site for building raw water intake facility, which is situated near to the bank of Nui Coc Lake) must be tightly sealed. Furthermore, these containers will be kept in a secondary special storage house to protect against leakings. Contractor should ensure that all hazardous materials are kept in a proper way including storage in labeled containers. The pollutants must not be allowed to reach water sources, especially groundwater.
- Raise awareness of workers in environmental protection, in disposal of the solid waste at designated area, and in cleaning up ground when the construction is completed.

Labor Safety During Construction Phase:

- Ensure infrastructure facilities for workers such as eating places, accommodations, bathhouse, medical center, toilets
- Must install fire and explosion protection equipments on the construction site to rapidly respond to any incident.
- Do not store flammable waste materials. They must be regularly transported out of the construction site. Set up warning signs and fences around dangerous areas containing flammable or explosive materials.
- Install sufficient lighting system for security and working places at night
- Install fire alarming system, signal lights and information system.
- Provide training courses on labor safety for workers.
- Must have regulation and warning signs on labor safety on the construction site.
- Periodically check and maintain safety equipment (e.g. fire extinguisher)
- Must always have first aid equipment on the construction site.
- Workers directly working on site or operators must take training courses and implement right manipulations in case of incidents; they must be always available at their positions, manipulate, check and operate in right techniques
- Labor safety measures for workers are necessary. Thus, workers will be equipped with sufficient clothes to ensure labor safety and reduce risk, including labor safety clothes, helmets, gloves, eyeglasses and shoes.
- Necessary instruments as well as addresses in case of emergency will be clearly written, e.g. flush water in case of incidents; medical box, eye washing sprayer; address and telephone numbers of hospitals.
- Workers on site must take periodical physical examinations held every six months in order to check health status for proper working assignments.

Mitigation for social issues:

- Disclose to the public the construction progress and construction schedule of the construction site
- Corporate with local authority and concerned functional organs to organize programs: education and propagation programs for workers on site; introduce immigrant employees on local customs and traditions to avoid unfortunate misunderstanding among immigrant workers and local people.
- Workers must bring with them employee cards so that the management is more convenient.
- Coordinate closely with relevant local agencies in control and management of immigrant workers working for the project; and in protection against thieves and robbery on construction materials, machines and other assets on the construction site.
- For management of work camps, Contractor will consult with local government on locations of the camps; workers will be supplied with clean water and electricity; toilets, mosquito nets, and garbage collection service as well as other health protection measures will be provided. Fishing, hunting and disturbing on local social order are prohibited. Provide training courses for workers on safety and good sanitation. Other activities that are strictly prohibited are as follows:
 - Cutting down trees outside the boundary of the construction site. Poaching or fishing by chemicals or explosives

- Cause spills of hazardous chemicals such as lub. oil. Burn solid waste or destroy vegetative cover that is outside the boundary of the project area.; Xả bừa bãi rác hay các rác thải xây dựng và cao su; và
- Disrupt structure of architechural and historical value, use weapons (except the security persons wit permission); drink alcohol during working hours; drive dangerously on local roads;

b) Mitigation measures for negative impacts during construction of the main water supply pipelines.

Mitigation Measures for Dust, Exhaust Gases, Noise and Vibration Pollution:

- Construction sites for installation of main water supply pipelines will go through some populated areas along both sides of the designated roads (e.g. the area around Phuc Xuan market on road 270, area on the second half of road Z115 leading to the city, area on the part of Dương Tự Minh road leading to the inner city). At these populated areas, it is necessary to restrict using heavy construction machines during rush hours and especially from 21h-6h. Main water supply pipelines also run pass gates of schools like Phuc Xuan and Quyet Thang primary schools on road 270, Thai Nguyen University on road Z115. In these school areas, construction should be restricted during school time and especially at start time and end time when there are a lot of people at the school gates.
- Apply mitigation measures that are the same as those proposed for construction of water supply plant mentioned above.

Mitigation measures for water pollution:

- Before starting construction, Contractor must contact with relevant agencies that manage underground infrastructure to know the exact positions of underground structures especially the underground drainage system. It is necessary that the water supply pipelines be installed above the drainage sewers. In unavoidable case when a water supply pipeline crosses under a drainage pipe, water supply pipeline must be wrapped in an protective cover to prevent leakings and mixing of wastewater with clean water.
- For the main water supply pipeline that runs to the tourism area in the North of Nui Coc Lake (under the project), there are some sections that cross over a bridge or pass nearby the lake's bank. In those cases, there should be appropriate construction methods, e.g. erection of fences or restriction on using heavy construction machines to prevent falling of excavated soil into the lake's water column.
- Rainwater that flows over the construction site for installation of water supply pipelines will carry with it soil particles, sludge, oil and grease leaked from construction machines. This will impact on nearby watercourses (e.g. lakes and ponds). Furthermore, rainwater will flood the dug channel, affecting the pipeline installation. For this reason, the installation activities should be implemented in the dry season.
- Daily tidy up construction sites. Used lube oil and grease from transportation and construction machines must be collected and discharged appropriately. This is because the used lube oil and grease can have serious impacts on aquatic organisms. In addition, machines must be checked and maintained regularly.
- Raise awareness in environmental protection for workers on construction sites.

Control pollution due to domestic and construction wastes – Mitigation measures for labor safety and social security in the project area:

- The construction site for installation of water supply pipelines extends over 30 km along the designated roads mentioned above. Because the pipelines will be completed section by section, locations of work camps and those of assembly sites for construction materials will

be temporary and in a much smaller scale compared to the construction site of the water supply plant.

- Mitigation measures are the same as those applied for the construction site of water supply plant. However they are much simpler and in a smaller scale. (Item 5. 2.1. 6).

Mitigation for traffic safety:

- Manage traffic flow distribution; place traffic flow signs, speed limit boards; and danger warning signs for all the roads, to be installed with main water supply pipelines. Especially on national road No 3 where vehicles run fast, it is necessary to assign staff to guide the traffic by flags and walkie-talkie in the day time. Meanwhile, at the night time, there must be warning signs on construction site at a long distance.
- On the transportation truck and construction machines, stick the operation regulation table, with the content including: defined road / travel route, truck's tank covered, trucks washed and cleaned before departure from the material receiving sites to the dumping sites, warning on environmental sensitive sites...
- Work closely with local authorities and traffic police to control traffic in the area.
- Propagate and train drivers to strictly obey the traffic laws; and request Contractor to comply with the traffic law during transportation.
- Everyday, collect construction solid waste dispersed on the transportation route and construction site during pipeline installation time
- Gather construction materials tidily outside the road boundary so that they do not block the traffic flow. This is the responsibility of Contractor to coordinate with local authorities in ensuring the traffic will not be interrupted.
- Pipeline installation should be implemented in line with the pre-set schedule; The pipeline will be completed section by section. The construction of a new section is only started when the previous one has already finished. When a section is completed, Contractor should clean up and quickly return the ground to its original situation (dug parts of carriage way or sidewalk for pipeline installation will be re-paved).
- Build temporary fence around the construction site; and arrange signal lights at nights to prevent traffic accidents.

6.2.3. Mitigation measures for negative impacts during operation and maintenance of the project

233. When the water supply plant and the main water supply pipelines are put into operation, it is necessary to implement the following measures to ensure smooth operation and mitigate environmental negative impacts.

For treatment settling tank's sludge and water to wash filter tank:

234. The waste is separated with a mesh to block garbage, types of deposition tank's sludge, the sludge in the raw water collection work, waste water from treatment plant and from washing must be disposed of appropriately, the sludge must be disposed of at the prescribed place.

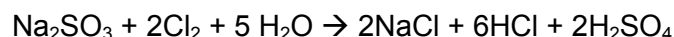
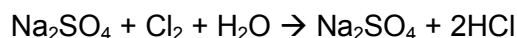
235. Reservoir / silting tank will be constructed with a capacity of 2129.6 me, divided into 3 compartments. The tank will be constructed on natural cos +51m; tank bottom +48m. Three compartments operate independently. When compartment 1 is full, it will be closed. After deposition time, water will be pumped return to the treatment plan, sludge will be pumped to the sludge press. The contractor must chose centrifugal sludge presses, with capacity of 15m³/h. And then compartment 1 continues contain and deposit filter tank washing water, compartments 2 and 3 repeat the same process of 1. Natural dried sludge will be used as backfill or switched

to the areas, which need leveling. Proper testing of these dried sludge should be done so they will not contain high toxicity levels of inorganics (Aluminum, mercury, copper, ...).

236. For safety on chemical application: Chemicals used at the water supply plant are mainly alum for coagulation the settling tank and chlorine gas for disinfection. Chlorine gas, which is liquefied and stored in pressurized cylinders, is a potential threat to human and environmental health, meanwhile alum has insignificant environmental impacts. Preventive and mitigation measures for risk of chlorine gas leaking are as follows:

- Chlorine room will be separated into 2 individual compartments and situated at the end of wind direction in the water supply plant: one compartment will hold chlorator used for disinfection and the other will house liquid chlorine gas cylinders. Each compartment will be installed with an emergency exit door.
- During operation, the whole chlorine system will be regularly monitored. An automatic detection system for leaks of chlorine gas will be installed to ensure that chlorine gas level is under the safe limit. A fume hood system will also be equipped to collect the leaked chlorine gas in case of accident. Warning signs and operational manuals should be ready at important places such as chemical store houses, chlorator...
- Provide training courses for staff on safe operation when the water supply plant is put into operation. Other measures include: amount of chlorine gas stored on site should be optimized; a buffer zone around the chlorine room should be created; gas masks and oxygen cylinder should be ready for any incidents.

237. In case of incident, leaked chlorine gas will be collected and treated with a solution 2-5% of sodium sulfite (as shown in the following reactions) or with activated carbon (sorption), then diluted by excessive amount of water.



238. Mitigation measures for alum: Alum used as coagulants is not toxic. However, ensure a good environmental sanitation; store house for alum should be kept dry and clean. In addition, because there are some by-products in the alum, it is still necessary to periodically drain off and clean up the alum diluting tank. Scum from this tank must be collected and transported to the designated disposal site. In addition, all Alum spills should be thoroughly clean has this product can still leave a highly slippery surface even after several clean-ups.

- Periodically clean and wash inside the main water supply pipelines according to a right technical procedure.
- Regularly check and monitor the main water supply pipelines and raw water treatment facilities in the plant to timely find out leakings & cracks on these pipelines and other facilities such as pumping stations, settling tanks This will help save water and prevent the entry of pollutants into clean water.
- Garbage taken from mechanical screens and sludge and scum from settling tanks as well as from raw water intake facility must be disposed of at a designated dumping site or periodically transported to a sanitary landfill site of the province (e.g., Tan Cuong landfill site).
- Besides the above-mentioned mitigation measures, other measures should also be taken into consideration, including:
- Comply with regulations on labor safety and sanitation for staff; avoid direct contact with garbage and sludge stuck on mechanical screen;
- Make a plan on inspecting implementation of labor safety in production areas (protective gears, e.g. clothes, boots and gloves; as well as insurance program)

- Periodically perform health check for staff to timely find out occupational diseases.
- Educate on good behavior in environmental sanitation and labor safety for staff; raise their awareness in environmental protection through (information communication and education) ICE programs.
- Send specialized staff for training courses on environmental and fire protection
- Establish regulations on environmental protection for operational staff, which include the following contents:
 - Define responsibilities and duties of environmental management staff
 - Define level of merit and rewards for groups and individuals who has innovations in saving water resources and in enhancing capacity for clean water supply system.

239. Define level of punishment for negligent actions that lead to environmental incident (including fire and explosive incident) Timely encourage and reward technical innovations and researches that help increase production yield and save materials, thus contributing to environmental protection and reduce product's price.

240. An emergency plan will be prepared and must be in place during the construction and subsequent operation phases of the new raw water pipeline, WTP, and treated distribution network to protect the public and workers. Potential emergencies could arise from accidents resulting from the operation of heavy equipment, excavation activities including work at borrow pits, chemical spills, electrical shock, work in/or near rivers, and from worker & public vehicle traffic. Environmental incidents could occur from pipeline failures, spills at WTP sites, improper disposal of WTP sludge, and failures along distribution network. In addition to the proposed training, simulated drills of safety measures will also be conducted.

241. The emergency plan will address the following issues and will clearly state the role and responsibilities of each agency involved in the project.

- Alert & communication & initial response
- Procedure for evacuation
- Medical issues (first aid, nearest medical services)
- Procedure in case of fire and explosion;
- Procedure in case of hazardous material spill
- Procedure in case of drinking water contamination

Chapter 7. INFORMATION DISCLOSURE AND PUBLIC CONSULTATION

7.1. Introduction

242. Information disclosures and public consultation on environment ensures the participation of local authorities, relevant parties and community in the project area. Public participation is one of basic conditions that ensure the community's support for project and the project implementation is sustainable and favorable. In addition, Community consultation on environment and positive attendance will reduce negative impacts and environmental problems which environmental consultant team has not recognized. In fact, if community takes part early in the project preparation, the relationship between community and project officials becomes closer. From that, community can contribute valuable comments and suggestions to the project.

243. Public consultation during preparation for the project's IEE report should be designed in such a way with aim to:

- Achieve compliance with the requirements in clause 8, article 20 of Environmental protection law No. 52/2005/QH11 dated 29/11/2005
- Comply with Decree No. 29/2011/NĐ-CP relative to regulations on SEA, EIA and EPC; and
- Meet requirements in Circular No. 26/2011/TT-BTNMT dated 18/07/2011 by Minister of Natural Resources and Environment.

244. The purposes of public consultation are as follows:

- Share information about project components and project proposed activities with community at project area and relevant enterprises.
- To collect opinions; understand the concerns and sensitivities of local authorities and community on environmental problems created in project area; especially problems which are not recognized by IEE preparing team. Based on this, public cares can be reasonably settled during the course of setting up the Project, and selection of designing solutions
- To perform thorough and comprehensive evaluation of all environmental impacts and proposes the most effective mitigation measures that exactly address the adverse environmental impacts.

245. For this project, PMU in close collaboration with the Consultants had conducted public consultation with all People's Committees and local communities of 7 communes and wards in Thach That, Quoc Oai and Hoai Duc District of the project areas. This is to ask for their comments and suggestions on environmental impacts of the project.

246. Contents expressed in consultation meeting include:

- Project information disclosure: provided participants with project-briefing documentation, and construction map of different project components in different locations.
- Disclosed tasks and plans of consultant on environmental impact assessment of the project.
- Consulted leaders' and people's, asking for their comments and suggestions on environmental problems: discussion at the meeting

Table 15. Time, places and participants of meetings for public consultation

Date	Place	Participants
07/02/2012	Phúc Hà Commune	Representatives from PMU Representatives from local government Representatives from local mass organizations Project-affected HHs (PAHs); Consultant
10/02/2012	Tân Long Ward	
09/02/2012	Tân Thịnh Ward	
08-09/02/2012	Quyết Thắng Commune	
07/02/2012	Phúc Xuân Commune	
	Phúc Triu Commune	
08/02/2012	Tân Thái Commune	

247. Results of public consultation are presented in the following sections.

7.2. Comments and Suggestions of Commune-level People's Committees.

248. Comments and suggestions of people's committees and fatherland's fronts are summarized in the following table.

Table 16. Comments and suggestion of local governments

Order	Comments and suggestion of local governments	Responses of PMU and Consultant
1	Phúc Trìu Commune <ul style="list-style-type: none"> ○ The project will change natural environment ○ It will also affect HHs with land acquired ○ Impacts on social order and security in the project-influence areas if management is not good. ○ Replant trees and restore vegetative cover when the project is completed. ○ Provide jobs for PAHs ○ Coordinate with local governments and communities in the project-influence area during project implementation. 	<ul style="list-style-type: none"> ○ PMU and Consultant agree with the comments and suggestions of the local government; solutions have been incorporated into Chapter 5: Mitigation measures
2	Phúc Xuân Commune <ul style="list-style-type: none"> ○ Agree with the findings in the environmental impact assessment report of the project. ○ Implement measures to suppress dust generated during transportation or construction activities (e.g. regularly spray water) ○ Clean-up and restore the ground to the original conditions when the construction is completed; do not indiscriminately dump solid waste and excessive dug soil. ○ Strictly implement mitigation measures during construction time 	<ul style="list-style-type: none"> ○ PMU and Consultant agree with the comments and suggestions of the local government; ○ All of these comments and suggestion have been addressed in Chapter 5: Mitigation measures
3	Phúc Hà Commune <ul style="list-style-type: none"> ○ Agree with the findings of environmental assessment for the project. ○ PMU should be responsible for proper implementation of mitigation measures mentioned in the IEE report. ○ During project implementation, manage construction sites effectively so that livelihood and assets of the local residents will not be affected. 	<ul style="list-style-type: none"> ○ PMU and Consultant agree with the comments and suggestions of the local government; ○ All of these comments and suggestion have been addressed in Chapter 5: Mitigation measures
4	Quyết Thắng Commune <ul style="list-style-type: none"> ○ People's Committee and Fatherland's Front agree with the findings on negative socio-environmental impacts of environmental assessment for the project. ○ Agree with the proposed mitigation measures; PMU should make Contractors strictly implement these measures to minimize negative impacts on environmental and human health. ○ Must not use transportation and construction machines that are outdated and do not meet technical and safety requirements. 	<ul style="list-style-type: none"> ○ PMU and Consultant agree with the comments and suggestions of the local government; ○ All of these comments and suggestion have been addressed in Chapter 5: Mitigation measures
5	Tân Thái Commune <ul style="list-style-type: none"> ○ Presently, Tan Thai Commune already has a project for rural water supply, which is under implementation for the period from 2011-2015. The new project should not be overlapped with the existing project. Strictly implement mitigation measures to minimize impacts on livelihoods of local residents. Later on, when the existing project for rural water supply 	<ul style="list-style-type: none"> ○ PMU and Consultant agree with the comments and suggestions of the local government; ○ All of these comments and suggestion have been addressed in Chapter 5:

	<p>cannot meet the demand, clean water from the new project will be used to supply for the new demand.</p> <ul style="list-style-type: none"> ○ Clean-up and restore the construction sites to the original condition when the construction is completed. ○ Minimize impacts on the traffic inside the commune. 	Mitigation measures
6	<p>Tân Long Ward</p> <ul style="list-style-type: none"> ○ When main water pipelines are installed inside the Tan Long's boundary, it is necessary to send to Tan Long People's Committee a copy of pipeline installation permit and ground-restoration plan for the construction site along Duong Tu Minh Street. This is for good management coordination between PMU and local government in project implementation 	<ul style="list-style-type: none"> ○ PMU and Consultant agree with the comments and suggestions of the local government;
7	<p>Tân Thịnh Ward</p> <ul style="list-style-type: none"> ○ Contractors should apply mitigation measures for waste generation (solid, water and gaseous). ○ Minimizing emission levels of dust, noise and vibration during project implementation. ○ Ensure traffic safety for road users ○ Transportation trucks must be tank-covered ○ Good sanitation and regular solid waste collection on construction sites must be ensured. ○ Strictly obey local regulations during construction time. Implement all the mitigation measures committed in the IEE report. Pay compensation for any damages to local houses and assets, which may be caused by Contractors during construction time. Make sure that the affected HH will receive full compensation. 	<ul style="list-style-type: none"> ○ PMU and Consultant agree with the comments and suggestions of the local government; ○ All of these comments and suggestion have been addressed in Chapter 5: Mitigation measures

7.3. Comments and Suggestion of the Local Communities.

249. Comments and suggestions of the project affected HHs are tabulated in the following table. Pictures taken from public consultation meetings and minutes of these meeting are shown in the Annex 3.

Table 17. Comments and suggestions of local communities

	Comments and suggestions of local communities	Responses of PMU and Consultant
	<ul style="list-style-type: none"> ○ Agree with the draft IEE report and mitigation measures proposed by environmental Consultant. ○ Local residents in the project-influence area also have demand for clean water supply. ○ Should have measures for traffic safety during construction time. ○ During construction time, if causing damages to local residents, Contractors must pay compensation. For the public infrastructure (e.g. roads, drainage system), Contractor must be responsible for repair. ○ Well manage solid waste on the construction site. ○ Must be responsible for cleaning up construction sites after the construction is completed. ○ Concentration of a large number of workers can negatively affect social order and security in the project areas, especially areas around the construction site of in Phuc Triu Commune. ○ Provide jobs for the PAHs, whose land will be acquired. 	<ul style="list-style-type: none"> ○ PMU agree with the comments and suggestions of the local communities ○ Perform detail assessment of environmentally sensitive sites and prepare mitigation measures in a way that is scientific, feasible and adaptable to local conditions. ○ Role of local communities and governments in environmental supervision during project implementation has been incorporated into the access diagram of EMP

7.4. Feedbacks and Commitment of PMU with Regard to Comments, Suggestion and Requirements of Consulted Units and Organizations.

250. At the public consultation meetings, for the comments and suggestions of local government and communities on environmental impacts that can occur in the project area, PMU and Environmental Consultant are eager to accept. A detail assessment of environmentally sensitive sites has been performed and mitigation measures have been prepared in a way that is scientific, feasible and adaptable to local conditions.

7.5. Consultation with downstream communities

251. The Government approval process for raw water intake will include public survey of downstream users. Results of the surveys will be documented and sent to ADB during detailed design.

7.6. Disclosure of Information

252. 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 19 inner wards and 9 communes of Thai Nguyen city.

Chapter 8. GRIEVANCE REDRESS MECHANISM

253. The grievance redress mechanism (as described below) follows the same procedure adopted for resolving grievance related to community dislocation and resettlement impacts of the Project. 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 stages before they can be elevated to a court of law as a last resort

254. The project-affected people (PAP) can submit their complaint (s) verbally or in written form. The Commune authorities will make biggest efforts to resolve the problem at commune level through public consulting. All meetings will be recorded by the Commune People's Committee (CPC) and the Resettlement Committee; and PAP will be provided with a copy. Furthermore, copies of the meetings will be submitted to PMU and ADB when required.

255. 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.

256. 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.

257. 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.

258. 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..

Chapter 9. ENVIRONMENTAL MANAGEMENT PLAN

9.1. Environmental Management Plan (EMP)

259. Contractors must be responsible for implementation of mitigation measures during project construction under supervision of PMU and Detailed Design and Supervision Consultant (DDSC)). The TNWSJSC for most environmental measure can also request an EMC to provide the services under their jurisdiction

260. Implementation of compensation plan for land acquisition during pre-construction (site clearance) will be the responsibility of PMU with assistance from an independent consulting unit. Compensation is estimated to cost 2,555,000,000 VND (equivalent to 121,458 USD)

261. The project will be implemented under the Thai Nguyen PC as the Executing Agency and the TNWSJSC as the project implementing agency. A Project Management Unit (PMU) will be created to supervise the implementation, on behalf of TNWSJSC, of the capital investments related to the water supply project.

262. 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.

263. 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 intake, the WTP and its surroundings, the pipelines 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.

264. 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 Thai Nguyen town's PC 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 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;
- 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.
- 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 TNWSJSC (and supervised by the PMU). The compliance monitoring and auditing will be fully documented, and the findings and recommendations will be sent immediately to TNWSJSC. During the operation phase, TNWSJSC will be responsible for the protection and monitoring of effluent, and the results will be reported to the Thai Nguyen town PC.

265. A Detailed Design and Supervision Consultant² (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).

266. City 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 EMA. If any unusual case found, Town's 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, Town's PC will conduct verification, as described in claim solving procedures.

267. 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.

268. 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.

² DDSC contract expected to include construction supervision.

Table 18. EMP of the Project

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.	At intake at Nui Coc lake, at WTP, & along distribution network	Before subproject implemented	See resettlement plan	See resettlement plan	TNWSJSC / PMU ³	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 ⁴	TNWSJSC	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 ⁵	PMU
Detailed		4. Complete detailed designs of: 1) raw water intake and pipeline from Nui Coc lake to Voi Phun WTP; 2) new Voi Phun WTP; and 3) treated distribution network that incorporate the following: a) updated review of raw water sources at Nui Coc lake to ensure that <u>sufficient</u> and <u>sustainable</u> supplies of <u>treatable</u> raw water will be available to water supply systems long after commissioning stage;(depth of the intake) b) 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;	(a-e), Entire subproject area: 1) raw water intake at reservoir & pipeline corridor; 2) Voi Phun WTP; and Treated water distribution	Before construction initiated	Once with detailed designs documents	No marginal cost		

³ Project Management Unit under TNWSJSC; identified as Project Management Board (PMB) in IEE

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

⁵ Detailed Design & Supervision Consultant

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
designs	Minimize negative environmental impacts	c) minimal acquisition of agricultural land d) no or minimal disruption to water supply, utilities, and electricity with contingency plans for unavoidable disruptions; and e) final review of ability for wastewater infrastructure to accommodate the increased wastewater that will be produced.	network				TNWSJSC / 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 to review. 8. For the three components of subproject develop individual environmental management sub-plans for: a) Securing GoV approvals; b) UXO survey & removal; c) Forest clearing, tree/ vegetation removal, & site restoration; d) Civil works; e) Cultural chance finds; f) Contaminated spoil identification & disposal; g) Construction materials acquisition, transport, & storage including borrow pit management; h) Erosion & river sedimentation control; i) Construction site drainage; j) Noise, dust & NOx, SOx, CO, CO ₂ emissions; k) Worker camp operation; l) Solid and liquid waste disposal; m) Hazardous chemical & waste management; n) Construction & urban traffic (especially along raw water pipeline); o) Utility and Power Disruption; p) Worker and public Safety (especially along raw water pipeline); q) Raw water quantity & quality sustainability; r) Training & capacity development plan; s) WTP chemicals & sludge management; and t) Treated water quality management.	Entire subproject	In parallel with completion of detailed designs	Once, as part of detailed design phase	No marginal cost	TNWSJSC / DDSC	PMU

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
Develop bid documents	No negative environmental impact	9. Ensure the EMP is included in contractor tender documents to enable contractors to develop their CEMP ⁶ , and that tender documents specify that implementation of CEMP must be included in cost estimates. 10. The environmental management sub-plans identified in 11) 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	TNWSJSC / 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 TNWSJSC / 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 contractors whom will implement mitigation measures.	For all project areas	Before construction begins	After each training session	No marginal cost	DDSC	DDSC / TNWSJSC
Procurement of Contractor(s)	No negative environmental impact	15. Ensure winning contractor bid(s) include a CEMP that addresses items 8 – 11 of the EMP" section above.	All project areas	Before contracts signed	Once	No marginal cost	TNWSJSC / DDSC	TNWSJSC / 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	TNWSJSC / DDSC	Contractor's bid documents

⁶ Contractors Environmental Management Plan

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
Construction Phase – General Mitigations for all Components of Subproject								
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	TNWSJSC / DDSC	PMU & DDSC
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. 19. Coordinate with local administration to implement legal management on immigrated workers	For all construction sites	Beginning of construction	Once	No marginal cost	TNWSJSC / DDSC	PMU & DDSC
Worker camp operation	Pollution and social problems	20. Locate worker camps away from human settlements. 21. Ensure adequate housing and waste disposal facilities including mobile toilets, garbage cans and recycling bins if services are available. 22. Domestic waste water should be completely collected and primarily treated (through rakes and filter) before being discharged into the existing drainage system at the foot of Voi Phun hill. 23. Exceeding prepared food should be offered to local charity (shelters/orphanage/food bank, temple). 24. A solid waste collection program must be established and implemented that maintains a clean worker camps 25. Locate separate mobile toilets for male and female workers away from worker living and eating areas. 26. A clean-out or infill schedule for mobile toilets must be established and implemented to ensure working toilets are available at all times. 27. Worker camps must have adequate drainage. 28. Local food should be provided to worker camps. Guns and weapons not allowed in camps. 29. Transient workers should not be allowed to interact with the local community. HIV Aids education should be given to workers.	All worker camps	Throughout construction phase	Monthly	No marginal cost	DDSC & PMU	DDSC

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		30. Preservatives should be provided if such practice does not interfere with local belief or customs. 31. Camp areas must be restored to original condition after construction completed.						
Training & capacity	Prevention of impacts through education	32. Implement training and awareness plan for TNWSJSC / 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, ecological resources, vegetation, and erosion of landscape	33. Restrict tree and vegetation removal to within designated RoWs and work site boundaries. 34. Within RoWs minimize removals, and install protective physical barriers around trees that do not need to be removed. 35. All RoWs to be re-vegetated and landscaped after construction completed. Consult forestry department to determine the most successful restoration strategy and techniques. 36. Recuparate tree logs and make them available for local use. 37. Hunting, fishing, keeping, buying and selling wild animals must be strictly prohibited.	All construction sites.	Beginning and end of project	Monthly	No marginal cost	DDSC / PMU	DDSC
Civil works	Degradation of terrestrial resources	38. All construction sites should be located away forested, plantation, & agricultural areas as much as possible. 39. No unnecessary cutting of trees. 40. All construction fluids such as oils, and fuels should be stored and handled well away from forested and plantation areas. 41. No waste of any kind is to be discarded on land or in forests/plantations.	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PMU	DDSC
Civil works	Degradation of water quality & aquatic resources	42. Minimize earthworks & final area of foundation for intake in Nui Coc lake. 43. Nui Coc lake pipeline placement works should be done during dry season. 44. Erosion channels must be built around aggregate stockpile areas to contain rain-induced erosion. 45. Plastic tarps should be used to cover piles to avoid drying	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PMU	DDSC

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							Supervision	Implementation
		<p>and erosion of the piles.</p> <p>46. Earthworks should be conducted during dry periods.</p> <p>47. All construction fluids such as oils, and fuels should be stored and handled well away from surface waters.</p> <p>48. No waste of any kind is to be thrown in surface waters.</p> <p>49. No washing or repair of machinery near surface waters.</p> <p>50. Construct specialized washing area which is equipped with traps to collect oil and solid particles.</p> <p>51. Toilets wastes are not allowed to be discharge into the environment. Mobile toilets and collection services must be provided by a professional such as URENCO.</p> <p>52. No unnecessary earthworks in or adjacent to all water courses.</p> <p>53. No aggregate mining from Nui Coc lake, or from nearby lakes.</p> <p>54. All existing irrigation ditches, canals and channels to be protected the same way as rivers and lakes.</p> <p>55. Because of high ground level of the construction site (+79 m to + 80 m on Voi Phun Hill) it is necessary to construct an efficient temporary drainage system, stabilize taluses and reduce disruption to vegetative cover in order to minimize landslide and soil erosion.</p> <p>56. Prepare on-reserve pumps to pump rainwater in case of floods (especially when constructing the sludge pond).</p> <p>57. Timely implement construction plan, avoid delay or elongation in construction time (especially during the rainy season from June to October).</p>						
Civil works	Degradation of air quality	58. All unused vehicle should be stopped instead of being let on idle mode..	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PMU	DDSC
Cultural chance finds	Damage to cultural property	<p>59. As per detailed designs, all civil works should be located away from all cultural property and values including cemeteries and pagodas.</p> <p>60. Chance finds of valued relics and cultural values should be anticipated by contractors. Site supervisors should be</p>			Monthly	No marginal cost		

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							Supervision	Implementation
	or values & chance finds	<p>on the watch for finds.</p> <p>61. 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.</p> <p>62. Work at find site will remain stopped until authorities allow work to continue.</p>	All construction sites	At the start , and throughout construction phase			DDSC & PMU	DDSC
Construction materials acquisition, transport, and storage sub-plan	Pollution, injury, increased traffic, disrupted access	<p>63. All borrow pits and quarries should be approved by DoNRE.</p> <p>64. Select pits and quarries in areas with low gradient and as close as possible to construction sites.</p> <p>65. Required aggregate volumes must be carefully calculated prior to extraction to prevent wastage.</p> <p>66. Pits and quarries should not be located near surface waters, forested areas, critical habitat for wildlife, or cultural property or values.</p> <p>67. 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.</p> <p>68. All topsoil and overburden removed should be stockpiled for later restoration.</p> <p>69. All borrow pits and quarries should have a fence perimeter with signage to keep public away.</p> <p>70. 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>71. Unstable slope conditions in/adjacent to the quarry or pit caused by the extractions should be rectified with tree planting.</p> <p>72. Define & schedule how materials are extracted from borrow pits and rock quarries, transported, and handled & stored at sites.</p> <p>73. Define and schedule how fabricated materials such as steel, wood structures, and scaffolding will be transported</p>	For all construction areas.	Throughout construction phase	Monthly	No marginal cost	DDSC / PMU	DDSCs

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		and handled. 74. All aggregate loads on trucks must be covered. 75. Piles of aggregates at sites should be used/or removed promptly, or covered and placed in non-traffic areas.						
Excavation spoil management sub-plan	Contamination of land and surface waters from excavated spoil	76. 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. 77. 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. 78. Where possible spoil should be used at other construction sites, or disposed in spent quarries or borrow pits. 79. A record of type, estimated volume, and source of disposed spoil must be recorded. 80. Contaminated spoil disposal must follow GoV regulations including handling, transport, treatment (if necessary), and disposal. 81. Suspected contaminated soil must be tested, and disposed of in designated sites identified by DoNRE as per GoV regulations. 82. Before treatment or disposal contaminated spoil must be covered with plastic and isolated from all human activity.	All excavation areas	Throughout construction phase	Monthly	No marginal cost Testing of contaminated soil (See Monitoring Plan below)	DDSC, PMU & DoNRE	DDSC DoNRE
Construction Drainage sub-plan	Flooding from loss of drainage & flood storage	83. Provide adequate short-term drainage away from construction sites to prevent ponding and flooding. 84. Manage to not allow borrow pits and quarries to fill with water. Pump periodically to land infiltration or nearby water courses. 85. Install temporary storm drains or ditches for construction sites. 86. Ensure existing road & street drains do not become plugged with construction waste . 87. Protect surface waters from silt and eroded soil.	All areas with surface waters	Design & construction phases	Monthly	No marginal cost	DDSC & PMU	DDSC

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
Solid and liquid construction waste sub-plan	Contamination of land and surface waters from construction waste	<p>88. 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>89. Areas of disposal of solid and liquid residual matter to be determined by DoNRE.</p> <p>90. Disposed of residual matter should be catalogued for type, estimated weigh, and source.</p> <p>91. Construction sites should have large garbage bins.</p> <p>92. 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>93. Solid residual matters should be separated and recyclables sold to buyers in community.</p> <p><u>Hazardous Waste</u></p> <p>94. Collection, storage, transport, and disposal of hazardous waste such as used oils, gasoline, paint, and other toxics must follow GoV regulations.</p> <p>95. Wastes should be separated (e.g., hydrocarbons, batteries, paints, organic solvents)</p> <p>96. 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>97. All spills must be cleaned up completely with all contaminated soil removed and handled with by contaminated spoil sub-plan.</p> <p>98. 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.</p>	All construction sites and worker camps	Throughout construction phase	Monthly	No marginal cost	DDSC, PMU, & DoNRE	DDSC
Noise and dust sub-plan	Dust Noise	<p>99. Regularly apply wetting agents to exposed soil and construction roads especially in high density areas.</p> <p>100. Cover or keep moist all stockpiles of construction aggregates, and all truckloads of aggregates.</p> <p>101. Minimize time that excavations and exposed soil are left</p>	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC & PMU	DDSC

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		<p>open/exposed. Backfill asap.</p> <p>102.As much as possible restrict working time between 06:00 and 21:00. In particular are activities such as pile driving.</p> <p>103.Between 21h and 6h, circulation in residential areas and especially on road 267 and 270 towards the WTP is prohibited..</p> <p>104.Maintain equipment in proper working order</p> <p>105.Replace unnecessarily noisy vehicles and machinery.</p> <p>106.Vehicles and machinery to be turned off when not in use.</p> <p>107.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.</p>						
Utility and power disruption sub-plan	Loss or disruption of utilities and services such as water supply and electricity	<p>108.Develop carefully a plan of days and locations where outages in utilities and services will occur, or are expected.</p> <p>109.Contact local utilities and services with schedule, and identify possible contingency back-up plans for outages.</p> <p>110.Contact affected community to inform them of planned outages.</p> <p>111.Try to schedule all outages during low use time such between 24:00 and 06:00.</p>	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC, PMU & Utility company	DDSC
Erosion sub-plan	Land erosion	<p>112.Berms, and plastic sheet fencing should be placed around all excavations and earthwork areas.</p> <p>113.Earthworks should be conducted during dry periods.</p> <p>114.Maintain a stockpile of topsoil for immediate site restoration following backfilling.</p> <p>115.Protect exposed or cut slopes with planted vegetation, and have a slope stabilization protocol ready.</p> <p>116.Re-vegetate all soil exposure areas asap.</p>	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PMU	DDSC
		<p>117.Proper fencing, protective barriers, and buffer zones should be provided around all construction sites.</p> <p>118.Sufficient signage and information disclosure, and site supervisors and night guards should be placed at all sites.</p>						

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
Worker and public safety sub-plan	Public and worker injury, and health	119. Worker and public safety guidelines published by MoLISA should be followed. 120. Population near blast areas should be notified 24 hrs ahead, and evacuated well before operation. Accepted GoV blast procedures and safety measures implemented. 121. Speed limits should be imposed on all roads used by construction vehicles. 122. Limit the speed of transportation trucks in sensitive spots (Phuc Xuan Market, Phuc Xuan and Quyet Thang primary school for example) 123. Standing water suitable for disease vector breeding should be filled in. 124. Worker education and awareness seminars for construction hazards should be given. A construction site safety program should be developed and distributed to workers. 125. Appropriate safety clothing and footwear should be mandatory for all construction workers. 126. Adequate medical services must be on site or nearby all construction sites. 127. Drinking water must be provided at all construction sites. 128. Sufficient lighting is used during necessary night work. 129. All construction sites should be examined daily to ensure unsafe conditions are removed.	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC & PMU	DDSC
Construction and local vehicle traffic sub-plan	Traffic disruption, traffic block, accidents, public injury	130. Schedule construction vehicle activity during light traffic periods. Create adequate traffic detours, and sufficient signage & warning lights at all construction locations. 131. Post speed limits, and create dedicated construction vehicle roads or lanes. 132. 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. 133. Increase the number of pedestrian crossings away from construction areas. 134. Increase road and walkway lighting. 135. Avoid circulation of trucks during rush hours especially on	All construction sites	Fulltime	Monthly	No marginal cost	DDSC & PMU	DDSC

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		road 270 which as a bus route. 136. Organize the dump trucks travelling to avoid as much as possible the circulation of empty loads on the roads. 137. Provide alternate routes and / or work planned locations to help emergency response units to plan their alternate routes			Weekly			
Specific Mitigations for Construction of Raw Water Supply Pipeline								
Construction of pipeline	Minimal negative environmental impacts	138. Special attention to be given to sub-plans identified item #8 and 107 to 109 above as they apply to the raw water pipeline on the banks of Nui Coc lake.. Specific attention to be given to the protection of the following values: • a) erosion through Nui Coc lake new intake installation & water quality of Nui Coc lakes; b) public & worker safety;	Pipeline corridor	During construction	Monthly	No marginal cost	DDSC / PMU	DDSC
Specific Mitigations for Construction of Voi Phun WTP & Treated Water Distribution Network								
Construction of WTP	Minimal negative environmental impacts	139. Mitigation measures to address potential impacts of WTP are almost all addressed by the general subproject mitigations listed above. 140. Between 21h – 6 h, heavy machinery should not be used in proximity of the transit reception station for drug addict.	Land around WTP site	During construction	Monthly	No marginal cost	DDSC / PMU	DDSC
Construction of treated water distribution network	Minimal negative environmental impacts	141. 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	DDSC
Post-construction Operation of Water Supply System								
Treated water supply	Unsustainable quantity or quality of treated water	142. 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 ³ /day) always meets WTP design specifications. Incorporate contingency and back-up plans for planned and unplanned system shutdowns.	Entire WS system	Quarterly, and as needed	As needed	No marginal cost	TNWSJSC / DDSC	TNWSJSC

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							Supervision	Implementation
		<p>143. 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).</p> <p>144. As part of #131 coordinate with Dept of Health for them to periodically monitor treated water quality to ensure it meets potable quality standards</p>	At WTP outlet and at select locations along distribution network					EMC / DoH
Operation of raw & treated water pipelines	Local flooding from ruptures	145. As part of implementation of O&M manual for entire WS system instate a regular inspection program of all pipeline networks starting at intake at Nui Coc lake to SP, 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	TNWSJSC / DDSC	TNWSJSC
Operation of WTP	Chemical spills, and pollution from solid and domestic waste	<p>146. As part of O&M manual, provide clear methods and procedures for safe handling and storage of planned treatment chemicals defined by poly-aluminum chloride (PAC), soda, and chlorine in designated chemical house and chlorine house on WTP property, including spills action plan.</p> <p>147. With O&M manual define and implement a formal solid and domestic waste collection and disposal protocol for all WTP activities.</p>	At WTP	Continuously	As needed	No marginal cost	TNWSJSC	TNWSJSC
Production of WTP sludge	Contamination of environment	<p>148. Review and clarify with DN DoNRE the appropriate landfill location to dispose of the planned dried sludge produced at the WTP.</p> <p>149. Ensure planned plate pressing technology for dewatering sludge to be located in sludge press house at WTP is maintained in good working order, and can more than accommodate production capacity of WTP.</p> <p>150. Ensure sludge is covered when transported to designated landfill.</p> <p>151. Never dump or temporarily store sludge on lands outside landfill site, WTP property, or near water courses.</p> <p>152. Develop and implement regular sludge quality monitoring to document sludge quality (See Environmental Monitoring</p>	At WTP	Continuously	As needed	No marginal cost	TNWSJSC / DoNRE	TNWSJSC

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Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		Plan)						
Production of treated water	Wastewater production too much for city wastewater management	153. Review and clarify wastewater loads generated from treated water from Thai Hoa and Dung hill WTP can be handled by current and planned future capacity wastewater collection and treatment systems for Thai Hoa.	At WTP	Periodically	As needed	No marginal cost	TNWSJSC / DoNRE	TNWSJSC
Operation of entire WS system,	Worker and public injury	154. Educate workers in workplace safety of WS system operation according to MoLISA regulations. Prevent public access to SP and WTP property, Nui Coc lake intake area, and all pipeline areas with fencing and appropriate signage. 155. Enforce WTP truck drivers to follow speed limits on roads and highways. Provide adequate signage informing public of WTP truck traffic routes, and pipelines service routes. 156. Ensure all WS system vehicles in good working order.	WTP and all pipeline property WTP area & road to landfill site All facilities	Continuously	As needed	No marginal cost	TNWSJSC	TNWSJSC

9.2. Environmental Monitoring Program

269. It is essential to design the monitoring program and monitoring frequency appropriately to be able to record both the overall performance of the project works as well as the short-term impacts due to construction activities. The environmental monitoring program will be implemented during construction at three levels:

- Monitoring the level of compliance with mitigation measures,
- Community-based Monitoring, and
- Monitoring the environmental parameters set out for each of the works

9.2.1. Objective and Approach

270. Main objective of the Environment Monitoring program is to ensure that (a) the potential negative impacts of the project are minimized; (b) the EMP is effectively implemented; and (c) the EMP is adequate to mitigate the potential negative impacts. Given that monitoring the implementation of the RP will be conducted separately, the environmental monitoring program will comprise (a) monitoring the safeguard performance of Contractor during site clearance and construction, (b) environmental quality monitoring, (c) monitoring impactiveness of the EMP

9.2.2. Monitoring on Contractor's Environmental Safeguard Performance

271. Three levels of safeguard monitoring will be implemented: routine monitoring, periodic monitoring, and community monitoring as follows:

- Routine monitoring: The routine monitoring will be made by the Detailed Design and Supervision Consultant (DDSC) as assigned by PMU. The DDSC will include the monitoring results in the project progress reports.
- Periodic monitoring (every six months): As part of the overall monitoring of the EMP, the ESU assisted by the Independent Environmental Monitoring Consultant (IEMC) will also monitor Contractor performance every 6 months and the results will be reported to the PMU and ADB.
- Community monitoring: Monitoring by local communities will be conducted following the Government practices with the technical and management support from the PMU.

9.2.3. Environmental Quality Monitoring

272. To ensure an acceptable level of environmental quality, monitoring of dust, noise, vibration, air quality, and water quality will be made at project specific locations that are likely to be significantly affected by the construction activities, or requested by local authorities and communities for specific purposes. ESU/IEMC will be responsible for the monitoring of the program.

273. Below is the list of main problems and scope of environmental monitoring that will be taken into account in environmental monitoring program:

- Impacts of construction activities on quality of surface water in Nui Coc Lake
- General construction impacts, including local flooding; traffic management especially in residential areas; air, noise, and dust levels in residential areas; and water quality upstream and downstream of construction sites, specifically paying attention for impacts on local residents;
- Others: as agreed with local agencies and communities during the preparation of the monitoring program.

274. The following tables provide general guidance on the monitoring program and its estimated cost for the project at different stage: pre-construction (project baseline environment), during construction (proposed to be from 3/2012-6/2016), and during the first year of operation.

Table 19. Scope of environmental monitoring during pre-construction and construction time

Order	Monitoring items	Pre-construction	Construction	Standards
I	Noise			
	1. Parameters	Leq, L50, Lmax	Leq, L50, Lmax	QCVN 26/2010/BTNMT
	2. Frequency	01 location/day, 03 time/h	Every 3 month 01 location/day, 03 time/h	
	3. Location	Baseline environmental locations should be established in line with the construction sites at the time of monitoring		
II	Air quality			
	1. Parameters	TSP, CO, NO ₂ , SO ₂ , HC	TSP, CO, NO ₂ , SO ₂ , HC	QCVN 05 :2009/BTNMT, QCVN 06:2009/BTNMT
	2. Frequency	1 location/day	Once per 3 months	
	3. Location	Baseline environmental locations should be established in line with the construction sites at the time of monitoring		
III	Surface water/waste water quality monitoring			
	1. Parameters	pH, temperature, DO, TSS, T-N, T-P, BOD ₅ , COD, oil and grease, Coliform	pH, temperature, DO, TSS, BOD ₅ , COD, DO, oil and grease, Coliform	QCVN 08:2008/BTNMT; QCVN 14:2008/BTNMT; QCVN 40:2011/BTNMT
	2. Frequency	1 location/day	Once per 03 months	
	3. Location	Baseline environmental locations should be established in line with the construction sites at the time of monitoring		

275. The following tables estimate total numbers of water and air samples to be taken and analyzed (including cost) for project's environmental monitoring program during preconstruction and construction.

Table 20. Basic cost for chemical analyses

Order	Parameter	Price in Vietnamese currency (VNĐ)
I	Air sample	
1	TSP	125,105
2	CO	314,139
3	NO2	351,942
4	SO2	368,994
5	HC	458,867
6	Noise	119,365
Total		1,738,412

Order	Parameter	Price in Vietnamese currency (VND)
II	Water/Surface water sample	
1	Temperature and pH	89,365
3	DO	115,240
4	TSS	157,572
5	BOD5	162,444
6	COD	213,275
7	Oil and grease	689,458
8	Coliform	658,979
Total		2,086,333

Note: All the prices are based on Decision No 1802/QĐ-UBND dated 19/07/2011 on approval of cost estimation for monitoring air, surface water, soil, ground water and industrial gaseous exhaust in Thai Nguyen province

Table 21. Estimated cost for samples analysis

No	Content	Unit	Quantity	Price (VND)	Total (VND)	Total USD)
1	Water sample	Sample	45	2,086,333	93,884,985	4463.06
2	Air sample	Sample	45	1,738,412	78,228,540	3718.80
Summation					172,113,525	8181.86

9.2.4. Monitoring Impactiveness of the EMP

276. The ESU assisted by IEMC will monitor performance of the EMP implementation during the detailed design/bidding stage as well as during construction and first year operation of the facilities to ensure that (1) the impacts identified in the EMP will be effectively managed and mitigated;; (2) traffic management is adequate and the level of impacts are acceptable (no complaints or outstanding cases). Results/are to be properly kept in the project file for possible review by PMU and ADB. Cost for the monitoring will be part of the PMU cost.

9.3. Role and Responsibilities for EMP Implementation

9.3.1. Organization Arrangement

277. Figure and Table below summarize roles and responsibilities of the key parties and their relationships regarding the implementation of the EMP.

- Contractors are responsible for implementing mitigation measures. Measures will be included in bidding documents and costs are to be included in construction bids;
- DDSC is responsible for monitoring the day-to-day implementation of mitigation measures. Cost included in DDSC service contract;
- IEMC will be responsible for environmental monitoring which includes support to the PMU for implementing supervision and monitoring, and reporting on the implementation through monitoring reports.

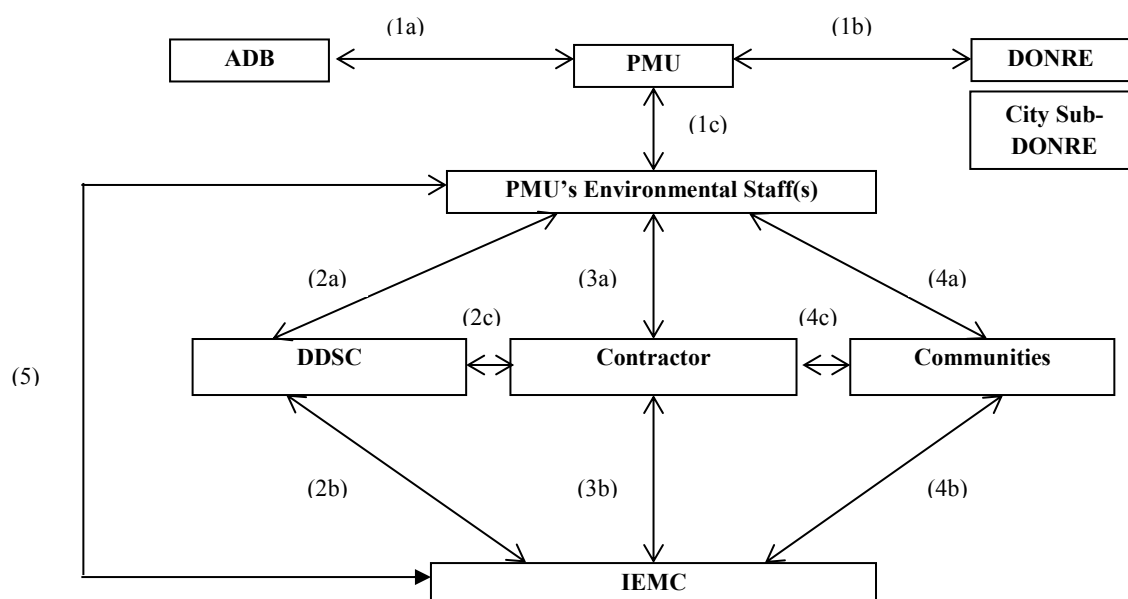


Figure 15: Roles and responsibilities of key parties (Description referred to the right above Figure)

Description	Roles/Responsibilities
(1a) (1b)	Based on quarterly reports of IEMC, PMU is responsible for preparing periodic reports to submit to ADB and to the Provincial DONRE.
(1c)	PMU assigns the safeguard staff (ESU) to review and check the related sections in the Contract Documents on the bidding packages for construction items of the project to ensure compliance with EMP PMU assigns the safeguard staff (ESU) to supervise, manage and carry out EMP activities and also assigns DDSC to closely supervise/monitor safeguard performance of Contractor, including undertaking the environmental monitoring program. PMU/ESU establishes a hotline communication with local community to be responsive to the complaints, comments, and/or recommendations from local people and/or the public throughout the site clearance and construction period.
(2a)	DDSC submits periodic monitoring report of environmental mitigation measures to PMU; Recommends to the PMU to suspend in part or completely, construction works if it does not meet labor safety and environmental protection requirements of the contract. PMU reviews DDSC's periodical reports to ensure compliance with mitigation measures.
(2b)	DDSC: Support, collaborate with IEMC to establish, collect and point out information about essential environmental parameters in the field and information for construction implementation; IEMC: Monitor the implementation of the EMP every 3 months including submission of the field report. Create database of results from environmental supervision and monitoring and train PMU in using such database Coordinate with DDSC on monitoring and preparation of safeguard reports on EMP performance; enhance capacity for DDSC through a training program on environmental supervision

(3a)	<p>Contractor: Before construction, with assistance from IEMC, prepare a site-specific environment management plan (SEMP) during site clearance and construction process as part of their construction method statement, then submit it to DDSC and/or PMU for review and approval; During construction, Contractor has to submit a monthly report on safeguard issues, mitigation, and results throughout the construction period. In case of unexpected problem, Contractor will consult DDSC/PMU.</p> <p>PMU/DDSC: reviews the SEMP and can propose change as deemed necessary to be in line with the legal obligations as well as appropriate to each specific site. Daily supervision and monitoring of Contractor's safeguard performance will be responsibility of the DDSC.</p>
(3b)	<p>Contractor: Carry out the EMP required during site clearance and construction, including conduct self-monitoring and submission of report.</p> <p>IEMC: periodically supervise and monitor the overall project EMP implementation including provision of safeguard training to PMU/ESU staff, community, DDSC, and Contractors as needed. The training will be designed to enhance the impactiveness of the EMP implementation and reporting.</p>
(4a)	<p>Community: According to Vietnamese practice, the community has the right and responsibility to routinely monitor environmental performance during construction to ensure that their rights and safety are adequately protected and that the mitigation measures are impactively implemented by Contractors and/or PMU. In case of unexpected problems, they will report to DDSC/PMU and/or call the hotline.</p> <p>PMU: Encourage, support and create good conditions for local community to participate in the environmental supervision and monitoring activities. PMU/DDSC will review and response to the requests and/or recommendations made by community to ensure that the potential negative impacts are adequately mitigated.</p>
(4b)	<p>Community: Support and collaborate with IEMC during periodic monitoring and provide inputs to the overall safeguard issues that require attention and/or mitigation.</p> <p>IEMC: Strengthen local community's capacity and relevant agencies through preparation of relevant documents necessary for monitoring, supervision, and reporting including preparation of a database for the activities.</p> <p>IEMC: assist PMU and communities for the implementation of Information-Education-Communication (IEC) activities within Component 4 with regard to environmental hygiene, sanitation, road safety, etc.</p>
(5)	<p>IEMC supports PMU/ESU to implement the EMP in line with Government's environmental regulations as well as the ADB safeguard policies. In consultation with DONRE, IEMC will establish specific environmental monitoring program for the project to be implemented by DDSC at key locations as shown in detailed design documents.</p> <p>PMU is responsible for preparation of the 6-month progress reports to be submitted to ADB and DONRE, based on quarterly reports submitted by IEMC.</p>

9.3.2. Specific Responsibilities of PMU, DDSC, and IEMC

9.3.3. Project Management Unit (PMU)

- PMU is responsible for implementing the EMP during the detailed design and construction stages. EMP implementation during operation stage is the responsibility of the facilities operators. PMU will set up an Environmental and Social Unit (ESU) to ensure timely and effective implementation of the EMP, including preparation of reports on safeguard compliance as required by Government and ADB.
- PMU/ESU is responsible for ensuring that the related sections in the Contract Documents on the bidding packages for construction items of the project are in compliance with the EMP.
- PMU/ESU is responsible for communicating with relevant local, provincial and national departments; and with parties responsible for implementing and supervising EMP, especially with the provincial Department of Natural Resources and Environment (DONRE) and the concerned wards/communes during planning, monitoring, operation, and management.

- PMU/ESU will coordinate with community organizations to encourage them to actively participate in the planning, management, and implementation of the project, including monitoring of Contractor's performance.
- To ensure effective monitoring and timely implementation of the EMP, PMU/ESU will hire national environmental Consultant to assist in carrying out and monitoring the EMP implementation. Responsibilities of the Independent Environmental Monitoring Consultant (IEMC) will be described below.
- For supervision and monitoring of Contractor's performance, PMU will be responsible for: (a) Checking project implementation indicators relating to environment; (b) Unannounced inspections to ensure that mitigation measures are being implemented as presented in construction contract by Contractor; (c) Reviewing periodic report of construction supervision consultant (DDSC) to ensure compliance with mitigation measures; and (d) Based on the periodic reports by DDSC and IEMC, PMU will prepare report on environmental compliance of subproject to submit to ADB and DONRE (This is part of the submission of a 6-month progress report to ADB).
- PMU will coordinate closely with relevant enterprises on water supply, environmental sanitation, and solid waste collection and to monitor operation and maintenance during project implementation.

Independent Environmental Monitoring Consultant (IEMC)

278. The IEMC will be responsible for assisting the PMU in EMP implementation. This also includes advising the DDSC, Contractors and communities on environmental compliance, and carrying out the monitoring program in accordance with regulations and procedures of the Government and ADB. Once the detailed operational implementation of the environmental monitoring program is discussed by PMU and ADB, the IEMC will be responsible for quarterly checking, and supporting the PMU staff to supervise overall project activities to ensure that unified environmental protection policies of the Government and ADB are applied and supervised during project implementation. The IEMC will be responsible to: (1) provide training and capacity building for construction management for PMU/ESU staff, including field engineers and/or Consultant (DDSC) in supervising the EMP implementation of Contractor; (2) ensure active participation of the local communities and schools in the project areas, (3) monitor environmental parameters to assess the overall impacts of the project, and (4) establish environmental training program.

279. Specifically, the IEMC's responsibilities include:

- Ensuring that the approved EMP and all project loan agreements related to environmental safeguards are fully applied and complied during project implementation.
- Assessing the impactiveness of mitigation measures, which are provided by Contractor and DDSC in implementation process; providing proposals and recommendations to the PMU on necessary improvement and supplementation to meet the safeguard requirements.
- Reporting periodically (every 3 months) to the PMU on actual EMP performance during project implementation.
- Establishing standard procedures, methods and forms to assist the PMU and DDSC to assess Contractors' progress in implementing required impact mitigation and monitoring measures.
- Assisting the PMU's environmental staff to review and check the related sections in the Contract Documents on the bidding packages for construction items of the project to ensure compliance with environmental protection policies and impact mitigation and monitoring requirements.

- Measuring, taking samples and monitoring periodically environmental parameters (once per 3 months) during the time of environmental monitoring contract.
- Assistance in the preparation of documents and implementation of training program on environmental monitoring and supervision for Contractors, DDSC and relevant staffs of PMU (environmental staffs and coordinators of packages).
- Via PMU, discussing with relevant enterprises (if necessary) to find suitable solutions for unexpected risks relating to environmental sanitation.

Detailed Design Supervision Consultant (DDSC)

280. The DDSC is responsible for monitoring the safeguard performance of Contractor during site clearance and construction, including oversight of the self-monitoring to be conducted by Contractor. With regard to safeguards, the DDSC's main responsibility will include, but not be limited to, the following:

- Assist IEMC to establish, collect and provide information about both essential environmental indicators on-site and construction work.
- Ensure that construction work complies with approved EMP, relevant indicators and standardized operation in documents for environmental impact mitigation and monitoring.
- Monitor the mitigation measure implementation of Contractor, propose and deploy supplementary measures in time to complete mitigation measures and to meet the environmental management safety requirements of project.
- Make action plans/urgent solutions to cope with environmental problems, urgent situation and damages happening in construction
- Recommend PMU to suspend partially or completely construction work if labor safety and environmental protection requirements of the contract are not complied with.
- Organize regularly discussions with relevant enterprises and other stakeholders to provide information about implementation plans and necessary working program to enhance people's awareness of environmental protection during construction process.

Construction Contractor

- The construction Contractor's responsibilities in respects of all aspects of the works, including the environmental aspects, are set out in the contract between it and the PMU.
- Construction Contractors have their own responsibilities for both carrying out environmental impact mitigation measures and compliance with approved EMP during assembling construction of project packages. In the preparation of technical method statement, Contractor will study the project's approved IEE report and propose a construction method that includes environmental mitigation and protection measures that are aligned with the recommendations of the approved EMP.
- Contractor's method statement will be submitted to PMU and DDSC for review, as well as to IEMC as deemed necessary. Changes, if there are any, will be evaluated for feasibility and for legal issues (laws, decrees, circulars and other regulations) before suitable adjustments are approved for specific cases on-site.
- During construction work, construction Contractor will be closely supervised by PMU, DDSC, IEMC, environmental authorities and local community on EMP observation.

9.3.4. Compliance Monitoring & Reporting

281. Regular reporting on the implementation of mitigation measures, and on monitoring activities during construction phase of the project is required as indicated in Table 18.

282. 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.

283. 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).

284. PMU will prepare reports twice per year for submission to the ADB including the compliance with the EMP.

285. The report will contain the monitoring results and assessments of the EMC that show project progress and the status of implementation of the EMP. The reports will cover, among other matters as appropriate, the following:

- Contractor's compliance with mitigation measures
- Wastewater and environmental sanitation issues
- Existing flood situation where relevant
- Potential project-related risks and risk management issues

286. The report needs also to summarize results of status of measures to aid PAHs at new resettlement area.

287. A template for monitoring process is presented in Annex 3.

9.4. Plan for Strengthening Capacity in the Environmental Supervision and Management

288. Collaboration between PMU and EMC is needed to organize training courses to strengthen knowledge and experiences in environmental supervision and management. In TOR of EMC, detailed plan and training documents for relevant objects in environmental supervision and management need to be included. These documents are prepared in the early stage and then approved by PMU and ADB.

289. Participants in these training courses are coordinators of project bidding packages, environmental & social unit's staff (ESU) of PMU, DDSC, Contractors, local authorities and community representatives in the project area.

290. The schedule and content of each course will be discussed with PMU depending on scale, level and project progress.

Table 22. Training program for environmental capacity building

I. Objects	PROJECT MANAGEMENT UNIT
Training course	Environmental supervision, monitoring and reporting
Participators	Environmental staff and technical staff
Training Frequency	Soon after the project is impactive and will be updated based on requirements
Time	1 day presentation (yearly basis, until year one of implementation)
Content	General environmental management relating to project including requirements of ADB, DONRE, cooperating with relevant agencies Environmental supervision for the project include: <ul style="list-style-type: none">• Requirements on environmental supervision• Supervision and implementation of mitigation measures;• Community participation in environmental supervision;

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	Guide and supervise Contractor, DDSC and community representatives in implementation of environmental supervision. <ul style="list-style-type: none"> • Forms used in environmental supervision; • Risk response and control; • Receiving approach and submit forms. • Other areas to be determined;
Responsibilities	PMU and IEMC.
II. Objects	DDSC, CONTRACTOR, COMMUNE/WARDS AUTHORITIES, COMMUNITY REPRESENTATIVES
Training course	Implementation of mitigation measures
Participators	DDSC; on-site construction management staff; environmental staff of Contractor; commune/ward/group authorities.
Training frequency	After bidding, update based on requirements
Time	1 day presentation (yearly basis, until year one of operation)
Content	Overview of environmental monitoring; Requirements of environmental monitoring; Role and responsibilities of Contractors and DDSC Content and methods of environmental monitoring; Response and risk control; Propagate monitoring forms and guide how to fill in the forms and risk report; Other areas to be determined; Preparation and submission of report.
Responsibilities	PMU and IEMC
III. Objects	COMMUNITIES AND WORKERS
Training course	Environmental sanitation and safety
Participators	Representatives of community and/or worker leaders (as appropriate)
Training frequency	Soon after the project is impactful and will be updated based on requirements
Time	One-day presentation and one-day on-the job training (yearly basis)
Content	Preliminary presentation on environmental protection and environmental overview Key issues that require community and workers attention to minimize safety risks (roads, waterways, equipment, machines, etc.) as well as reduce pollution (dust, fume gases, oil/grease spill, waste management, etc.) Management of environmental safety and sanitation in work sites and worker camps; Mitigation measures at construction site and work camps; Safety measures on electricity, mechanical, transportation, air pollution; Other areas to be determined; Procedures to deal with emergency situation.
Responsibilities	Contractors, PMU with support from IEMC

9.5. Estimated EMP Cost**Table 23.** Estimated cost for hiring Environmental Monitoring Consultant (EMC)

No.	Content	Unit	Quantity	Price (VND)	Total (VND)	Total (USD)
1	Specialist salary	Month	6	30,680,000	184,080,000	8838.10
2	Local stays and allowance	Day	90	520,000	46800,000	2246.97
3	Traveling expenses	Turn-person	30	832,000	24,960,000	1198.39
4	Training course	Overall	4	5,720,000	22,880,000	1098.52
5	Office supply	Overall	15	6,240,000	93,600,000	4493.95
6	Office and communication	Overall	15	4,992,000	74,880,000	3595.16
	Total				447,200,000	21,500

Table 24. Environmental Monitoring Plan

Environmental Indicators	Location	Means of Monitoring	Frequency	Reporting	Responsibility		Estimated ⁷ Cost (USD)
					Supervision	Responsibility	
Pre-construction Phase – Update Baseline Conditions							
Update baseline on presence of rare & endangered fauna & flora, and critical habitat that will be affected by raw water pipeline construction and operation. Include aquatic resources of affected reaches of Hieu river	Hieu river intake and pipeline corridor in non-developed areas.	Review of existing data and information supplemented by original surveys as required.	Once	Once	DDSC & TNWSJSC	IEMC	Included in EMC contract
A) Noise: Leq, L50, Lmax B) Air quality: dust, CO, NOx, SOx, HC,noise, wind, and vibration levels to supplement baseline air quality data collected during PPTA and reported in IEE C) Surface water quality: TSS, heavy metals (As, Cd, Pb,) oil and grease, total & E. coliform, pH, DO, COD, BOD ₅ , temperature, NH ₃ , and other nutrient forms of N & P. sampled at Nui Coc lake station during PPTA & reported in IEE.	Representative sites of heavy civil & earthwork including along truck routes At raw water intake at Nui Coc lake	Using field and analytical methods described in QCVN and TCVN standards for ambient air and surface water quality sampling & analysis.	A)one location in one day, 3 measurements in an hour B-C) one location , one day	One baseline supplement report before construction phase starts	DDSC & PMU	IEMC	Included in EMC contract.
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	IEMC	Included in EMC contract
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.	D): Once if needed	Once	DDSC & PMU	IEMC	Included in EMC contract
Presence of UXO	Potentially located throughout	Military to survey and sweep	Once	Once	TNWSJSC	military	TBD.

⁷ Estimated costs to be updated at detailed design stage

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Environmental Indicators	Location	Means of Monitoring	Frequency	Reporting	Responsibility		Estimated ⁷ Cost (USD)
					Supervision	Responsibility	
	project area	affected areas of UXO					
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 Grievance Redress Mechanism	For each event	PPC / TNWSJSC	PMU	Included in EMC contract.
Construction of Raw Water Pipeline, Voi Phun WTP, and Treated Water 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 ₅ , temperature, NH ₃ , and other nutrient forms of N & P. D) Survey and Analysis of soil quality (heavy metals (As, Cd, Pb, Hg, Mn), hydrocarbons. E) Ground water quality monitoring: Implementation of suspected and / or in case of problems or complaints F) Domestic and construction solid waste inside & outside construction sites G) Public comments and complaints H) Incidence of worker or public accident or injury	A) For Project items under construction during monitoring time, at the baseline environmental monitoring locations; and other environmentally sensitive points as proposed by EMC 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-H): along all component of the project	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. D-F) Visual observation G) Information transferred by telephone hotline number H) regular reporting by contractors/PMU	A) Quarterly. 1 location/day. 3 times/h. Measure noise only one hour per day B-C): Quarterly D-E) Once before start of excavation F) Monthly G) Continuous public input H) Continuous	A) Quarterly B-C)Twice per year D-H) Quarterly	(A - F):		A-B) \$826 /yr + collection C) \$991. /yr + collection D) With A-C (no marginal cost) E) TBD F-G-H) No marginal cost
					DDSC / PMU	IEMC	
					E & F) & daily observations:		
					PPC / TNWSJSC	PMU / DDSC	
Operation of WTP & Pipeline Network							

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Environmental Indicators	Location	Means of Monitoring	Frequency	Reporting	Responsibility		Estimated ⁷ Cost (USD)
					Supervision	Responsibility	
Air quality: dust, noise and vibration levels	At WTP	Using field and analytical methods described in QCVN & TCVN standards for ambient air quality monitoring.	Quarterly for 1 years	Biannual	TNWSJSC		Included in EMC contract
Worker & public injury associated with WTP & pipeline network	On property of WTP, pipelines, and pump stations	Regular record keeping	Continuously	For each event	TNWSJSC		No marginal cost
Treated water quality: total & faecal coliform, pH, DO, NH ₃ , NO ₃ , NO, chlorine, PAC, NaCl, and heavy metals (As, Cd, Pb,).	At WTP & random user locations along distribution network	Using field and analytical methods described in QCVN & TCVN standards for water quality monitoring, and parameters of QCVN 14:2008/BTNMT	Biannually, or when public complaint arises	For each event	TNWSJSC / DoNRE / MoH		TBD
WTP sludge quality: ToC, heavy metals (As, Cd, Pb,), coliforms, pH, BOD, nutrients (N&P), PAC, chlorine,	After removal of sludge from reservoir and before disposal at designated landfill or site.	Using field and analytical methods described in QCVN & TCVN standards for water quality monitoring	Quarterly for 5 years	Biannually	TNWSJSC		TBD
Public complaints of operation of WTP, drinking water availability & quality, and malfunctions with pipelines (e.g., leaks).	At all sites	Regular record keeping	Continuously	Biannually	TNWSJSC		TBD
Erosion follow up along the project	At all sites	Photographical record of sloped sites	1 year after completion, 1 year after correction if needed	Annually, once if no problems are detected	TNWSJSC		TBD
	Specifically at Nui Coc lake intake	Photographical record of connecting pipe with ground	Biannually and after storm surges	Biannually			TBD

Chapter 10. CONCLUSION, SUGGESTION AND COMMITMENT

Conclusion

291. The project on development of water supply system for Thai Nguyen city is a feasible and in compliance with orientation in master plan for socio-economic development of Thai Nguyen city in particular and Thai Nguyen province in general. The project will upgrade clean water supply and improve economic efficiency as well as reduce losses in water resources caused by indiscriminate exploitation of underground water and leaks in the existing water pipelines. This environmentally beneficial project will enhance capacity in clean water supply, offering Thai Nguyen city a synchronous and safe water supply system. This will contribute to the improvement of living conditions and meet the local residents' demand in using clean water supplied by Thai Nguyen Water Supply JSC. The project will also help increase public awareness on environmental protection.

292. Content of the IEE report complies with present requirements on environmental assessment of Vietnamese Government as well as environmental safeguard policies of ADB. This IEE report will serve as an important documentation submitted to relevant governmental and local agencies on environmental management, thus helping in defining project's location and scope as well as in applying for approval and investment permission of the project. Besides, this is also important documentation in assistance for project's appraisal, negotiation and signing agreement between Vietnamese Government and ADB.

293. The IEE report has identified and assessed most of environmental impacts from planning/designing stage through construction stage to operation stage. During environmental assessment process, negative impacts were quantitatively assessed based on theoretical and empirical calculation formulas as well as on statistical data and experience with the similar projects that were already completed. However, even with the best research methodology it is not possible to exactly quantify impacts, thus most results on impact's quantification are only relatively accurate. As a result, during project implementation, it is necessary to adjust mitigation measures to adapt to real conditions. This should be done based on founding and observations of environmental monitoring Consultant (EMC).

294. Based on scientific evidence analyzed in this IEE report, it is possible to conclude that the selected positions for construction of water supply plant and installation of main water pipelines meet the environmental standards and requirements.

295. Socio-environmental problems arisen from land acquisition for project implementation are not very significant. Furthermore, installation of main water pipelines will not require any land acquisition.

296. During construction, the main environmental impacts to occur will be: (1) Noise, dust and gas emissions from transportation trucks and construction machines used for building water supply plant and for installation of main water pipelines; (2) Domestic wastewater and solid waste from workers; (3) Construction activities will cause negative impacts on livelihood of the affected people, resulting in changes in living conditions and disruption customary habits as well as negative impacts on production and economy of local residents. However, these impacts are only temporary, localized and can be mitigated by measures mentioned in Chapter 5.

297. During project implementation, main problems include: (1) Risks of chemical leaks (e.g. chlorine gas and alum) at the water supply plant; damages (both natural and anthropogenic) of equipment and main water pipelines. (2) Public awareness on protection of environment and public works is still low. (3) Capacity on management and operation of the water supply system is still not sufficient. However, these issues can be dealt with by solutions such as: regularly supervise and monitor the operation of the water supply plant and main water pipelines; organize public awareness raising programs and provide staff with training courses.

298. Supervision and monitoring program on the project's compliance with environmental standards and national technical regulations must be collaboratively implemented by relevant environmental management agencies. The project will be implemented under coordination and guidance of these agencies. The main objective of the supervision and monitoring program is to: strictly manage and mitigate unavoidable negative environmental impacts, and at the same time ensure that the quality of clean water to be distributed to HHs will meet the present regulations. To ensure a unified environmental management, an environmental management system will be set up from preconstruction to operation time. This environmental management system will make sure that activities including management, supervision, reporting, preparation and adjustment of mitigation measures will be performed during the whole project implementation. Environmental monitoring will be regularly carried out in compliance with Environmental Protection Law and other guiding regulations of the Government.

299. Environmental supervision and monitoring program will be implemented right after the Government approves and issues permission for the project to undergo construction and operation. Data obtained from supervision, monitoring will be archived, and serve as legal base for project's compliance to Vietnam's environmental laws and environmental safeguard policy of ADB. These data will also assist in evaluation on efficiency and environmental sustainability of the project.

300. If all the mitigation measures proposed in the IEE report will be complied during project implementation, the project on "development of the clean water supply system for Thai Nguyen city" will be successfully implemented, contributing to positive results in terms of socio-economic and environmental aspects.

301. Information on this project has been disclosed to local government and local residents in the project area. The project has received support and valuable comments as well as suggestions from local government and residents.

Suggestion

302. During project implementation, PMU recommends Thai Nguyen provincial people's committee to direct local administration and relevant departments collaborate with project investor and PMU in the area of environment protection for the entire project implementation from preparation, construction to operation phase of the project components.

303. For environmental protection, the PMU will need coordination, support and opinions from Department of Natural Resources and Environment of Thai Nguyen province for proactive project implementation.

304. For traffic access, PMU needs coordination as well as supports from Department of Transport, traffic police and local authorities to divert traffic flow as well as to prevent traffic jam and accidents.

305. To ensure social security and social order, PMU and Contractors should work closely with local administration and police to control immigrated workers.

Commitment

306. During whole project implementation, project owner commits to full compliance with regulations set in Vietnam environmental protection laws, including:

- Decree No. 80/2006/NĐ-CP and Decree No. 21/2008/NĐ-CP of Government dated 28/ 2/ 2008 on revision and supplement of some articles of Decree No. 80/2006/NĐ-CP dated 09/8/2006 on detailed regulations and guidelines for implementation of some articles of environmental protection laws;

- Decree No. 29/2011/ND-CP dated 18/4/2011 relative to regulation on strategic environmental assessment (SEA), EIA and environmental protection commitment;
- Circular No.26/2011/TT-BTNMT dated 18/07/2011 by Minister of Natural resources and environment on detail guidelines for preparation and approval of SEA, EIA and EPC report; and other relevant documents;
- Decree 201/2013/ND-CP on stricter regulations for effective water resource management including associated consultation of communities;

307. Project owner also commit to compliance with environmental safeguard policies of ADB.

308. Project owner also commits on implementation of environmental-impact mitigation measures and of environmental supervision and monitoring plan mentioned in this IEE report. Project owner will also perform commitments to local communities, in which project owner will pay compensation and mitigate environmental pollution in case of accidents and/or risks occur during project implementation.

309. 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.

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Annex 1: Background information about the project

Project Description

In 2012, the Government of Vietnam and Asia Development Bank (ADB) has the list of projects under stage II of the loan for Vietnam Water Section Development Program on the basis of Multitranche Financing Facility (MFF), financed by ADB; in which it includes Thai Nguyen City Water Supply System Development Project. The project is proposed with the objectives of the water supply sustainability for Thai Nguyen city in the upcoming and long-term periods, simultaneously for the contribution to the development of infrastructure in Thai Nguyen city particularly and Thai Nguyen province generally.

The objectives of the Project:

Timely supply of water sufficiently with the quality for demanding users, population in 19 inner wards and suburbs of Thai Nguyen city.

Improvement of water supply services safely and sustainably through the enhancement of drinking water production capability and improvement of the water supply network, expansion of the entire water supply system, contributing to the improvement of living and health conditions of Thai Nguyen people.

The project outputs

The project will contribute to the improvement, expansion and enhancement of the quality of water supply with the expected outputs:

(i) Constructing a water intake and pumping station on the Nui Coc Lake; (ii) Constructing 170m DN800 raw water pipeline from the intake to the WTP; (iii) Constructing Nam Nui Coc Water Treatment Plant capacity 50,000 m³/day, (iv) Constructing two 5,000 m³ treated water storage reservoirs, pumping station, chemical house, backwash water tank and other auxiliary facilities in the WTP; (v) Constructing 22,31km DN300-DN800 transmission and 20,32km DN100-DN200 distribution main; 62,01km service pipelines and (vi) installing 4134 HH connections; (vii) Provision of consulting services for design, construction supervision, project management and safeguards monitoring.

When the project is completed, there are 27449 HHs approached to the drinking water supply first time, contributing to increase number of house connections from 49650 in 2013 to 77099 in 2024; 7 connections industry, 51 commercial connections, 673 administrative connections. 4749 poor people and 933 HH will benefit from this for the first time. The present NRW ratio will reduce from 22,38% to 18% by 2019.

Figure 1.1: Customer Development Diagram in Thai Nguyen city

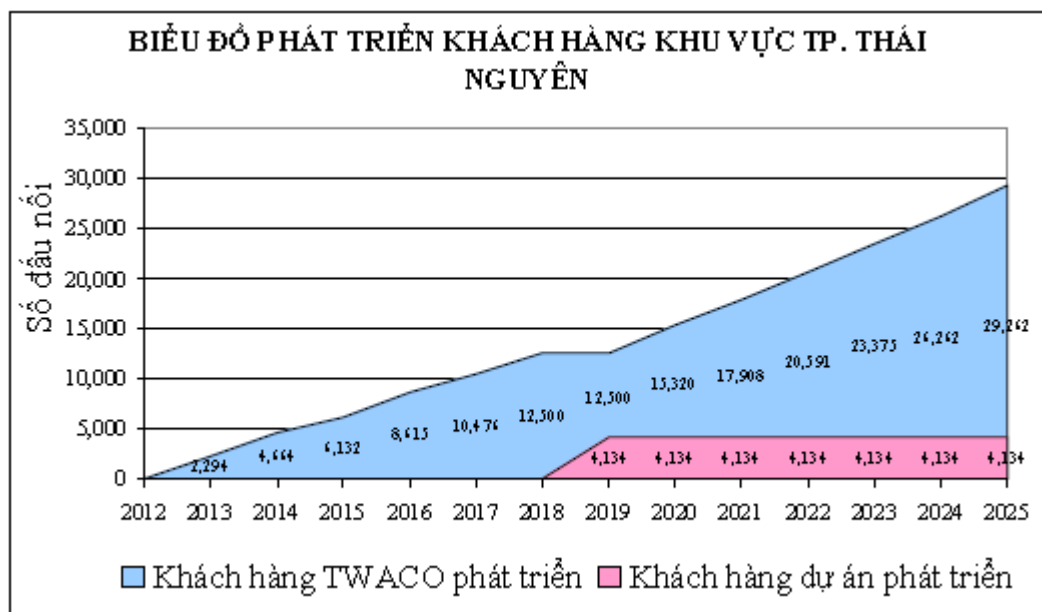
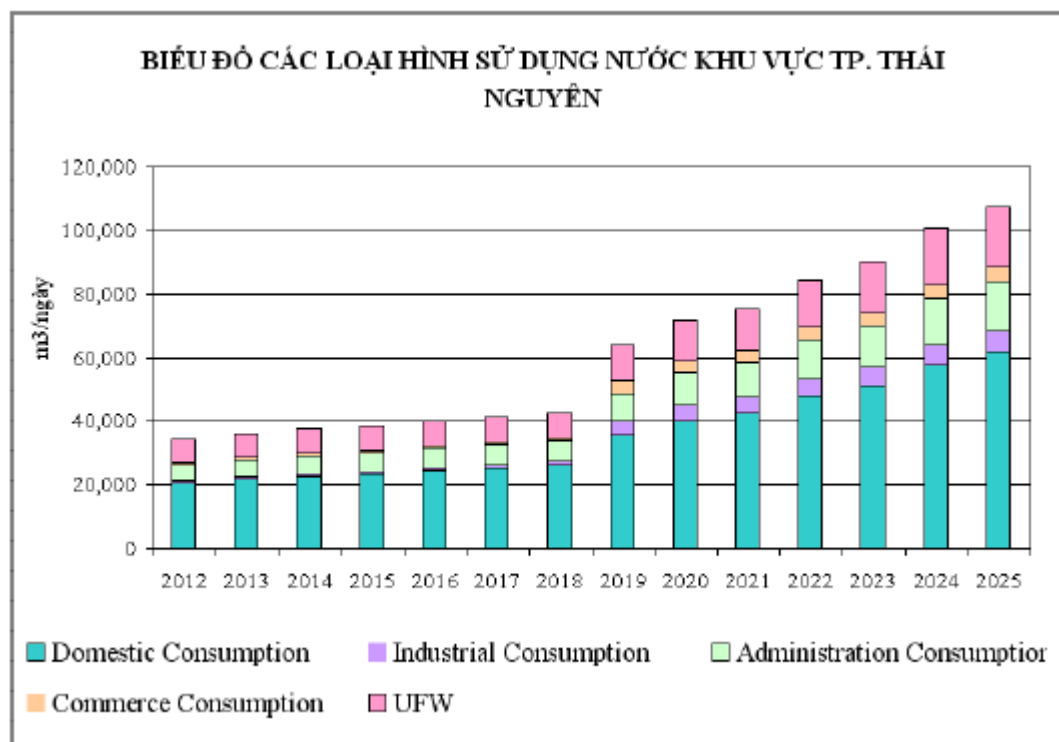


Figure 1.2: Customer Composition developed by the Project



Figure 1.3: Types of Water Usage in Thai Nguyen city



Project Managing Agency

Thai Nguyen Water Joint Stock Company (TWACO) will be the project managing agency, as the state-owned enterprise, and officially operates as the joint stock company since 01/01/2010. The company shall actively decide on its business activities, responsible to the laws on its operation. TWACO is a class-II enterprise of the province and striving to be upgraded to class I. Beside the management of water supply systems of Thai Nguyen city, the Company currently manages other water supply systems in Song Cong town, Dai Tu district town, Trai Cau district town and Vo Nhai district... In Thai Nguyen city, TWACO manages the water supply system capacity of 43,000m³/day, supplying water for the inner urban areas of Thai Nguyen city and adjacent suburban areas.

The PMU under the company operating specializingly has experiences in project management and implementation, especially projects from ODA financing sources such as: Thai Nguyen City Water Supply and Sanitation Project, in which construction of Tich Luong Water Treatment Plant with capacity of 20,000 m³/day, rehabilitation of Tuc Duyen Water Treatment Plant to increase the capacity from 7,000 m³/day to 10,000 m³/day and upgrading of water supply network in the city, using ADB fund; Song Cong town water supply project, using 60.6% from Norway ODA finance and the remaining counterpart fund; Vietnam Urban Water Supply Development Project-Thai Nguyen Sub-project (for Du town of Phu Luong district and Dinh Ca town of Vo Nhai district); and other projects.

Annex 2: Baseline environmental data of the project areas

(Including results obtained from literature review and from analyzing environmental samples collected during field surveys.)

Table 25. The average temperature of the years (Unit : oC)

Year	2007	2008	2009	2010	2011	2012
Annual average	24	23	24.2	24.2	22.8	23.7
January	16.2	14.4	15.1	17.7	11.9	14.2
February	21.6	13.5	21.9	20.5	17.3	15.6
March	20.7	20.8	20.5	21.5	16.7	20
April	22.9	24	24.1	23.5	23.4	25.7
May	26.7	26.7	26.5	27.8	26.3	28.5
June	29.4	28.1	29.2	29.5	28.7	29.4
July	29.6	28.4	28.9	29.7	29.5	28.7
August	28.5	28.2	29.4	27.8	28.5	28.8
September	26.8	27.7	28.3	27.9	27.1	27.2
October	25.4	26.1	26.2	25.1	24	26.0
November	20.3	20.5	21	20.9	22.9	22.5
December	19.5	17.3	19.4	18.5	16.8	18.0

Sources: Statistical Yearbook 2012, Thai Nguyen province

Table 26. Total hours of sunshine (Unit: hrs)

Year	2007	2008	2009	2010	2011	2012
Annual average	115	106	122	107	100.3	98.9
January	55	55	96	33	10.4	4.8
February	54	27	49	88	32	18.2
March	13	71	42	36	10	28.6
April	70	54	93	51	49.2	111
May	161	128	140	107	137	159.3
June	191	110	168	136	132.1	116.2
July	205	156	160	178	181.8	167.2
August	153	148	217	147	183.2	207
September	133	153	175	166	143.1	138.6
October	115	108	120	142	93	127
November	190	158	138	117	137	75.2
December	34	101	60	81	95	33.9

Sources: Yearly Statistic book 2012, Thai Nguyen province

Table 27. Average rainfall years (Unit: mm)

Year	2007	2008	2009	2010	2011	2012
Annual average	120.9	169.2	152.9	132.6	117.7	136.5
January	2.1	12.3	10.8	83.4	4.4	48.8
February	39.1	18.4	14.1	5.8	10.8	18.6
March	85.7	24.6	33	49.7	93.3	33.3
April	135.4	129.7	137.8	119.6	30.1	45.8
May	160.2	120.8	567.8	206.5	226.3	281.8
June	238.1	238.8	318.7	211.4	237.5	148.6
July	317.2	523.3	248.2	367.1	144.0	465.2
August	120.8	395.7	187.8	328.2	268	402.4
September	273.3	207.1	221	166.6	284.7	85.7
October	45.7	154.1	66.1	8.7	103.8	50.6
November	9.9	200.1	0.5	2.1	4.3	29.4
December	23.8	5.3	2.9	41.8	5.2	28.3

Sources: Yearly Statistic book 2012, Thai Nguyen province

Table 28. The average annual humidity (Unit : %)

Year	2007	2008	2009	2010	2011	2012
Annual average	81	82	80	81	79.6	81.2
January	71	83	73	79	73	84
February	83	77	86	79	82	84
March	90	86	83	80	80	77
April	82	87	84	86	83	82
May	77	80	83	84	80	80
June	80	83	79	80	84	83
July	80	83	84	81	80	83
August	84	85	81	85	82	83
September	84	86	80	83	83	78
October	80	85	79	77	81	79
November	75	79	71	74	79	81
December	84	75	74	79	68	80

Sources: Yearly Statistic book 2010, Thai Nguyen province

Results on water quality at the main discharge gate of Nui Coc Lake

Order	Parameter	Unit	2/2009	4/2009	6/2009	8/2009	10/2009	12/2009	2/2010	4/2010	6/2010	8/2010	10/2010	12/2010
1	pH	-	6.7	6.7	7.3	5.9	6.5	6.5	5.8	5.9	6.02	7.1	5.3	6.9
2	DO	mg/l	8.2	7.9	7.8	6.6	7.5	7	7.6	7.2	6.4	5.2	7.2	5.2
3	BOD5	mg/l	4.4	6.5	5.3	4.4	4.7	6.3	6.2	3.8	5.9	3.5	6.5	4.7
4	COD	mg/l	13.3	10.4	13.3	12.1	8.6	12.6	15.1	5.1	10.8	8.3	12.6	10.8
2	TSS	mg/l	5.4	0.7	0.3	0.6	28.8	4.7	9	11.4	4.2	9.1	4.1	6.6
3	NH ₄ -N	mg/l	0.006	0.05	<0.006	0.09	0.08	0.04	<0.006	<0.006	<0.006	0.06	<0.006	<0.006
4	NO ₂ ⁻	mg/l	<0.005	0.01	0.018	0.011	0.009	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
5	NO ₃ ⁻	mg/l	0.9	1.03	0.76	3.61	0.28	0.37	0.34	0.88	0.72	0.52	3.07	0.16
6	PO ₄ ³⁻	mg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
7	Fe	mg/l	0.273	0.2	0.52	0.58	0.22	0.42	0.85	0.29	0.53	0.46	0.08	0.24
8	Pb	mg/l	<0.005	<0.005	0.0055	<0.005	<0.005	<0.005	0.0064	0.0078	<0.005	<0.005	<0.005	<0.005
9	Cr	mg/l	0.001	<0.005	<0.005	0.002	<0.005	0.008	0.031	0.007	<0.005	<0.005	<0.005	<0.005
10	Zn	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	0.073
11	Mn	mg/l	0.091	<0.02	0.207	0.065	0.076	0.111	0.174	0.045	0.096	0.16	0.046	0.044
13	Sn	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0073	<0.005	<0.005
14	As	mg/l	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	0.008	<0.005	<0.005	0.009	<0.005	<0.005
15	Hg	mg/l	0.001	<0.0002	<0.0002	<0.0002	<0.0002	0.0007	0.0008	<0.0002	0.0007	<0.0002	0.0006	<0.0002
16	Cd	mg/l	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
17	Cu	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.012	<0.005	<0.005	<0.005	<0.005	<0.005
18	CN	mg/l	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008
19	Phenol	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20	Oil & grease	mg/l	<0.01	<0.01	<0.01	0.12	<0.01	<0.01	0.26	<0.01	<0.01	<0.01	<0.01	<0.01
21	Coliform	MPN/100ml	200	1900	1000	200	800	800	4800	2400	1000	2000	1200	1100

Annex 3: Documentation relative to public consultation



H1.Presentation of project and environmental impacts of project



H2. People opinion consultation



H3. Opinions of people and community



H4. Discuss opinions





**Letters of relevant community organizations on their comments for the Project
Consultation meeting minutes**

1. Minutes of Public Consultation in Phuc Triu commune on 07/02/2012
List of Participants

Name	Address
Trịnh Văn Xuyên	CT UB Phúc Trìu
Trịnh Văn Hùng	PCT UB Phúc Trìu
Long Văn Tịnh	PCTUB Phúc Trìu
Trịnh Thị Huệ	CTHDND
Trịnh Văn Luyện	PCTHDND
Tạ Huy Sơn	Phúc Trìu
Lê Khương Duy	Phúc Trìu
Trần Duy Tỵ	Phúc Trìu
Nguyễn Hồng Khanh	Phúc Trìu
Lê Thị Thu	Phúc Trìu
Nguyễn Thúy Hằng	Phúc Trìu
Nguyễn Thị Chi	Phúc Trìu
Phạm Thị Thục	Phúc Trìu
Đỗ Việt Nga	Phúc Trìu
Lương Văn Long	Phúc Trìu
Nguyễn Văn Hà	Phúc Trìu
Nguyễn Tiến Minh	Phúc Trìu
Bùi Văn Hoàng	Phúc Trìu
Dương Việt Bách	Phúc Trìu
Đào Ba Hữu	Phúc Trìu
Nguyễn Thọ Hùng	Phúc Trìu
Lê Văn Sỹ	Phúc Trìu
Nguyễn Bá Phú	Phúc Trìu
Nguyễn Vĩnh Sáng	Phúc Trìu
Nguyễn Công Tâm	Phúc Trìu
Bùi Văn Phúc	Phúc Trìu
Nguyễn Trọng Tạo	Phúc Trìu
Bùi Bá Tiến	Phúc Trìu
Nguyễn Hữu Đắc	Phúc Trìu
Lê Văn Dũng	Phúc Trìu
Phan Chí Việt	Phúc Trìu
Bùi Trọng Long	Phúc Trìu
Nguyễn Đăng Việt	Phúc Trìu
Bùi Bá Tạo	Phúc Trìu
Phan Viết Xuân	Phúc Trìu
Nguyễn Văn Thiên	Phúc Trìu

2.

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

Thai Nguyen, Ngày 17 tháng 3 năm 2012

**BIÊN BẢN CUỘC HỌP THAM VẤN
ĐÁNH GIÁ TÁC ĐỘNG MÔI TRƯỜNG
DỰ ÁN PHÁT TRIỂN HỆ THỐNG CẤP NƯỚC THÀNH PHỐ THÁI NGUYÊN**

I. THÔNG TIN CHUNG

Thời gian:

Bắt đầu: ...h ...giờ ngày ... tháng ... năm 2012

Kết thúc: ...h ...giờ ngày ... tháng ... năm 2012

Địa điểm: UBND Phường Trừ

II. THÀNH PHẦN THAM GIA

1. Đại diện Ban quản lý dự án:

- Ông/bà: ...*Đào Thị Bình*... Chức vụ: ...*GP*...

- Ông/bà: ...*Đào Đức Kỳ*... Chức vụ: ...*CBCL*...

2. Đại diện đơn vị tư vấn:

- Ông/bà: ...*Nguyễn Việt Hồng*... Chức vụ: ...*CBPA*...

- Ông/bà: ...*Phạm Thị Thúy Hằng*... Chức vụ: ...

3. Đại diện Chính quyền xã/phường:

- Ông/bà: ...*Trần Văn Xuân*... Chức vụ: ...*ST. UBND*...

- Ông/bà: ...*Trần Văn Hùng*... Chức vụ: ...*ST. UBND*...

- Ông/bà: ...*Trần Văn Hùng*... Chức vụ: ...*ST. UBND*...

- Ông/bà: ...*Trần Văn Hùng*... Chức vụ: ...*ST. UBND*...

- Ông/bà: ...*Trần Văn Hùng*... Chức vụ: ...*ST. UBND*...

- Ông/bà: ...*Trần Văn Hùng*... Chức vụ: ...*ST. UBND*...

- Ông/bà: ...*Trần Văn Hùng*... Chức vụ: ...*ST. UBND*...

4. Đại diện các hội gia đình/ tổ chức

III. NỘI DUNG CUỘC HỌP

1. Đại diện chính quyền địa phương

Ông/bà: ...*Trần Văn Xuân*... giới thiệu thành phần cuộc họp

2. Đại diện Ban Quản lý dự án

Ông/bà: ...*Đào Đức Kỳ*... nêu mục đích cuộc họp

3. Đại diện tư vấn trình bày các vấn đề sau:

- Giới thiệu chung về dự án (mục tiêu, vị trí, quy mô, kế hoạch của dự án);
- Các hạng mục đầu tư của dự án;
- Đánh giá sơ bộ các tác động môi trường của việc thực hiện dự án bao gồm các tác động đối với môi trường tự nhiên (đất, nước, không khí, sinh thái), các tác động đối với kinh tế-xã hội trong các giai đoạn thực hiện dự án (có tài liệu kèm theo)



IV. CÁC Ý KIẾN THAM VẤN VỀ VẤN ĐỀ MÔI TRƯỜNG

- Khi thi công vào mùa mưa có thể sẽ làm ảnh hưởng tới nguồn nước hồ Hòa Bình
- Khi thi công là dân sinh tại Hồ Hòa Bình do đó khi thi công cần có công tác chăm sóc đất đai, cây cối, nhất là có kế hoạch bồi đắp lại mặt nước trong sinh hoạt, xây dựng lại các công trình, phần bị hư hỏng ảnh hưởng tới môi trường sinh thái nguồn nước hồ
- Việc thu hồi đất của hộ dân cũng làm ảnh hưởng tới cuộc sống của họ. Cần có kế hoạch tái định cư, tạo công ăn việc làm cho họ ảnh hưởng
- Trong thời gian thực hiện dự án tạo công ăn việc làm cho lao động địa phương
- Nguồn vốn cấp nước cho Phú Trung Tân Công là khu vực đang thiếu nước, có nên cân có dụng nước
- Một bị ung thư địa an



Ngày... tháng... năm 2012

ĐẠI DIỆN BQL DỰ ÁN

ĐẠI DIỆN ĐƠN VỊ TƯ VẤN



GIÁM ĐỐC
Trương Chí Sơn

(Signature)
Nguyễn Việt Hùng

ĐẠI DIỆN CHÍNH QUYỀN ĐỊA PHƯƠNG



TM. UBND XÃ PHÚC TRƯU
CHỦ TỊCH
Trịnh Văn Xuyên

2. Minutes of Public Consultation in Tan Long commune on 10/02/2012
List of participants

Lê Văn Hải	PCT UBND Tân Long
Nguyễn Minh Hoàn	MTTQ Tân Long
Phạm Hữu Trí	Tân Long
Đào Văn Quang	Tân Long
Nguyễn Văn Bách	Tân Long
Nguyễn Văn Mạnh	Tân Long
Phạm Minh Đức	Tân Long
Bùi Hữu Mão	Tân Long
Bùi Bá Phú	Tân Long
Bùi Hữu Thực	Tân Long
Phạm Quang Luân	Tân Long
Phạm Bá Liêm	Tân Long
Đỗ Viết Văn	Tân Long
Trần Tiến Hợp	Tân Long
Đào Việt Bách	Tân Long
Đoàn Thế Hữu	Tân Long
Đoàn Văn Lợi	Tân Long
Doãn Văn Sơn	Tân Long
Bùi Khắc Việt	Tân Long
Nguyễn Văn Cường	Tân Long
Nguyễn Văn Dượng	Tân Long
Phan Hoàng Bình	Tân Long
Phan Hữu Nhu	Tân Long
Phan Hữu Hiếu	Tân Long
Nguyễn Văn Sơn	Tân Long
Nguyễn Văn Tám	Tân Long
Nguyễn Hữu Diêm	Tân Long
Dương Văn Huân	Tân Long
Dương Văn Công	Tân Long

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

Thái Nguyên, Ngày 10 tháng 2 năm 2012

**BIÊN BẢN CUỘC HỌP THAM VẤN
ĐÁNH GIÁ TÁC ĐỘNG MÔI TRƯỜNG**
DỰ ÁN PHÁT TRIỂN HỆ THỐNG CẤP NƯỚC THÀNH PHỐ THÁI NGUYÊN

I. THÔNG TIN CHUNG

Thời gian:

Bắt đầu: 9h 00, ngày 10 tháng 2 năm 2012

Kết thúc: 11h 30, ngày 10 tháng 2 năm 2012

Địa điểm: UBND phường Tân Long

II. THÀNH PHẦN THAM GIA

1. Đại diện Ban quản lý dự án:

- Ông/bà: ...*Đào Thị Sơn*... Chức vụ: *GP*

- Ông/bà: ...*Ma Đình Lý*... Chức vụ: *Ch. P. B.*

2. Đại diện đơn vị tư vấn:

- Ông/bà: *Nguyễn Lê Phúc*... Chức vụ: *CB. Dự án*

- Ông/bà: *Trần Thị Hiền*... Chức vụ: *CB. Dự án*

3. Đại diện Chính quyền xã/phường:

- Ông/bà: *Lê Văn Khoa*... Chức vụ: *Phó Chủ tịch UBND*

- Ông/bà: *Nguyễn Minh Hân*... Chức vụ: *CT. UBND xã*

- Ông/bà: Chức vụ:

- Ông/bà: Chức vụ:

- Ông/bà: Chức vụ:

- Ông/bà: Chức vụ:

- Ông/bà: Chức vụ:

4. Đại diện các hội gia đình/tổ chức

III. NỘI DUNG CUỘC HỌP

1. Đại diện chính quyền địa phương

Ông/bà: *Lê Văn Khoa*... giới thiệu thành phần cuộc họp

2. Đại diện Ban Quản lý dự án

Ông/bà: *Ma Đình Lý*... nêu mục đích cuộc họp

3. Đại diện tư vấn trình bày các vấn đề sau:

- Giới thiệu chung về dự án (mục tiêu, vị trí, quy mô, kế hoạch của dự án);
- Các hạng mục đầu tư của dự án;
- Đánh giá sơ bộ các tác động môi trường của việc thực hiện dự án bao gồm các tác động đối với môi trường tự nhiên (đất, nước, không khí, sinh thái), các tác động đối với kinh tế-xã hội trong các giai đoạn thực hiện dự án (có tài liệu kèm theo)

IV. CÁC Ý KIẾN THAM VẤN VỀ VẤN ĐỀ MÔI TRƯỜNG

- Toàn bộ đồng ý, tuy nhiên cần phải có điều chỉnh về hệ thống đường trục chính để tránh ảnh hưởng tới nhà dân và các công trình kiến trúc của người dân.
- Các trục đường chính cần có các trạm dừng tạm thời ảnh hưởng tới sự giao thông, ảnh hưởng tới các nhà dân.
- Các trục đường chính cần có hệ thống thoát nước và xử lý nước thải.
- Các trục đường chính cần có hệ thống chiếu sáng, hệ thống thoát nước và xử lý nước thải.

Ngày... tháng... năm 2012

ĐẠI DIỆN BQL DỰ ÁN

ĐẠI DIỆN ĐƠN VỊ TƯ VẤN



GIÁM ĐỐC
Đường Chuối Sơn

Nguyễn Lê Phan

ĐẠI DIỆN CHÍNH QUYỀN ĐỊA PHƯƠNG



KT. CHỦ TỊCH
PHÓ CHỦ TỊCH
Lê Văn Hải

2. Minutes of Public Consultation in Tan Tinh commune on 9/02/2012

List of participants

Trịnh Lâm An	Tân Thịnh
Nguyễn Kim Nam Dung	Tân Thịnh

UBND Tân Thịnh

Số: 2

V/v: Ý kiến tham vấn trong quá trình lập báo cáo đánh giá tác động môi trường của Dự án Phát triển Hệ thống Cấp nước Thành phố Thái Nguyên.

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

Tân Thịnh, ngày 09 tháng 2 năm 2012

Kính gửi: BAN QUẢN LÝ DỰ ÁN ĐẦU TƯ XÂY DỰNG - CÔNG TY CỔ PHẦN NƯỚC SẠCH THÁI NGUYÊN

Ủy ban nhân dân Tân Thịnh nhận được Văn bản số 13 ngày 7 tháng 2 năm 2012 của Ban Quản lý Dự án Đầu tư Xây dựng Công ty Cổ phần Nước sạch Thái Nguyên kèm theo tài liệu tóm tắt về các hạng mục đầu tư chính, các vấn đề môi trường, các giải pháp bảo vệ môi trường của Dự án Phát triển hệ thống cấp nước Thành phố Thái Nguyên. Sau khi xem xét tài liệu này, Ủy ban nhân dân Tân Thịnh có ý kiến như sau:

1. Về các tác động tiêu cực của Dự án đến môi trường tự nhiên và kinh tế - xã hội:

..... Gặp phiền nhiễu đến đời sống của nhân dân địa phương do việc xây dựng và vận hành nhà máy xử lý nước sạch tại khu vực này sẽ gây ra tiếng ồn, bụi, khí thải và các chất ô nhiễm khác.

2. Về các biện pháp giảm thiểu tác động tiêu cực đến môi trường của Dự án:

..... Là các biện pháp giảm thiểu tác động tiêu cực đến môi trường tự nhiên và xã hội như: trồng cây xanh, xây dựng công trình chắn bụi, giảm tiếng ồn, xử lý nước thải và chất thải rắn.

3. Kiến nghị đối với chủ dự án:

..... Cần thực hiện nghiêm túc các biện pháp giảm thiểu tác động tiêu cực đến môi trường và xã hội theo quy định của pháp luật.

Trên đây là ý kiến của Ủy ban nhân dân Tân Thịnh gửi BQL Dự án Đầu tư Xây dựng - Công ty Cổ phần Nước sạch Thái Nguyên để hoàn thiện báo cáo đánh giá tác động môi trường của Dự án.

Nơi nhận:

- Như trên;
- Lưu VP

ỦY BAN NHÂN DÂN



UBND PHƯỜNG TÂN THỊNH
KT CHỦ TỊCH
PHÓ CHỦ TỊCH
Vũ Xuân Phương

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

Thái Nguyên, Ngày 10 tháng 2 năm 2012

BIÊN BẢN CUỘC HỌP THAM VẤN
ĐÁNH GIÁ TÁC ĐỘNG MÔI TRƯỜNG
DỰ ÁN PHÁT TRIỂN HỆ THỐNG CẤP NƯỚC THÀNH PHỐ THÁI NGUYÊN

I. THÔNG TIN CHUNG

Thời gian:

Bắt đầu: 14h 30 ngày 10 tháng 2 năm 2012

Kết thúc: 16h 30 ngày 10 tháng 2 năm 2012

Địa điểm: UBND P. Tân Thịnh

II. THÀNH PHẦN THAM GIA

1. Đại diện Ban quản lý dự án:

- Ông/bà: Đỗ Văn Sơn Chức vụ: G.P.

- Ông/bà: Ma Đình Lý Chức vụ: CB. BQL

2. Đại diện đơn vị tư vấn:

- Ông/bà: Nguyễn Lê Thái Chức vụ: Chủ tịch an

- Ông/bà: Kim Thái Bạch Hoàng Chức vụ: Chủ tịch an

3. Đại diện Chính quyền xã/phường:

- Ông/bà: Tr. Văn Phương Chức vụ: phó Chủ tịch UBND

- Ông/bà: Trần Văn An Chức vụ: Chủ tịch UBND

- Ông/bà: Ng. Kim Nam Dương Chức vụ: CB. Văn phòng

- Ông/bà: Chức vụ:

- Ông/bà: Chức vụ:

- Ông/bà: Chức vụ:

4. Đại diện các hội gia đình/ tổ chức

III. NỘI DUNG CUỘC HỌP

1. Đại diện chính quyền địa phương

Ông/Bà: Tr. Văn Phương giới thiệu thành phần cuộc họp

2. Đại diện Ban Quản lý dự án

Ông/bà: Ma Đình Lý nêu mục đích cuộc họp

3. Đại diện tư vấn trình bày các vấn đề sau:

- Giới thiệu chung về dự án (mục tiêu, vị trí, quy mô, kế hoạch của dự án);

- Các hạng mục đầu tư của dự án;

- Đánh giá sơ bộ các tác động môi trường của việc thực hiện dự án bao gồm các tác động đối với môi trường tự nhiên (đất, nước, không khí, sinh thái), các tác động đối với kinh tế-xã hội trong các giai đoạn thực hiện dự án (có tài liệu kèm theo)

[illegible]

ĐẠI DIỆN ĐƠN VỊ TƯ VẤN



GIẢM ĐỐC

Dương Thái Sơn.

ĐẠI DIỆN CHÍNH QUYỀN ĐỊA PHƯƠNG



TỔNG BIÊN PHÒNG TÂN THỊNH
KT. CHỦ TỊCH
PHÓ CHỦ TỊCH
Vũ Xuân Phương

3. Minutes of Public Consultation in Tan Thai commune on 8/02/2012

List of participants

Nguyễn Đức Hồng	MTTQ Tân Thái
Đỗ Văn Nghi	CT UB Tân Thái

UBND*Tân Thái*.....

Số:.....*4*.....

V/v: Ý kiến tham vấn trong quá trình lập báo cáo đánh giá tác động môi trường của Dự án Phát triển Hệ thống Cấp nước Thành phố Thái Nguyên

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

.....*Tân Thái*..... ngày *8* tháng *2* năm 2012

Kính gửi: BAN QUẢN LÝ DỰ ÁN ĐẦU TƯ XÂY DỰNG - CÔNG TY CỔ PHẦN NƯỚC SẠCH THÁI NGUYÊN

Ủy ban nhân dân*Tân Thái*..... nhận được Văn bản số *13* ngày *7* tháng *2* năm 2012 của Ban Quản lý Dự án Đầu tư Xây dựng Công ty Cổ phần Nước sạch Thái Nguyên kèm theo tài liệu tóm tắt về các hạng mục đầu tư chính, các vấn đề môi trường, các giải pháp bảo vệ môi trường của Dự án Phát triển hệ thống cấp nước Thành phố Thái Nguyên. Sau khi xem xét tài liệu này, Ủy ban nhân dân*Tân Thái*..... có ý kiến như sau:

1. Về các tác động tiêu cực của Dự án đến môi trường tự nhiên và kinh tế - xã hội:

.....*Hiện nay tình hình môi trường tự nhiên, kinh tế - xã hội của xã Tân Thái đang phát triển ổn định, không có tác động tiêu cực nào của Dự án đến môi trường tự nhiên và kinh tế - xã hội của xã Tân Thái.*.....

2. Về các biện pháp giảm thiểu tác động tiêu cực đến môi trường của Dự án:

.....*Hiện nay, công tác bảo vệ môi trường của xã Tân Thái đang được thực hiện nghiêm túc, không có biện pháp giảm thiểu tác động tiêu cực nào của Dự án đến môi trường của xã Tân Thái.*.....

3. Kiến nghị đối với chủ dự án:

.....*Hiện nay, xã Tân Thái đã có quy hoạch cấp nước sạch, không còn tồn tại vấn đề thiếu nước sạch cho người dân. Do đó, không cần phải đầu tư xây dựng công trình cấp nước sạch cho người dân xã Tân Thái.*.....

Trên đây là ý kiến của Ủy ban nhân dân*Tân Thái*..... gửi BQL Dự án Đầu tư Xây dựng - Công ty Cổ phần Nước sạch Thái Nguyên để hoàn thiện báo cáo đánh giá tác động môi trường của Dự án./.

Nơi nhận:

- Như trên;
- Lưu VP.



ỦY BAN MẬT TRẦN TỔ QUỐC
Nguyễn Đức Hằng
 TM. ỦY BAN MTTQ. XÃ
 CHỦ TỊCH
Nguyễn Đức Hằng

4. Minutes of Public Consultation in Phuc Xuan commune on 8/02/2012

List of participants

Nguyễn Văn Đông	Phúc Xuân
Nguyễn Văn Hữu	Phúc Xuân

UBND xã Phúc Xuân.....

Số: 001/.....

V/v: Ý kiến tham vấn trong quá trình lập báo cáo đánh giá tác động môi trường của Dự án Phát triển Hệ thống Cấp nước Thành phố Thái Nguyên.

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

Phúc Xuân, ngày 8 tháng 2 năm 2012

Kính gửi: BAN QUẢN LÝ DỰ ÁN ĐẦU TƯ XÂY DỰNG - CÔNG TY CỔ PHẦN NƯỚC SẠCH THÁI NGUYÊN

Ủy ban nhân dân xã Phúc Xuân..... nhận được Văn bản số 15 ngày 3 tháng 2 năm 2012 của Ban Quản lý Dự án Đầu tư Xây dựng Công ty Cổ phần Nước sạch Thái Nguyên kèm theo tài liệu tóm tắt về các hạng mục đầu tư chính, các vấn đề môi trường, các giải pháp bảo vệ môi trường của Dự án Phát triển hệ thống cấp nước Thành phố Thái Nguyên. Sau khi xem xét tài liệu này, Ủy ban nhân dân xã Phúc Xuân có ý kiến như sau:

1. Về các tác động tiêu cực của Dự án đến môi trường tự nhiên và kinh tế - xã hội:

Đối với các hoạt động đầu tư xây dựng, môi trường của dự án bị ảnh hưởng chủ yếu là về mặt tiếng ồn, bụi, khí thải, chất thải rắn, chất thải lỏng, chất thải nguy hại, chất thải sinh hoạt, chất thải chăn nuôi, chất thải công nghiệp, chất thải y tế, chất thải điện tử, chất thải khác.

2. Về các biện pháp giảm thiểu tác động tiêu cực đến môi trường của Dự án:

Thực hiện các biện pháp giảm thiểu môi trường theo quy định của pháp luật về bảo vệ môi trường, đặc biệt là các biện pháp giảm thiểu tác động tiêu cực đến môi trường nước, môi trường không khí, môi trường đất, môi trường sinh vật, môi trường văn hóa, xã hội, môi trường di sản.

3. Kiến nghị đối với chủ dự án:

Chủ dự án cần thực hiện nghiêm túc các biện pháp giảm thiểu tác động tiêu cực đến môi trường, đặc biệt là các biện pháp giảm thiểu tác động tiêu cực đến môi trường nước, môi trường không khí, môi trường đất, môi trường sinh vật, môi trường văn hóa, xã hội, môi trường di sản.

Trên đây là ý kiến của Ủy ban nhân dân xã Phúc Xuân..... gửi BQL Dự án Đầu tư Xây dựng - Công ty Cổ phần Nước sạch Thái Nguyên để hoàn thiện báo cáo đánh giá tác động môi trường của Dự án.

Nơi nhận:

- Như trên;
- Lưu VP.

ỦY BAN NHÂN DÂN
TM. UBND XÃ PHÚC XUÂN
KẾT CHÚ TÍCH
PHÓ CHỦ TỊCH
Nguyễn Văn Đông

Phục Vụ, ngày 7 tháng 7 năm 2012

HỘI NGŢ T 32 X 3 PH 3 X 3
CH 3 T 3
NG 3 X 3 X 3 X 3

5. Minutes of Public Consultation in Quyet Thang commune on 8/02/2012
List of participants

Trần Trọng Đạt	PCT UBND Quyết Thắng
Nguyễn Văn Bình	CT UBMTTQ
Nguyễn Việt Thắng	Cán bộ môi trường QT
Bùi Thị Thanh Yến	Quyết Thắng
Lê Trung Kiên	Quyết Thắng
Nguyễn Thị Cần	Quyết Thắng
Nguyễn Văn Thành	Quyết Thắng
Nguyễn Hồng Minh	Quyết Thắng
Tất Thị Thanh Xuân	Quyết Thắng
Vũ Thị Sáu	Quyết Thắng
Nguyễn Văn Nhã	Quyết Thắng
Lê Thị Hợi	Quyết Thắng
Trần Thị Mỹ Dương	Quyết Thắng
Dương Văn Thắng	Quyết Thắng
Nguyễn Văn Trọng	Quyết Thắng
Trần Duy Hiệp	Quyết Thắng
Nguyễn Mạnh Hà	Quyết Thắng
Vũ Văn Dung	Quyết Thắng
Vũ Văn Triệu	Quyết Thắng
Vũ Trường Sơn	Quyết Thắng
Đặng Thị Hạ	Quyết Thắng
Vũ Thị Thảo	Quyết Thắng
Lưu Thị Mơ	Quyết Thắng
Nguyễn Văn Thúy	Quyết Thắng
Nguyễn Bảo Khánh	Quyết Thắng
Hà Anh Quang	Quyết Thắng
Nguyễn Thị Văn	Quyết Thắng
Chu Thị Thanh Hà	Quyết Thắng
Nguyễn Bá Trúc	Quyết Thắng

UBMTTQ

Số: 05-

V/v: Ý kiến tham vấn trong quá trình lập báo cáo đánh giá tác động môi trường của Dự án Phát triển Hệ thống Cấp nước Thành phố Thái Nguyên

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM

Độc lập - Tự do - Hạnh phúc

ngày 8 tháng 2 năm 2012

Kính gửi: **BAN QUẢN LÝ DỰ ÁN ĐẦU TƯ XÂY DỰNG - CÔNG TY CỔ PHẦN NƯỚC SẠCH THÁI NGUYÊN**

Ủy ban Mặt trận Tổ Quốc xã Quyết Thắng nhận được Văn bản số ... ngày ... tháng ... năm 2012 của Ban Quản lý Dự án Đầu tư Xây dựng Công ty Cổ phần Nước sạch Thái Nguyên kèm theo tài liệu tóm tắt về các hạng mục đầu tư chính, các vấn đề môi trường, các giải pháp bảo vệ môi trường của Dự án Phát triển hệ thống cấp nước Thành phố Thái Nguyên. Sau khi xem xét tài liệu này, Ủy ban Mặt trận Tổ Quốc xã Quyết Thắng có ý kiến như sau:

1. Về các tác động tiêu cực của Dự án đến môi trường tự nhiên và kinh tế - xã hội:

UBMTTQ xã Quyết Thắng hoàn toàn nhất trí với các nội dung đã nêu về các tác động tiêu cực của dự án đến môi trường tự nhiên và kinh tế xã hội của địa phương. Các biện pháp giảm thiểu tác động tiêu cực đến môi trường của dự án được chủ đầu tư đưa ra có tính khả thi.

2. Về các biện pháp giảm thiểu tác động tiêu cực đến môi trường của Dự án:

Các biện pháp giảm thiểu các tác động tiêu cực môi trường của dự án được chủ đầu tư đưa ra có tính khả thi. Ủy ban Mặt trận Tổ Quốc xã Quyết Thắng hoàn toàn nhất trí với các biện pháp giảm thiểu.

3. Kiến nghị đối với chủ dự án:

Đề nghị ban quản lý dự án nghiêm túc thực hiện các biện pháp giảm thiểu tác động tiêu cực đến môi trường tự nhiên và kinh tế xã hội của địa phương. Các biện pháp giảm thiểu được chủ đầu tư đưa ra có tính khả thi. Ủy ban Mặt trận Tổ Quốc xã Quyết Thắng hoàn toàn nhất trí với các biện pháp giảm thiểu.

Trên đây là ý kiến của Ủy ban Mặt trận Tổ quốc xã Quyết Thắng gửi BQL Dự án Đầu tư Xây dựng - Công ty Cổ phần Nước sạch Thái Nguyên để hoàn thiện báo cáo đánh giá tác động môi trường của Dự án.

Nơi nhận:

- Như trên;
- Lưu VP.

ỦY BAN MẶT TRẬN TỔ QUỐC



Nguyễn Văn Bình

SO 45.

V/v: Ý kiến tham vấn trong quá trình lập báo cáo đánh giá tác động môi trường của Dự án Phát triển Hệ thống Cấp nước Thành phố Thái Nguyên.

..... ngày 8 tháng 4 năm 2012

NƯỚC SẠCH THẢI NGUYÊN

Ủy ban nhân dân Xã Quyết Thắng nhận được Văn bản số ... ngày ... tháng ... năm 2012 của Ban Quản lý Dự án Đầu tư Xây dựng Công ty Cổ phần Nước sạch Thái Nguyên kèm theo tài liệu tóm tắt về các hạng mục đầu tư chính, các vấn đề môi trường, các giải pháp bảo vệ môi trường của Dự án Phát triển hệ thống cấp nước Thành phố Thái Nguyên. Sau khi xem xét tài liệu này, Ủy ban nhân dân Xã Quyết Thắng có ý kiến như sau :

1. Về các tác động tiêu cực của Dự án đến môi trường tự nhiên và kinh tế - xã hội :

... MAND. xa' chuyet, thảng hơu kùn nhất tr. với cái nưi, chuyet ta
nưi. Lẽ cái lồi đong, cái của đi an, cớ với trượng, đi
nhện và kẩn, t. xa', hơu: ta', thốt trốt, lợng, lợng, xa
pan mà chuyet đi an cớ gưi

2. Về các biện pháp giảm thiểu tác động tiêu cực đến môi trường của Dự án

Coi kien, phap giem, thien, cai lai, dong xau, toi moi, truyen
cua lu, cu, chut, chut, dau tu, chut, sa, co, tinh, tha, thi,
UBNB, xa, Duyet, Thang, hoan, toan, nhut, bi, voi, cai, kien, phap

3. Kiến nghị đối với chủ dự án :

Đi nghỉ ban quản lý dự án, nhóm tư thù, hèn cái...
 Bùn, pháp xử lý, nhân, mồi, tương nhân, giảm, thười...
 là, mồi, pháp, phát, cái, tại, đong, liều, cái, đơ, nước, tương...
 và mồi, kho, con, con, người, như, đi, ra, trong, nư, dung, bào, cái...
 ARM của dự án, m, th, phư,

(1. phoan, su, lung, Lai, phulphig, hui, thi, cong, lo, guai, bau, phuong tien, qua.
han, di, dung, khong, tam, hau, an, trau, hay, thuy)

Tên đây là ý kiến của Ủy ban nhân dân xã... gửi BQL Dự án Đầu tư Xây dựng - Công ty Cổ phần Nước sạch Thái Nguyên để hoàn thiện báo cáo đánh giá tác động môi trường của Dự án./.

Nội nhân:

- Như trên;
- Lưu VP.

ỦY BAN NHÂN DÂN



KT. CHỦ TỊCH
PHÓ CHỦ TỊCH
Trần Trọng Đại

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

Thái Nguyên, Ngày 9 tháng 2 năm 2012

BIÊN BẢN CUỘC HỌP THAM VẤN
ĐÁNH GIÁ TÁC ĐỘNG MÔI TRƯỜNG
DỰ ÁN PHÁT TRIỂN HỆ THỐNG CẤP NƯỚC THÀNH PHỐ THÁI NGUYÊN

I. THÔNG TIN CHUNG

Thời gian:

Bắt đầu: 12 h 30 ngày 9 tháng 2 năm 2012

Kết thúc: 15 h 30 ngày 9 tháng 2 năm 2012

Địa điểm: UBND Quận Thái Nguyên

II. THÀNH PHẦN THAM GIA

1. Đại diện Ban quản lý dự án:

- Ông/bà: Đỗ Thị Sơn Chức vụ: GP

- Ông/bà: Ma Bình Lý Chức vụ: CABQL

2. Đại diện đơn vị tư vấn:

- Ông/bà: Nguyễn Việt Hùng Chức vụ: C.B.ĐA

- Ông/bà: Phạm Thị Thuý Hằng Chức vụ:

3. Đại diện Chính quyền xã/phường:

- Ông/bà: T.Đ. Trần Đức Chức vụ:

- Ông/bà: Nguyễn Văn Bình Chức vụ:

- Ông/bà: Nguyễn Việt Hùng Chức vụ: C.B. M.Đ. T.Đ.Đ.

- Ông/bà: Chức vụ:

- Ông/bà: Chức vụ:

- Ông/bà: Chức vụ:

- Ông/bà: Chức vụ:

4. Đại diện các hội gia đình/ tổ chức

III. NỘI DUNG CUỘC HỌP

1. Đại diện chính quyền địa phương

Ông/bà: T.Đ. Trần Đức giới thiệu thành phần cuộc họp

2. Đại diện Ban Quản lý dự án

Ông/bà: Ma Bình Lý nêu mục đích cuộc họp

3. Đại diện tư vấn trình bày các vấn đề sau:

- Giới thiệu chung về dự án (mục tiêu, vị trí, quy mô, kế hoạch của dự án);
- Các hạng mục đầu tư của dự án;
- Đánh giá sơ bộ các tác động môi trường của việc thực hiện dự án bao gồm các tác động đối với môi trường tự nhiên (đất, nước, không khí, sinh thái), các tác động đối với kinh tế-xã hội trong các giai đoạn thực hiện dự án (có tài liệu kèm theo)



IV. CÁC Ý KIẾN THAM VẤN VỀ VẤN ĐỀ MÔI TRƯỜNG

Hủy bỏ dự án
- Các bình thì công có thể gây ảnh hưởng đến môi trường
thủy văn, thủy văn, thủy văn...
- Thực hiện các biện pháp bảo vệ môi trường một cách
tối ưu
- Khi các kế hoạch nước sạch của người dân các địa phương
tổ hợp phân vùng các ý thức kế hoạch nước sạch và
bình của người dân
- Khi thì công xong cần dọn dẹp sạch sẽ khu vực
thị trấn

Ngày...9...tháng...2...năm 2012

ĐẠI DIỆN BQL DỰ ÁN

ĐẠI DIỆN ĐƠN VỊ TƯ VẤN



GIÁM ĐỐC
Dương Chí Sơn

Nguyễn Việt Hùng

ĐẠI DIỆN CHÍNH QUYỀN ĐỊA PHƯƠNG



KT, CHỦ TỊCH
PHÓ CHỦ TỊCH
Trần Trọng Đạt

2. Minutes of Public Consultation in Phuc Ha commune on 7/02/2012

List of participants

Nguyễn Minh Tuấn	Phúc Hà
Dương Văn Năm	Phúc Hà

UBND Xã Phúc Hà TP. Tân

Số:

V/v: Ý kiến tham vấn trong quá trình lập báo cáo đánh giá tác động môi trường của Dự án Phát triển Hệ thống Cấp nước Thành phố Thái Nguyên.

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

Phúc Hà, ngày 07 tháng 02 năm 2012

Kính gửi: BAN QUẢN LÝ DỰ ÁN ĐẦU TƯ XÂY DỰNG - CÔNG TY CỔ PHẦN NƯỚC SẠCH THÁI NGUYÊN

Ủy ban nhân dân Xã Phúc Hà..... nhận được Văn bản số 13, ngày 07 tháng 02 năm 2012 của Ban Quản lý Dự án Đầu tư Xây dựng Công ty Cổ phần Nước sạch Thái Nguyên kèm theo tài liệu tóm tắt về các hạng mục đầu tư chính, các vấn đề môi trường, các giải pháp bảo vệ môi trường của Dự án Phát triển hệ thống cấp nước Thành phố Thái Nguyên. Sau khi xem xét tài liệu này, Ủy ban nhân dân Xã Phúc Hà..... có ý kiến như sau :

1. Về các tác động tiêu cực của Dự án đến môi trường tự nhiên và kinh tế - xã hội :

Thất hi với các đánh giá tác động môi trường của dự án

2. Về các biện pháp giảm thiểu tác động tiêu cực đến môi trường của Dự án :

Đề nghị BQL Thực hiện đúng với dự án đã được lập

3. Kiến nghị đối với chủ dự án :

Trong quá trình thi công, giao lưu và sử dụng không làm ảnh hưởng đến đời sống sinh hoạt, tài sản, hoa màu của nhân dân quanh khu vực

Trên đây là ý kiến của Ủy ban nhân dân Xã Phúc Hà..... gửi BQL Dự án Đầu tư Xây dựng - Công ty Cổ phần Nước sạch Thái Nguyên để hoàn thiện báo cáo đánh giá tác động môi trường của Dự án./.

Nơi nhận:

- Như trên;
- Lưu VP;

ỦY BAN NHÂN DÂN

Nguyễn Minh Tuấn
CHỦ TỊCH

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

Thái Nguyên, Ngày 7 tháng 2 năm 2012

BIÊN BẢN CUỘC HỌP THAM VẤN
ĐÁNH GIÁ TÁC ĐỘNG MÔI TRƯỜNG
DỰ ÁN PHÁT TRIỂN HỆ THỐNG CẤP NƯỚC THÀNH PHỐ THÁI NGUYÊN

I. THÔNG TIN CHUNG

Thời gian:

Bắt đầu: 8h 00, ngày 7, tháng 2, năm 2012

Kết thúc: 11h 30, ngày 7, tháng 2, năm 2012

Địa điểm:

UBND Phường

II. THÀNH PHẦN THAM GIA

1. Đại diện Ban quản lý dự án:

- Ông/bà: Nguyễn Thái Sơn Chức vụ: GP

- Ông/bà: Ma Bình Lý Chức vụ: CB. BQL RA

2. Đại diện đơn vị tư vấn:

- Ông/bà: Nguyễn Việt Hưng Chức vụ: Chủ biên

- Ông/bà: Nguyễn Lê Bình Chức vụ: CB. hỗ trợ

3. Đại diện Chính quyền xã/phường:

- Ông/bà: Nguyễn Minh Tuấn Chức vụ: ST. UBND

- Ông/bà: Đ. Văn Kiên Chức vụ: CT. HT. TĐ

- Ông/bà: Chức vụ:

- Ông/bà: Chức vụ:

- Ông/bà: Chức vụ:

- Ông/bà: Chức vụ:

- Ông/bà: Chức vụ:

4. Đại diện các hội gia đình/ tổ chức

III. NỘI DUNG CUỘC HỌP

1. Đại diện chính quyền địa phương

Ông/bà: Nguyễn Minh Tuấn giới thiệu thành phần cuộc họp

2. Đại diện Ban Quản lý dự án

Ông/bà: Ma Bình Lý nêu mục đích cuộc họp

3. Đại diện tư vấn trình bày các vấn đề sau:

- Giới thiệu chung về dự án (mục tiêu, vị trí, quy mô, kế hoạch của dự án);

- Các hạng mục đầu tư của dự án;

- Đánh giá sơ bộ các tác động môi trường của việc thực hiện dự án bao gồm các tác động đối với môi trường tự nhiên (đất, nước, không khí, sinh thái), các tác động đối với kinh tế-xã hội trong các giai đoạn thực hiện dự án (có tài liệu kèm theo)

IV. CÁC Ý KIẾN THAM VẤN VỀ VẤN ĐỀ MÔI TRƯỜNG

Ý kiến của anh
Chị ý kiến tham gia thi công hợp công nhân đi đất
đá đắp trong khu vực thi công, tránh việc mua cát theo
đất cát ảnh hưởng tới sức khỏe người dân
Nghiên cứu thực hiện các biện pháp bảo vệ môi
trường trong thời gian thi công dự án

Ngày...7...tháng...2...năm 2012

ĐẠI DIỆN BQL DỰ ÁN

ĐẠI DIỆN ĐƠN VỊ TƯ VẤN



GIÁM ĐỐC
Đường Thái Sơn

Nguyễn Lê Phú

ĐẠI DIỆN CHÍNH QUYỀN ĐỊA PHƯƠNG



TRẦN VĂN XÃ PHÚC HÀ
CHỦ TỊCH
Nguyễn Minh Tuấn

Annex 4: 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

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

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"> Job openings of the project should give priority to local communities. Recruitment of local laborers should be stipulated in the contract 	<ul style="list-style-type: none"> Field inspections and interviews with communities - DONE Note each complaint case in the field – 3 COMPLAINTS RECEIVED Set up grievance centre and report as part of 		

Document : Initial Environmental Examination Report:

MFF0054-VIE: PFR3 – Thai Nguyen Water Supply Subproject – Thai Nguyen City, Thai Nguyen province

for construction	monitoring action plan – NOT DONE		

b. Issues for Further Action

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

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 ⁸
Establishment of personnel in PMU/PIU			
Public consultation and socialization process		Provide information on: <ul style="list-style-type: none"> • Public consultation, participation activities carried out • Inclusive dates of these activities To be elaborated on in Item 5	
Land area to be acquired is identified and finalised			

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

Document : Initial Environmental Examination Report:

MFF0054-VIE: PFR3 – Thai Nguyen Water Supply Subproject – Thai Nguyen City, Thai Nguyen province

Land acquisition completed			
Establishment of Resettlement Site(s)		<p>Please state:</p> <ul style="list-style-type: none"> • Number of AHs to be relocated as per agreed RP • Number of AHs already relocated • Number of houses built • Status of installation of community facilities to be provided as per agreed RP 	
Compensation payments for affected assets is completed		<p>Please state:</p> <ul style="list-style-type: none"> • Total Number of Eligible AHs and APs (as per agreed RP) • Number of AHs and APs compensated as of this monitoring period • Total Budget allocation as per agreed RP • Total budget disbursed to AHs as of this monitoring period 	
Transport assistance for relocating affected HH		As above	
Additional assistance to vulnerable affected household		<p>Please state:</p> <ul style="list-style-type: none"> • Total Number of vulnerable AHs and APs (as per agreed RP) • Agreed forms of assistance as per RP • Number of AHs and APs assisted as of this monitoring period 	
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)		<p>Please state:</p> <ul style="list-style-type: none"> • Total Number of AHs affected by temporary impacts as per agreed RP • 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) • Status of restoring affected property 	
Capacity building activities			

Document : Initial Environmental Examination Report:

MFF0054-VIE: PFR3 – Thai Nguyen Water Supply Subproject – Thai Nguyen City, Thai Nguyen province

b. Issues for Further Action

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

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

a. OHS for worker

Issue	Required Action	Responsibility and Timing	Resolution
Old Issues from Previous Reports			
New Issues from This Report			

b. Public Safety

Issue	Required Action	Responsibility and Timing	Resolution
Old Issues from Previous Reports			
New Issues from This Report			

5. Information Disclosure and Socialization including Capability Building

- Field Visits (sites visited, dates, persons met)

Document : Initial Environmental Examination Report:

MFF0054-VIE: PFR3 – Thai Nguyen Water Supply Subproject – Thai Nguyen City, Thai Nguyen province

- 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
Old Issues from Previous Reports			
New Issues from This Report			

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