

# Initial Environmental Examination

---

September 2014

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

Prepared by Thai Hoa Water Supply Company for the Asian Development Bank

**Asian Development Bank**

**MFF0054-VIE: PFR3**

**THAI HOA WATER SUPPLY SUBPROJECT**

**THAI HOA TOWN, NGHE AN PROVINCE**

# **FINAL REPORT**

## **APPENDIX 11**

**INITIAL ENVIRONMENTAL EXAMINATION REPORT**

**September 2014**

## **ABBREVIATIONS**

ADB	Asian Development Bank
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
DARD	Department of Agriculture and Rural Development
DoNRE	Department of Natural Resources and Environment
DPI	Department of Planning and Investment
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPRC	Environmental Protection and Research Center
HHs	Households
IEE	Initial Environmental Examination
LCPD	Liters per Capita per Day
LEP	Law on Environment Protection
MARD	Ministry of Agriculture and Rural Development
MASL	Meters above mean sea level
MOD	Meters over datum
MoLISA	Ministry of Labor, Invalids, & Social Assistance
MoNRE	Ministry of Natural Resources and Environment
MPN	Maximum Probable Number
NEA	National Environmental Agency
NF	Not found
NPPC	Nghe An People's Committee
NPV	Net Present Value
NRW	Non-Revenue Water
PAC	Poly-Aluminium Chloride
PMU	Project Management Unit
PPTA	Project Preparation Technical Assistance
SEA	Strategic Environmental Assessment
TDS	Total Dissolved Solids
THOAWASCO	Thai Hoa Town water supply one member Limited Company
TOR	Terms of Reference
TSS	Total Suspended Solids
UXO	Unexploded Ordnance
WS	Water Supply System
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

## **TABLE OF CONTENT**

I.	BACKGROUND .....	1
II.	POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK.....	2
III.	PROJECT DESCRIPTION .....	4
IV.	DESCRIPTION OF THE ENVIRONMENT .....	10
	A. Location, Climate and Geography .....	10
	B. Population and Land Use .....	12
	C. Surface Water Resources.....	12
	D. Existing Water Supply Source.....	13
	E. Water Demand .....	15
	F. Surface Water Quality .....	16
	G. Ecological conservation area .....	20
	A. Area of influence of the Project.....	21
	C. Design and Location Consideration .....	22
	D. Pre-construction activities.....	22
	E. Construction activities .....	22
VI.	INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION .....	32
VII.	GRIEVANCE REDRESS MECHANISMS (GRM) .....	33
VIII.	ENVIRONMENTAL MANAGEMENT PLAN .....	34
	A. Institutional Arrangement and Responsibilities .....	34
	B. Summary of Potential Impacts .....	36
	C. Mitigation Plan .....	37
	D. Environmental Monitoring Plan .....	51
	E. Budget.....	55
X.	CONCLUSION AND RECOMMENDATIONS .....	57

## **LIST OF TABLES**

Table 1: The main components of project .....	9
Table 2: Projected water demand divided by customers .....	15
Table 3: Quality of surface water in areas affected by project .....	17
Table 4: Samples of groundwater in location of expected WTP .....	19
Table 5: Trees Affected by the Project .....	20
Table 6: Vietnam Laws and Standards for Regulating Construction Impacts .....	27
Table 7: Mitigation of WTP Wastes .....	30
Table 8: Summary Matrix on Public Consultation .....	32
Table 9: Summary of Key Potential Impacts from IEE .....	36
Table 10: Environmental Impact Mitigation Plan .....	38
Table 11: Environmental Monitoring Plan.....	52
Table 12: Budget for EMP and Monitoring .....	55

## **LIST OF FIGURES**

Figure 1: PFR-3 Sub-project locations. ....	1
Figure 2: Administrative Divisions of Thai Hoa town.....	5
Figure 3: Location of Water Intake and Water Treatment Plant.....	6
Figure 5: Location of construction of raw-water pumping station.....	8
Figure 6: Location of construction of water treatment plant .....	8
Figure 6: Vertical sedimentation tank of Existing WTP .....	14
Figure 7: The auto filtering tank system of Existing WTP .....	14
Figure 8: Secondary pumping station of Existing WTP.....	14
Figure 9: Control cabinet for secondary pump station of Existing WTP .....	15
Figure 10: Existing WTP Administrative Building.....	15
Figure 11: Pictures of surface water of Hieu river at raw water PS.....	19
Figure 12: Current Land Use at Dong Hung WTP .....	30

## **LIST OF ANNEXES**

Annex 1: Overall Project Implementation Schedule .....	58
Annex 2: Analysis of environmental components testing.....	59
Annex 3: Minutes of public consultation .....	71
Annex 4: Some pictures of public consultation .....	75
Annex 5: Template for Safeguards Monitoring Report.....	77

## **EXECUTIVE SUMMARY**

### **Background and Scope**

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.

2. Nghe An People's Committee (NPPC) has approval on Thai Hoa water supply system expansion including construction of Dong Hung WTP with capacity of 6,000 m<sup>3</sup>/day serving eastern area and Nghia My industrial complex. The IEE covers construction of new WTP, transmission pipeline from WTP to boosting Pumping Station (PS) and distribution network.

### **Project Description**

3. Water demand of Thai Hoa is projected to reach 10,000 m<sup>3</sup>/day by 2020 and 16,000 m<sup>3</sup>/day by 2030. The existing Thai Hoa WTP has a capacity of only 4,000 m<sup>3</sup>/day and is serving the western area and the centre of the town. The main raw water resource is Hieu River surface water with a WTP locating near town's centre in Lien Thang block, Hoa Hieu ward. It is also the Surface water of Hieu river that has been selected to be raw water resource for project.

4. Flow rate of Hieu river section passing Thai Hoa town can ensure exploitation of water for domestic use with total capacity upon project's completion of 16,000 m<sup>3</sup>/day (by 2030). The exploitation of water doesn't make any negative impact on flow rate raise conflict nor raise any conflicts on water use at upstream and downstream of Hieu river.

5. By 2020, water use demand of the town reaches about 10,000 m<sup>3</sup>/day, so it is needed to construct Dong Hung WTP with an immediate capacity of 6,000 m<sup>3</sup>/day to increase serving capacity from existing 4,000 m<sup>3</sup>/day to 10,000 m<sup>3</sup>/day meeting projected demand. Dong Hung WTP will mainly serve eastern area and Nghia My industrial complex.

6. Currently, Thai Hoa WTP has an intake structure of 4,000 m<sup>3</sup>/day. Increase of the existing PS is impossible, so it is suggested to construct a new raw water PS for Dong Hung WTP with an immediate capacity of 6,000 m<sup>3</sup>/day to reach the 2020 demand of 10,000m<sup>3</sup>/day and an additional setup for the installations of another 6000 m<sup>3</sup>/day to prepare for the 2030 prevision. Location of raw water PS is near Hieu River bank in Lien Thang block, Hoa Hieu ward, about 20m away from previous raw water PS upwards upstream.

7. Construct a transmission pipeline working separately to lead raw water to Dong Hung WTP, use HDPE-PN12.5 pipe. The pipeline has diameter of D500mm, L= 5,500m, located along roads. New WTP is located on Dong Hung hill, Nghia My commune without residents living around. The nearest residential area is about 300m away from there. Raw water will flow from Hieu river through pipes to WTP and after treatment will flow to households (HHs) by gravity from the storage tanks.

8. The main water treatment process consists of 2 phases: (1) clarification, and (2) filtration and disinfection. Beside normal treatment clusters (receiving tank, reaction tank, settling tank, filtering tank and clean water tank), other constructions that will be located together with the WTP are the chemical house, Chlorine house, generator house,

warehouse, pumping station, and administration office. Chemicals to be used on a regular basis during operation are poly-aluminium chloride (PAC) for flocculation, soda for pH control, and chlorine for disinfection

9. Transmission, distribution pipeline includes: Plastic pipe HDPE PN10 for transmission pipe; and DN350 – L = 1,895m; DN300 – L = 610m; DN250 – L = 1,896m; DN200 – L = 7,790m; DN160 – L = 10,581m; DN110 – L = 11,415m for distribution pipeline. Construct 7,916 points to connect to HHs. Transmission pipeline and main pipeline is constructed underground of road. The branch pipeline will be constructed underground of walk side.

### **Impacts and Mitigation Measures**

10. The main benefit of the proposed project is decreased supply costs to consumers as a result of shifting from non-piped sources (i.e., shallow wells in the case of Thai Hoa) to a piped water system under THOAWASCO.

11. The Table below summarizes the potentially adverse environmental impacts of the project, mainly associated with construction works, and corresponding safeguards and mitigation measures.

**Table 1. Summary of environmental impacts, mitigation measurements and impact monitoring**

<b>Potentially Significant Impacts of the Project</b>	<b>Summary of Mitigation Measures and Safeguards</b>	<b>Verification and monitoring means</b>
Excavation work for the pipeline trenches will produce spoil; heaps of excavated soil beside the trench could obstruct community access, and erosion from spoil storage areas could silt up nearby streams and drains. Dry heaps could cause dust nuisance.	<p>Temporary heaps of excavated soil to be used to backfill the pipeline trench should not be left on the roadside for long periods, and should be watered regularly to prevent excessive dust.</p> <p>At excavation sites close to drains or streams, silt traps should be used to prevent excessive water turbidity.</p> <p>Storage or disposal areas for excess spoil should be sited so as not to be susceptible to flooding, and not located on steep slopes. Adequate drains/ditches should be installed around the area.</p> <p>Tender documents for construction should require provisions for proper handling and disposal of spoil. Soundness of measures should be part of selection criteria for contract awards.</p>	<p>Water quality sampling along the Hieu River (at 2 locations) adjoining the pipeline route to be monitored every 3 months throughout the duration of pipeline construction. Include 16 criteria parameters under National technical standard QCVN 08:2008/BTNMT for quality of surface waters.</p> <p>Groundwater quality to be monitored sampling in 2 locations every six years during project construction, including: 26 parameters based on Vietnamese Standard 9:2008/BTNMT for quality of underground water.</p> <p>Bidding documents, contractor plans and compliance reports on the temporary storage and disposal of spoils. Also, criteria used by the PMU procurement committee in contractor selection.</p> <p>Follow-up consultations and interviews with local residents, every 3 months during construction. (To be done after results of water and air sampling are completed.)</p>
Obstruction to traffic during construction, exacerbated by the	Excavation and transport equipment should be appropriately sized to fit the narrow road and limited work spaces.	Air quality to be monitored in 2 locations and every 3 months along the pipeline and WTP

Potentially Significant Impacts of the Project	Summary of Mitigation Measures and Safeguards	Verification and monitoring means
<p>narrow road and work spaces:</p> <ul style="list-style-type: none"> <li>Local residents could be cut off from the road due to the trench-building</li> <li>Increased traffic of dump trucks carrying spoils to and from storage areas</li> <li>Air pollution from excavation and transport equipment</li> <li>Traffic hazard to pedestrians, especially scholars and elderly</li> </ul>	<p>Impose speed limits.</p> <p>Durable wooden or steel plates/planks should be placed across open trenches and drainage ditches to provide temporary crossings.</p> <p>Check emissions from construction and transport equipment for compliance with standards, particularly for particulates.</p> <p>During dry weather, the construction transport route near residential areas should be sprayed with water to prevent excessive dust. Dump trucks loaded with dry earth should be covered.</p>	<p>construction route during construction; include 7 parameters based on Vietnamese Standard TCVN 5937:2005 for air quality.</p> <p>Bidding documents, contractor plans, and regulatory compliance reports.</p> <p>Criteria used by the PMU procurement committee in contractor selection.</p> <p>Follow-up consultations and interviews with local residents, every 3 months during construction.</p>
<p>Nuisance and public safety hazards caused by pipeline excavation and pipe-laying activities in urban areas</p>	<p>Work schedules should be well-planned and activities during rush hours near schools and markets should be minimized; construction and materials storage sites should be adequately lighted at night; open trenches must be fenced and clearly marked; and adequate sanitation facilities for workers should be provided at the major work sites.</p> <p>Contractors must avoid activities producing loud noise and vibration if night time construction work is necessary.</p> <p>Ensure compliance with existing Vietnamese regulations and standards for managing pollution, nuisance effects, and public safety hazards related to construction works.</p> <p>Tender documents to require contractor to specify safeguards and compliance measures, which will be considered in awarding contracts.</p>	<p>Bidding documents, contractor plans, and regulatory compliance reports.</p> <p>Criteria used by the PMU procurement committee in contractor selection.</p> <p>Follow-up consultations and interviews with local residents, every 3 months during construction.</p>
<p>Accidental detonation of unexploded ordnance (UXO) during pipeline excavations</p>	<p>Ensure that the pipeline excavation corridor is surveyed for unexploded ordnance prior to construction work.</p>	<p>PMU will supervise the UXO survey; if ordnance is detected, will be responsible for commissioning subsequent clearing work prior to construction.</p>
<p>Hazard posed by water treatment process chemicals during operation, of which Chlorine is the most hazardous</p>	<p>Clearly mark the chlorine storage house, storage containers, and associated process equipment, and keep Chlorine containers moisture-free and stored separately from other chemicals.</p> <p>Provide adequate personal protective equipment for workers handling chlorine. They should be trained on safe work practices and emergency steps in case of exposure. Adopt regular inspection and maintenance schedule for all chlorine storage and handling equipment.</p>	<p>Detailed design of the water treatment plant facilities, and operating rules for the handling of chemicals during commissioning and WTP operation.</p>
<p>Disposal of water treatment sludge and wastes from WTP operation</p>	<p>The recommended design feature of the WTP is construction of sludge sedimentation tank then collection of sludge. Sludge after that will be transferred</p>	<p>Detailed design of the water treatment facilities, construction plan, commissioning plan and</p>



Potentially Significant Impacts of the Project	Summary of Mitigation Measures and Safeguards	Verification and monitoring means
	and disposed to landfill.  Proper procedures (during plant commissioning) for the disposal of test water, water used for disinfecting tanks, and other chemical wastes from the plant operation process will be incorporated into the contract specifications during the testing and commissioning stage of the WTP.	report.
Operation phase: Urban wastewater discharged increased	Town authority has construction plan of Wastewater treatment plant, capacity of 5,000 m <sup>3</sup> /day located in Long Son ward, funded by WB. This work is in phase of detailed design, ensuring criteria for wastewater treatment plant.	Regularly monitor report on wastewater treatment with reference to QCVN 14:2008/BTNMT on quality of wastewater.

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

12. As regulation of Vietnamese law, to small-scale capacity under 50,000m<sup>3</sup>/day to work using raw water like Dong Hung WP, it is not necessary to conduct public consultation. However, consultation on option of construction of WTP, technology processes, water supply alternatives, etc. is essential as a part of actual survey in project preparation. With support of Environment and Natural Resource Engineering One member Co., Ltd and Pacific Ocean Engineering., JSC (PCO) public information and consultation activities were carried out as part of a baseline survey of local environmental conditions along the pipeline corridor and in the WTP plant site. A 3-person survey team conducted the survey and interviews with local residents, especially in Nghia My commune – location of Dong Hung WTP in October 2011 and August 2013 HHs near the pipeline route and WTP site, were covered. The community leaders were interviewed in greater depth for their views and concerns regarding the potential effects of the project on the community.

13. 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. However, respondents and group discussants main concerns were about: (a) dust, vehicle exhaust smoke, noise, and soil spilled on the road during transport of pipeline excavation materials; (b) wastes from construction and clogging of drains; and (c) worry about low quality water resource to supply to HHs as well as negative impacts on HHs assets.

14. 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 level 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. THOAWASCO will bear all administrative and legal cost arising in such complaint solving processes.

### Environmental Management Set-up

15. Institutional Arrangement: The project will be implemented under the Thai Hoa People's Committee as the Executing Agency and the THOAWASCO as the project implementing agency. A Project Management Unit (PMU) has been created to supervise the implementation, on behalf of THOAWASCO.

16. The PMU will be responsible for fulfilling the environmental requirements of the project, particularly for incorporating the mitigation measures and safeguards identified in this report in the detailed engineering design of the pipeline, WTP 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.

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

18. 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 DoNRE Environment Protection Center on regulatory compliance issues (for water quality in Hieu River 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 bi-annual status reports on environment and public safety protection to be submitted (through the PMU director) to the Thai Hoa town PC.

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

protection and monitoring of effluent, and the results will be reported to the Division of Environment and Natural Resources.

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

21. 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.

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

23. Budget. The monitoring budget covers: (a) survey on awareness and following consultation with local residents conducted by assigned unit of PMU - Environment and Natural Resource Engineering One member Co., Ltd to serve preparation of IEE; (b) monitoring quality of surface water, ground water and air during construction; (c) survey pipe ditches to check materials which can be dangerous to workers; (d) local environmental specialist supporting PMU (in preparing of TORs, air and water sample test evaluation, draft safeguards regulations combined in bidding document and construction contract, preparation of report of PMU) and (e) training for PMU's staff and community authorities on environmental impact management of construction of pipeline and related safeguard measurements (prepared by environmental specialist). The total estimated budget is \$50,000 that will be taken from the ADB loan partly under the PMU incremental cost and Construction Supervision Consultant.

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

**Project Implementation Schedule**

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

<b>Tasks</b>	<b>Tentative schedule</b>
FS preparation (Updated)	10/2013
Project approved by NAPPC	06/2014
Loan agreement negotiation and signing	11/2014
Establishment of PMU	Early 2015
Preparation of detailed design, cost estimate and bidding document, procurement and selection of bidder.	2nd Quarter 2015
Update EMP and conduct consultation with downstream communities;	3 <sup>rd</sup> Quarter 2015
Coordinate with the Environment Protection Center on regulatory compliance issues	All duration of the project
Construction duration (24 months)	Start Early 2016

**Conclusion and Recommendation**

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

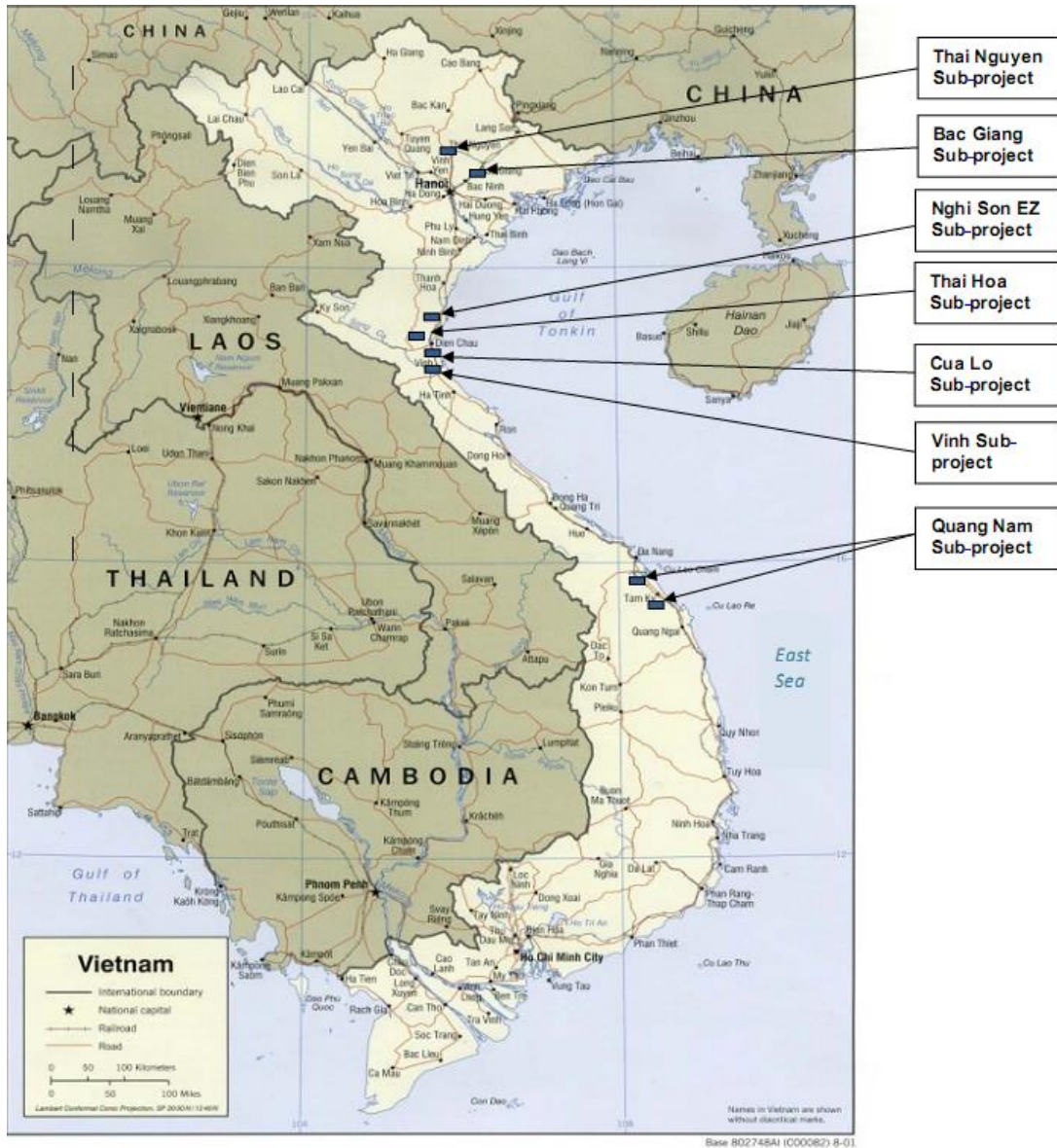
26. The potential adverse environmental impacts of the project are mainly the consequences of construction activities, in particular the potential impairment of water and air quality in areas near the pipeline construction corridor, and nuisance and safety hazards posed to nearby HHs and small businesses.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

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

28. 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.

## I. BACKGROUND

1. Thai Hoa town water supply project is part of the seven water supply subprojects<sup>1</sup> that formed the third Periodic Funding Request (PFR-3) of the Multi-tranche Financing Facility (MFF0054-VIE) for Support of the Water Sector in Viet Nam. The tranche finances 7 water companies for urban water supply, including one economic zone.



**Figure 1: PFR-3 Sub-project locations.**

2. This 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 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 sedimentation tank in the design of the water treatment facility.

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

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

4. 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.

## **II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK**

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

6. 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.

7. 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.

8. 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.

9. 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.

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

11. 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.

12. 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.

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

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

15. 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.

16. 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.

17. 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.

### **III. PROJECT DESCRIPTION**

18. Water demand in Thai Hoa is increasing, driven by the town's rapid development and population influx in recent years. The town is developing to become the city centre of Western Nghe An with priority on high-tech agriculture, exploiting and processing minerals, forestry, etc. Thai Hoa is a new urban community established from the division of Nghia Dan district.

19. Water demand is projected to reach 10,000 m<sup>3</sup>/day by 2020; 16,000 m<sup>3</sup>/day by 2030; including domestic water for residents and operation of Nghia My industrial complex of Thai Hoa town. The existing water treatment works has total capacity of 4,000 m<sup>3</sup>/day in Lien Thang block, Hoa Hieu ward, Thai Hoa town from surface water of Hieu river passing the town, meeting just 20% of residential water demand.

20. The proposed project includes:

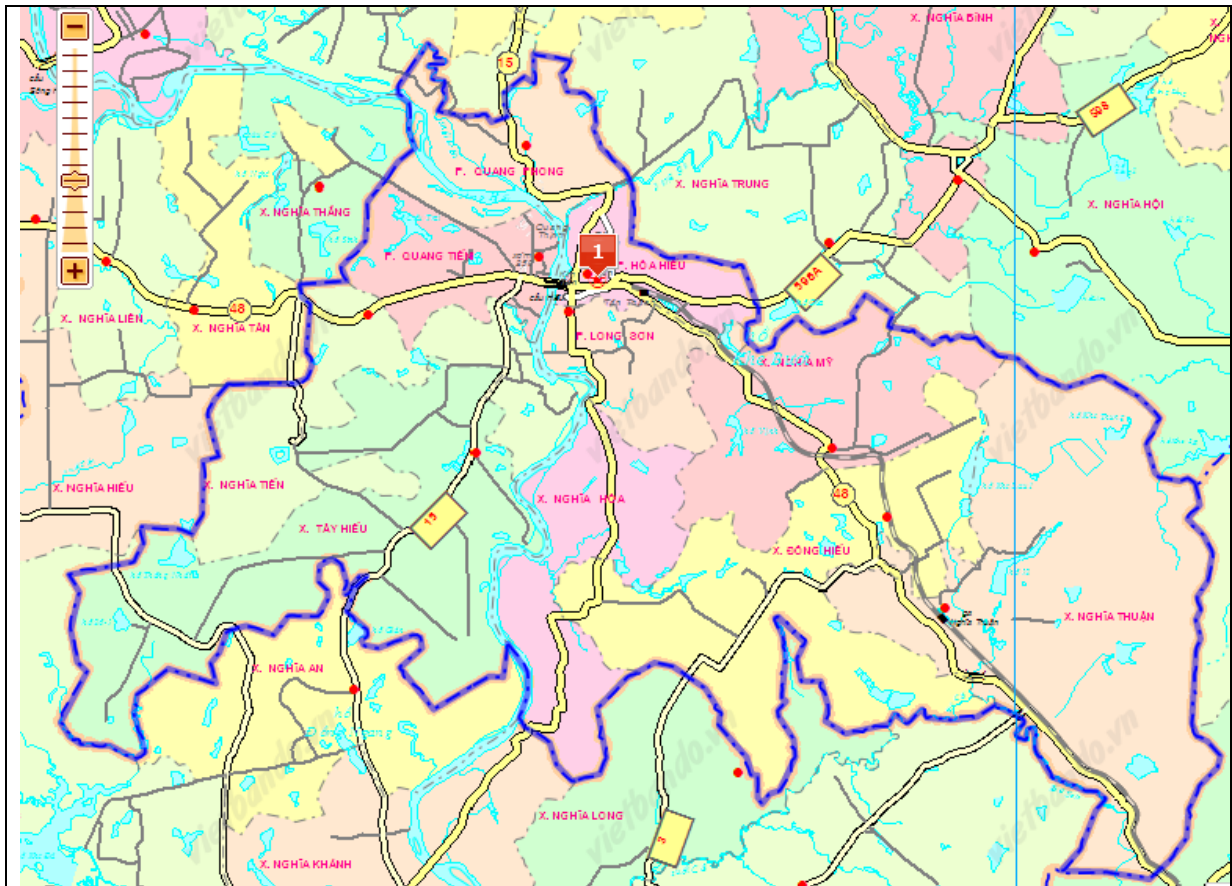
- Construction of a new intake from the Hieu River, pumping station and raw water pipeline D500 over 5.5 km
- Construction of new water treatment plant 6,000 m<sup>3</sup>/day
- Expansion of the distribution network by 32 km for pipes diameter D100 to D350, by 93 km for pipes D32 to D90 and about 7,500 connections.
- Support for the implementation and operation of the project
- The project will benefit about 12,500 households, including 7,500 poor households with piped water connection for the first time

21. The new water resource is exploited based on approval of DoNRE of Nghe An province. The surface water exploitation report is also prepared for analysis and evaluation of tanking water and impacts in current water flow rate.

22. Construction of Dong Hung WTP will contribute to reduce cost for water supply, especially in eastern area and Nghia My industrial complex. Raw water use material HDPE, flowing to Dong hung WTP has pipe D500mm, L=5,500m



23. The basic plan for the WTP is designed in the perspective of 2 phases: The first phase aims a production of 10,000 m<sup>3</sup>/day treated water which includes the 4,000 m<sup>3</sup>/day of the Thai Hoa WTP. The second phase, in 5 years, aims at supplementing 6,000 m<sup>3</sup>/day. However, due to economic reason and water demand of the town by 2020, the priority is put on the first phase (Construction of Dong Hung WTP, capacity of 6,000 m<sup>3</sup>/day. Therefore, the IEE will focus on the first phase as mentioned.



**Figure 2: Administrative Divisions of Thai Hoa town**



**Figure 3: Location of Water Intake and Water Treatment Plant**

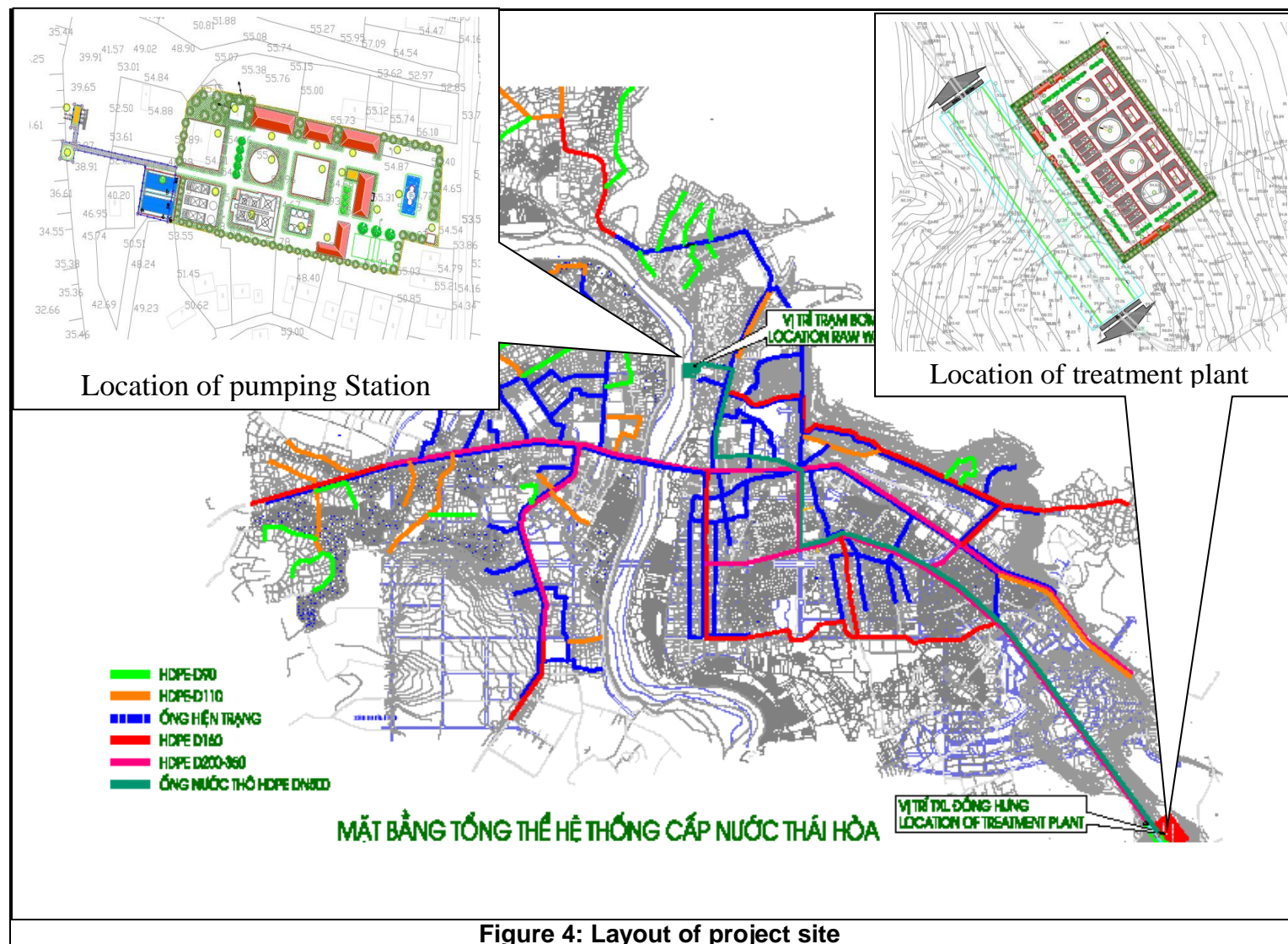


Figure 4: Layout of project site





**Figure 5: Location of construction of raw-water pumping station**



**Figure 6: Location of construction of water treatment plant**

24. Approach to site development of WTP is to establish the main facilities as high as possible in correlation with existing ground level of the network to benefit from the gravity. Such arrangement will reduce cost for pumping treated water to distribution network. Expansion of town's water supply system to meet demand of 10,000 m<sup>3</sup>/day (by 2020) will be done by the construction of a raw water PS with capacity of 12,000 m<sup>3</sup>/day and one more WTP on Dong Hung hill. The area required for the WTP build is about 2.3ha and entire agricultural land (long time tree) allocated for 5 HHs since 1996-1997 under management of Nghia My commune's PC. The development of this land is approved on detailed planning of Nghe An PPC.

25. Water treatment process basically consists of two stages: (1) settlement, and (2) filtration and disinfection. This process is expected to use multiple entry pipes for settlement stage as used in the existing work. After settling, it is expected to use rapid gravity filtering tank for the second stage with a sand layer (1m deep) and is equipped with normal wind-water wash.

26. Details for water treatment processes: Raw water (taken from the Hieu River) → intake structure → raw water pump station → Dong Hung WTP → static mixing device (raw water + alum) → mechanical mixing tank, lamellae settling tank → self-cleaning filtering tank → Disinfection (with chlorine) → clean water tank → consumption network (gravity flow).

27. The main water treatment process consists of 2 phases: (1) settlement and (2) filtering and disinfection. Beside normal treatment clusters (receiving tank, reaction tank, settling tank, filtering tank and clean water tank), other works will be located together with WTP are chemical house, Chlorine house, power generator, warehouse, PS and administration office. The chemicals to be often used during operation time are PAC (for flocculation), soda (for controlling pH) and chlorine (for disinfection). The main components of the WTP are summarized in table 1 and 2.

**Table 1: The main components of project**

<b>Item</b>	<b>Technical proposal</b>
Location	Thai Hoa town – Nghe An province
Intake structure – TB1	Construction of a new PS – intake structure with capacity of 12,000m <sup>3</sup> /day. Installing a cluster of pumps with capacity of 6,000m <sup>3</sup> /day and constructing waiting base plate for future capacity increasing to 12,000 m <sup>3</sup> /day
Raw water pipeline	Raw water pipeline flowing water to Dong Hung Water plant is calculated to meet capacity of 12,000 m <sup>3</sup> /day. Use plastic pipe HDPE-PN12.5, diameter D500mm, length L=5,500m
Dong Hung water plant	Dong Hung water plant has capacity of 6,000 m <sup>3</sup> /day. The technology process is as following: Raw water → Mixing tank + Mechanical reaction tank → Lamella sedimentation tank → Quick filter → Reservoir → Gravity flow to network.
Pipeline and connection network	Distribution network use HDPE PN10: <ul style="list-style-type: none"><li>- DN350 – L = 1,895m</li><li>- DN300 – L = 610m</li><li>- DN250 – L = 1,896m</li><li>- DN200 – L = 7,790m</li></ul>

Item	Technical proposal
	- DN160 – L = 10,581m - DN110 – L = 11,415m Service network use HDPE PN8: - D90 - L = 10,679m - D63 - L = 32,738m - D50 - L = 20,905m - D32 - L = 42,398m
House connection	7916 households.

28. Water distribution work will entail the construction of water transmission pipeline and branch pipeline from water treatment plant to new service areas and expanded area, including construction of distribution lines in the service area. Network diagram shall conform with the general plan for the development of Thai Hoa expected to 2025. The network is designed in accordance with the land use proposed in the master plan of the town, and the expected water demand of each sub-region. The layout of the water pipelines are located along the main road network in the overall planning of urban space. The existing pipelines will be retained and incorporated into the new network as much as possible.

29. Transmission and main water distribution pipelines will be built beneath the road, or under the pavement of the sidewalk if enough width. Smaller branch pipeline will be built under the road surface, unless the space is limited. In case the pipe will be placed under the roadway, the distribution and service pipes (diameter less than 150 mm) shall be placed under the sidewalk.

30. The distribution system is planned synchronously as a single network combining all outputs from all WTPs in town and in integrating the current network with expansion network to suit the expected capacity of the whole system in 2020. The layout of the main pipes is shown in *Figure 2: Layout of project site above*.

31. 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.

32. General project schedule is presented in Annex 1.

#### **IV. DESCRIPTION OF THE ENVIRONMENT**

##### **A. Location, Climate and Geography**

33. Thai Hoa is established by Decision No. 164/2007/NĐ-CP dated November 15, 2007 of GoV based on division of Thai Hoa town and 7 communes: Nghia Quang, Nghia Hoa, Nghia Tien, Nghia My, Tay Hieu, Dong Hieu, Nghia Thuan of Nghia Dan district with area of about 135 km<sup>2</sup> and population by end of 2012 of 61,136. Thai Hoa town is located in north-western of Nghe An on coordinates of 19°13' – 19°33' north latitude and 105°18' – 105°35' east longitude, about 50km from Vinh city to the west, bordering Nghia Dan district to the south and west, Quynh Luu district to the east.

34. Thai Hoa is a mountainous area with quite complex terrain and divided by Hieu River, including some low hills, deep lying space and valleys interspersed between hillsides with

average height of +40m to +70m. The terrain consist mainly of mid-level mountainous terrain accounting for about 60% of the total area, the valley occupy about 30% of the space and high hills represent about 10%. The Thai Hoa territory possesses relatively flat land providing large acreage and relatively favourable condition for agricultural development. Alpine terrain: the southwest in Nghia Tien commune from +57 m to +74.3m and a part of Hoa Hieu ward from +58 m to +91.6 m, with slopes between 20% and 30%. Sloping terrain: west of Hieu River area altitude from +45.4m to +52.6m, with slope less than 10% and the East of Hieu River with height from +41.7m to + 54.1m; riverine topography: altitude from +34.3m to +41m, this is usually flooded area.

35. Flooding. Nghe An province is affected by flooding due to Hieu River being the largest tributary on the left side of the Ca River. The catchment area of the Hieu River is 5 340 km<sup>2</sup> , its length is 228 km, originates from Pu Hoat 9-Range in the Laos-Vietnam boundary, flows into the Ca River at Anh Son Floods threaten frequently also the Ca river. In 2007 a series of five floods occurred in only one month period causing huge damage on both people and properties in the central districts of Nghe An province in the Ca River basin; also in October 2010 about 50 casualties and widespread inundation occurred in the same area.

36. Located in the tropical monsoon climate, Thai Hoa town is influenced by climate characteristic of the western mountains, directly affected by dry and hot drought inducing weather southwest monsoon (from April to August) affecting the production and life of residents and cold, wet northeast monsoon characterized by high humidity and high rainfall. (from November to following March). The annual average temperature is high from 23°-25°C, the total average annual temperature: 8,503° C. The average temperature of 23.7°C. Supreme Absolute Temperature: 42°C. Absolute low temperature: 6°C. (number of days in the winter-spring season with temperature <15°C is 30 days).

37. Expected climate change impacts in the Center of Vietnam include increased in frequency and/or intensity of tropical cyclones; increased rainfall and run-off; an expansion in flooded areas and a rise in annual flood levels. Although the intergovernmental panel for climate change (IPCC) does not forecast any great changes in the timespan of the project (2015-2030) but more in the years 2060 to 2090, punctual events due to climate change, notably recurrent flashfloods could affect the infrastructures and notably the water intake pipe in the Hieu river and the banks where the pipeline connect could suffer from increased erosion. As such, climate change impacts will be considered during design. Also, drought events aggravated by climate change could also occur during the same period. This could cause 2 potential risks: decrease of water quantity and quality and misuse of treated water. The question of the quantity and quality will be resolved by the location of the intake pipe in the river channel and an adjustment of the treatment at the WTP. The second issue, if it happens, will probably auto regulate itself with the water being charge to the user.

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

39. 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).

40. 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.

41. 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 Vinh.

## **B. Population and Land Use**

42. Total population of Thai Hoa town by end of 2012 was 61,139 people and the average density distribution of approximately 500 people/km<sup>2</sup>. The number of ethnic minority's persons is 6,000, including Thanh, Thai, Tho people, accounting for 8.5% of the total population. Number of people in working age labour is 30,750 people and the ratio of trained workers (including short-term and long-term) accounted for 50% of total employment and the ratio of non-agricultural labour accounted for 35% of total employment. According to the results of socio-economic survey of PCO consultant, out of 100 surveyed HHs, 31% has incomes mostly from employees/workers, then followed by free sales/trading at 28% and 11% of HHs from state employment. On a lower scale, HHs income based on home business is 6%, teaching is 4%, small business owners account for 3% and big business owners for 2%, ,

43. With above considerations, rate of future population is evaluated in more practical growth at 2.5%/year. The population without permanent registration are almost students and immigrating residents who are already included in most recent population project. Based on that, the population is expected to be 80,000 people by 2030.

44. The population is most concentrated in the wards of Hoa Hieu, Quang Tien and Nghia Thuan commune, with populations of about 10,000 peoples for each ward.

45. Regard to regional raw water pump station construction, population density, sparse areas of land by air traffic Hieu river and close to the area of plant water status quo of town and away (about 200 - 500m) compared with the nearest Lien Thang and Quyet Thang residential areas.

46. Regard to regional treatment plant construction, as it is hilly land farming should be in and around within a radius of 100 – 500m depending on the adjacent side will not be inhabited. This position is quite favorable during the construction and operation of water treatment plant of the project.

47. Cultural sites. No specific cultural site is located in the project area. Although chance finds are not impossible, they are very unlikely. If the situation presents itself, expert will be required on site before any further work be continued at this location.

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

## **C. Surface Water Resources**

49. The town main river is Hieu River which is a large river and also the current raw water source of the WTP, as well as the expected source for the future WTP project. Hieu River is a primary tributary of the Ca River (Lam River), deriving from the Phu Hoat mountain (2,452m high) in Nghe An province, flowing towards northwest - southeast, to Nghia Dan change flow towards northwest - southwest and down on the left bank of the Ca river in Dao Giang, Dinh Son commune, Anh Son district. Hieu river basin area is 5,340 km<sup>2</sup>, an average slope of 13%; stream network reaches 0.71 km/km<sup>2</sup>.



50. Hieu River has two main branches, namely: Con River: secondary branch flowing to Hieu River, originates from Ho mountain in Quy Hop district and enter the river in Nghia Hung commune. Total basin area is 1,530 km<sup>2</sup>, the length of the river is 72 km. The river flows through the Quy Hop district with 50km length and flows through Nghia Dan district with 22km length. In addition, Hieu River has following tributaries: (i) Sao River: 160 km<sup>2</sup> basin, 34km long, (ii) Cai ravine: length 23km, (iii) Ang ravine: length 23km, (iv) Deu ravine: Length 16km. Being narrow and deep, all those ravine present a similar morphology. Beside Hieu river there are some small streams, small ponds in the area project area but not of significant importance.

51. Groundwater resources of Thai Hoa are generally scarce. There is not any document that formally evaluate groundwater resource of the town, but the available information on site shows that groundwater is quite deep (8-15m) and contains much of extraneous matter, thus ability of exploiting this resource for domestic and production demand is risky. This means, in order to take groundwater resource serving project, it would require an official survey and assessment on its quality and volume.

#### **D. Existing Water Supply Source**

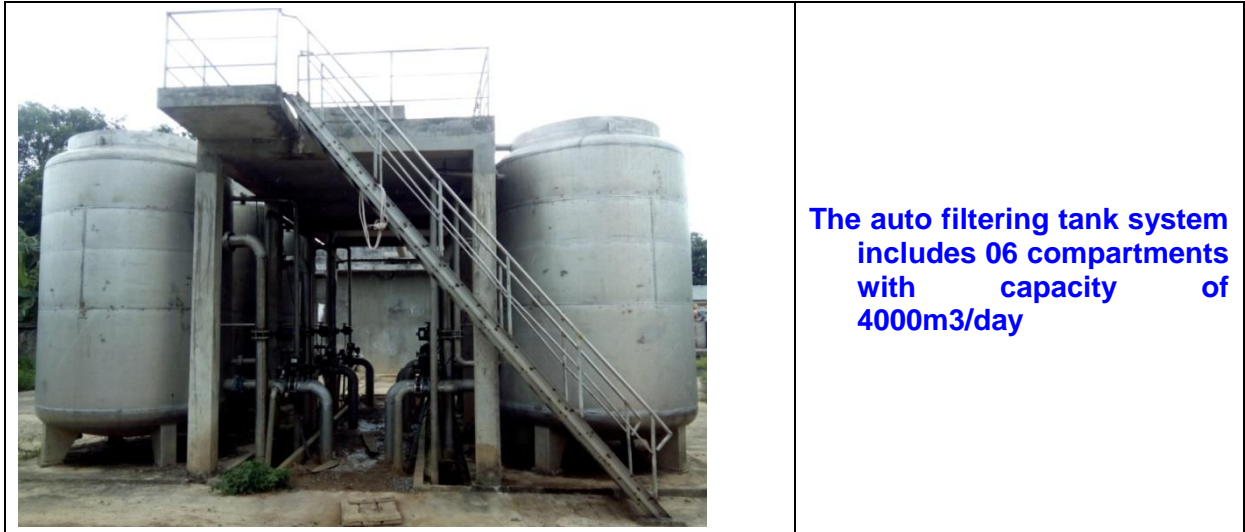
52. The existing water supply system of the town has capacity of 4,000 m<sup>3</sup>/day with raw water of Hieu River, using treatment process as follows: Raw water intake structure and PS 1 -> Mixing tank -> Vertical clarification -> Quick filtration -> Clean water tank -> PS 2 -> Network. The PS 1 is constructed near Hieu riverbank in Quyet Thang block, Hoa Hieu ward, away about 100m towards Hieu bridge. The treatment cluster consists of: (i) Mixing tank: Baffled reactor, (ii) Vertical clarification: 4 chambers, size of each chamber 3x4.3m, height 6.3m, (iii) Clean water tank: rounded, volume 5000m<sup>3</sup>, (iv) quick filtration: 3 chambers, size 3x3m, height 3.5m, (v) Secondary PS: arrange 3 pumps, 2 on duty, 1 standby, (vi) Pipeline network: Cast iron pipe, from 100mm to 300mm, L=8500m, including Ø100mm: 2100m; Ø150mm: 1750m; Ø200mm: 3150m; Ø250mm: 200m; Ø300mm: 1200m.

53. Only HHs and building along the main roads are supplied directly by pipe Ø50mm or Ø32mm. However, that water only meets about 20%-30% demand of residents of town. Many areas of the town are lacking the services of WTP. Especially in dry season, drilled well and dug wells waters are degraded in term of quality and are sometimes unusable. The HH's living on high hills have to go very far to collect water for their basic needs.

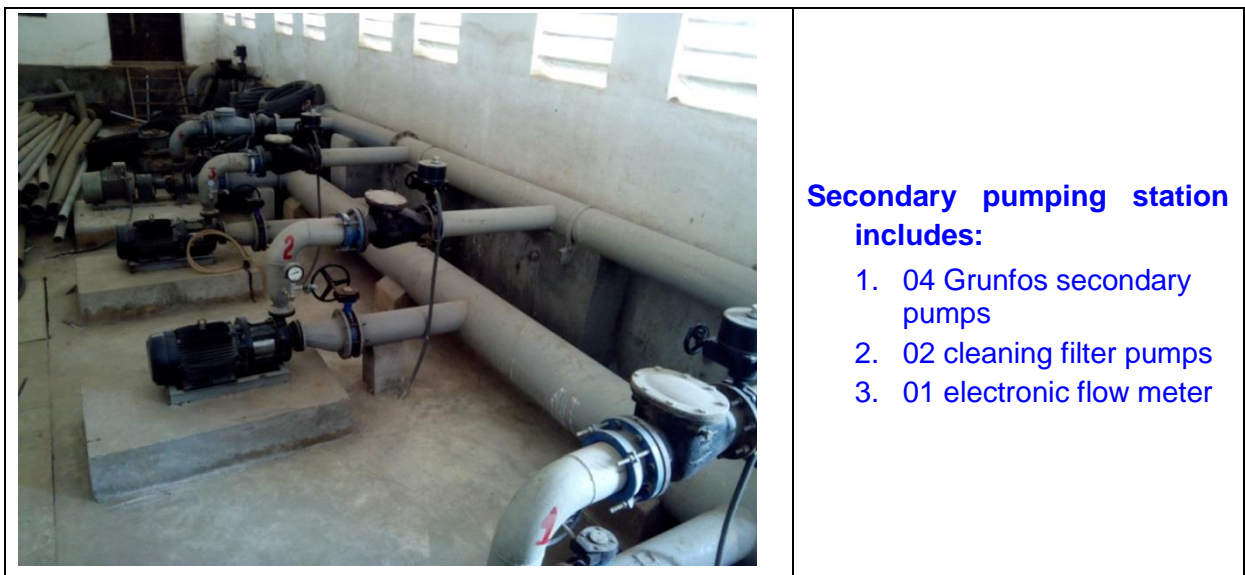


**Vertical sedimentation tank including 06 compartments with capacity of 4000m<sup>3</sup>/day.**

**Figure 7: Vertical sedimentation tank of Existing WTP**



**Figure 8: The auto filtering tank system of Existing WTP**



**Figure 9: Secondary pumping station of Existing WTP**



**Control cabinet for secondary pump station.**

**Figure 10: Control cabinet for secondary pump station of Existing WTP**



**Figure 11: Existing WTP Administrative Building**

## **E. Water Demand**

54. Water demand is detailed calculated in project preparation phase, the result is summarized as follows:

**Table 2: Projected water demand divided by customers**

No.	Content	Unit	Year 2020	Year 2030
<b>I</b>	<b>Total population served water</b>			
1	Inner town (wards)	person	28.810	31.825
2	Outer town (communes)	person	11.551	30.252
3	Total	person	40.362	62.077

No.	Content	Unit	Year 2020	Year 2030
<b>II</b>	<b>Water supply criteria</b>			
1	Domestic water supply			
	Inner town	lit/per./day	100	120
	Outer town	lit/per./day	80	100
2	Public water (Qsh)	m3/day	5%	5%
3	Commercial water (Qsh)	m3/day	10%	10%
4	Industrial complex	m3/ha	22	22
<b>III</b>	<b>Water use demand</b>			
<b>1</b>	<b>For domestic demand (Qsh)</b>	<b>m3/day</b>	<b>3.805</b>	<b>6.844</b>
	<i>Inner town</i>	m3/day	2.881	3.819
	<i>Outer town</i>	m3/day	924	3.025
2	Public demand	m3/day	390	592
	<i>General hospital of western Nghe An</i>	m3/day	200	250
	<i>Other public utilities (5%Qsh)</i>	m3/day	190	342
3	Services and commercial demand	m3/day	381	684
4	Water for production of Nghia My industrial complex	m3/day	770	770
5	Water sold to TH True milk Factory	m3/day	1.000	1.000
<b>7</b>	<b>Total average water demand (Qtt)</b>	<b>m3/day</b>	<b>6.346</b>	<b>9.891</b>
8	NRW (15%Qtt)	m3/day	952	1.484
9	Water for the plant itself (5%Qtt)	m3/day	365	910
<b>10</b>	<b>Total average daily water (Qtb)</b>	<b>m3/day</b>	<b>7.663</b>	<b>12.284</b>
11	Max daily water use coefficient - Kday max =		1,30	1,30
<b>12</b>	<b>Day capacity max - Qmax - rounded</b>	<b>m3/day</b>	<b>10.000</b>	<b>16.000</b>

55. Current water resources in the project cannot meet the demand for water, not only to achieve 20% - 30% of demand. Expected by 2020, 78% of water demand of the total population in Thai Hoa town will be met.

## **F. Surface Water Quality**

56. Analysis of river water quality at three locations (2 locations of Hieu river and 1 location for surface water reservoir that may be affected by the project) have the following parameters: Comparison with the maximum limit of QCVN 08:2008/BTNMT – column A2 - national technical Regulation on surface quality: Most targets are within the permissible limits specified in national technical regulation on surface water quality. Experimental results show the following data:

57. pH concentration: The pH of the water is related to the presence of a number of metals and gases dissolved in water. Currently, water resource has a favourable pH for the treatment process if using chemicals such as PAC.

58. Biochemical oxygen demand and chemical oxygen demand - the typical results of reduction level of oxygen in water are lower than the permissible limits. The BOD5 and COD are a main evaluation to preliminarily assessing the degree of contamination of a water source by measuring the amount of oxygen required for oxidation of organic matter in the water. The higher the results of oxidation, the more organic matter the water contains. When the results has an oxidation >10 mg/l, such water should not be used).

59. Metals: (Fe, Mn, Cr, Fe...) The metal results are within the permissible limits.

60. Organics: (NH<sub>4</sub><sup>+</sup> , grease, etc.) The organic are within the permissible limits.

61. Bacteria: Although many bacteria exist, the Coliform bacteria are the one measure in this case. Those type of bacteria form in the intestinal tract and are release in the environment through faecal matter from animal and human origin. The presence of E. Coli is the most problematic because its impacts are more dangerous than the others. The Hieu river has a coliform index ranging between 3400 and 3600 MPN/100ml which is below the limit levels.

62. As part of the baseline environment survey conducted under the PPTA, water samples were also collected from the vicinity of the pipeline construction and the site for the water treatment plant at Dong Hung. The samples are analysed by Environment and Natural Resource Engineering One member Co., Ltd, the results are shown below, along with the water quality standards set under QCVN 08:2008/BTNMT.

**Table 3: Quality of surface water in areas affected by project**

Parameter	Unit	Result						QCVN 08:2008/ BTNMT
		M1	M2	M3	M4	M5	M6	
Temperature	°C	20,6	22,7	21,0	23,8	20,7	23,8	-
pH	-	7,1	7,0	6,9	7,0	6,8	6,9	5,5-9
Turbidity	NTU	12	16	19	10	10	12	-
Conductivity	mS/s	0,8	0,9	1,1	1,2	0,6	0,8	-
TSS	mg/l	64,9	67,2	63,2	61,9	17,8	16,7	50
DO	mg/l	4,2	3,8	3,5	3,7	3,6	4,1	≥4
COD	mg/l	12,6	14,1	13,5	14,8	16,9	17,4	30
BOD5	mg/l	5,6	6,1	5,3	5,4	10,6	9,5	15
NH <sub>4</sub> <sup>+</sup> -N	mg/l	1,25	1,41	0,97	1,02	1,47	1,46	2,5
CN <sup>-</sup>	mg/l	NF	NF	NF	NF	NF	NF	0,02
Cu	mg/l	0,0170	0,0131	0,0098	0,0110	0,0128	0,0119	0,5
Pb	mg/l	0,0083	0,0085	0,0125	0,0110	0,0091	0,0095	0,05
Zn	mg/l	0,125	0,130	0,198	0,113	0,132	0,164	1,5
Fe	mg/l	0,98	0,95	1,24	1,35	0,72	0,80	1,5
Hg	mg/l	NF	NF	NF	NF	NF	NF	0,001
As	mg/l	0,0015	0,0011	0,0009	0,0009	0,0011	0,0012	0,05
Cd	mg/l	0,0009	0,0012	0,0024	0,0020	0,011	0,0015	0,01



**Document : Initial Environmental Examination Report***MFF0054-VIE: PFR3 – Thai Hoa Water Supply Subproject – Thai Hoa Town, Nghe An province*

Cr <sup>6+</sup>	mg/l	0,0013	0,0010	0,0009	0,0012	0,0008	0,0010	0,04
E. Coli	mg/l	32	30	25	24	28	29	100
Oil	MPN/100ml	0,003	0,004	0,006	0,006	0,003	0,003	0,1
Coliform	MPN/100ml	3.550	3.600	3.500	3.400	2.450	2.600	7.500

Results tables dated September 25<sup>th</sup>, 2012 are presented in appendix 2 at the end of this document.

**Figure 12: Pictures of surface water of Hieu River at raw water PS**



*Surface water of Hieu River in expected location for raw water PS*



*The existing raw water PS*



*The existing of location for new WTP construction on Dong Hung hill*



*The existing of the road lead to new WTP construction on Dong Hung hill*

63. For groundwater in the project area, the samples are not contaminated.

**Table 4: Samples of groundwater in location of expected WTP**

No.	Parameter	Unit	Analysis method	Result		QCVN 08:2008/ BTNMT
				N1	N2	
1	pH	-	Quick measure	6,8	6,8	5,5-8,5
2	Conductivity	mS/cm	Quick measure	0,6	0,3	-
3	DO	mg/l	Quick measure	1,5	0,8	-
4	Turbidity	NTU	Quick measure	3	1	-
5	Hardness (CaCO <sub>3</sub> )	mg/l	TCVN 2672-78	123	108	500
6	COD	mg/l	TCVN 6491-1999	3,1	2,9	4
7	TSS	mg/l	TCVN 6625-2000	89,3	76,1	1.500
8	Cd	mg/l	TCVN 6193:1996	0,0004	0,0003	0,005

No.	Parameter	Unit	Analysis method	Result		QCVN 08:2008/ BTNMT
				N1	N2	
9	Pb	mg/l	TCVN 6193:1996	0,0025	0,0039	<b>0,01</b>
10	Zn	mg/l	TCVN 6193:1996	0,009	0,018	<b>0,5</b>
11	Mn	mg/l	TCVN 6002:1995	0,098	0,054	<b>0,001</b>
12	As	mg/l	TCVN 6182:1996	NF	NF	<b>0,05</b>
13	Fe	mg/l	TCVN 6177:1996	0,48	0,34	<b>5</b>
14	Hg	mg/l	TCVN 5991:1995	NF	NF	<b>0,001</b>
15	Coliform	MPN/100ml	TCVN 6187-1-1996	1	2	<b>3</b>
16	E.coli	MPN/100ml	TCVN 6187-1-1996	ND	ND	<b>ND</b>

ND: Not detected

Results tables dated September 25<sup>th</sup>, 2012 are presented in appendix 2 at the end of this document.

### G. Ecological conservation area

64. Ecosystems at regional raw water pump station construction is mainly shrubs and Chinaberry, Eucalyptus, ... The scope of construction land is land categories are not coastal Hieu river and managed by Hoa Hieu ward People's Committee.

65. Ecosystems in the region to build water treatment plant is industrial ecology alternating tree crops such as coffee, rubber, wood, ... The scope of building land this category is construction contracting with farm land from the years 1996 to 1997. The volume of crop will be affected by the project as follows:

**Table 5: Trees Affected by the Project**

No.	Long-living tree	Unit	Quantity	Remarks
1	<i>Rubber</i>	tree	840	3 years old (height of 3m)
2	<i>Longan</i>	tree	30	Harvested, 5 years old, 8m high
3	<i>Chinaberry</i>	tree	255	5m high, diameter > 5cm
4	<i>Eucalyptus</i>	tree	8.820	For timber, stump diameter: 5 - 10cm
5	<i>Chukrasia tabularis</i>	tree	255	stump diameter from 10 - 20cm
6	<i>Lemon</i>	tree	300	Not yet harvested but not removable 0.3m high
	<i>Total</i>		10,500	

66. The project does not affect any ecological conservation areas in the region. The existing nature conservation area is the Western Nghe An biosphere reserve is an area profoundly influenced by a northeast and southwest monsoon. The topography of the Annamite Range influences circulation of the atmosphere, which creates large climatic differences in this region.

67. The Biosphere Reserve has area of about 1,303,285 ha, being the largest biosphere reserve in South-East Asia. Covering nine mountainous districts including Con Cuông, Anh



Sơn, Tương Dương, Quế Phong, Quỳnh Châu, Quỳnh Hợp, Thanh Chương and Tân Kỳ, its core consists of three nationally protected areas: the Pù Mát National Park,[3] the Pu Huong Nature Reserve, and the Pu Hoat Nature Reserve (Wikipedia 2014). The Pu Huong and Pu Hoat, both areas outside the Thai Hoa Subproject are the closest location.

68. Pu Huong nature conservation area is established by Decision No. 194/CT dated 09/8/1986 of Prime Minister. On 23/10/1997, plan of establishment of this reservation area with total area 50,075ha was approved by Nghe An PPC by Decision No. 4296/QĐ-UB (PMU of Pu Luong nature reservation area, 2003), by Decision No. 2452/QĐ-UB, buffer area is 110,880 ha (PMU of Pu Huong nature reservation area, 2003). Pu Huong nature reservation area is located in western of Nghe An province, belongs to Que Phong, Quy Chau, Quy Hop, Tuong Duong and Con Cuong district, 30km away Annamite Range and divided by Ca River in the north. The terrain here consists of steep and rugged hills. Elevation in the area ranges from 200-1,447 m. The general topography is commonly structured by the mountains running northwest – southeast mountains, forming the boundary Que Phong, Quy Chau, Quy Hop towards northeast and Con Cuong and Tuong Duong district towards southwest. The highest peak is 1,447 m high Phu Lon located at the northwest end. The mountains form the watershed of the Hieu River in northern and Ca River in southern. Hieu river comes into Ca river in the southern of province of Nghe An makes the basin of Vietnam's fourth largest river.

69. Pu Hoat nature reservation area is proposed to construct by Forest Inventory and Planning Institute with total area of about 67,934 ha, in which strictly protected area of 56,837 ha and Ecosystem restoration area of 11,097 ha has been approved by Ministry of Agriculture and rural development. The Restoration forest is under management of Forest Protection Department of Que Phong district. Pu Hoat is on the list of protected areas of Vietnam since 2010 with an area of 67,934 ha and belongs to 6 communes: Thong Thu, Dong Van, Tien Phong, Hanh Dich, Nam Giai and Tri Le of Que Phong district (northern district of Nghe An province). Elevation of the reservation area is from 800-1,400m, the highest peak is 2,452m. The eastern valley along the river out of reservation area is only in height of 100m. The terrain here is typical of rugged mountains interspersed with steep sloped valleys. The southernmost of the area is Ca River basin, the largest remaining area belongs to Chu River. Most of the river system is frequently full of water although there are large seasonal fluctuations. This variation with steep rugged terrain is complex restrictions for rice cultivation by local people.

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

### **A. Area of influence of the Project**

149. 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. It includes the following wards and communes of Thai Hoa town: Quang Phong, Hoà Hiếu, Quang Tiến and Long Sơn wards; Tây Hiếu, Nghĩa Mỹ, Nghĩa Thuận, Đông Hiếu, Nghĩa Tiến and Nghĩa Hoà communes.

### **B. Expected Benefits**

70. Overall, the benefits of the project are significant in terms of meeting projected growth in water demand and shifting household water supply from non-piped to piped sources. Based on the PPTA economic analysis, the full cost to residents of non-piped water is greater than the cost of piped supply. The PPTA household survey results revealed that the average household in Thai Hoa consumes about 100 liters /day from THOAWASCO piped

water system, and an additional 40 lpcd from non-piped sources. The total compares reasonably with the survey data on water consumption of HHs not connected to, i.e. 140 liters/day.

71. In Thai Hoa, almost all non-piped water consumption is well water which needs to be pumped, and filtered or boiled first for drinking use. Because of rapid urbanization and expansion of industries, the risk of contamination to shallow water wells could rise.

72. The main benefit of the proposed project is decreased supply costs to consumers as a result of shifting from non-piped sources (i.e. shallow wells in the case of Thai Hoa) to a piped water system under THOAWASCO. Projects will bring the socio-economic benefits to Thai Hoa town, contributing to raising living standards and living conditions of the people in the project area, reducing raw water borne illnesses and contributing to attracting investors to Thai Hoa.

73. The discussion that follows focuses on a number of potential adverse environmental impacts of the project - mainly associated with construction works--and corresponding options, safeguards and mitigation measures. The assessment is presented in three sections: (a) raw water pipeline from the pumping station on the Hieu river bank to Dong Hung WTP and (b) water distribution system. For each section, the discussion of impacts and mitigation measures is presented with regard to project construction and operation phases.

### **C. Design and Location Consideration**

74. Location of the water intake and of the WTP has been chosen due to its low impacts on human activities.

75. Location and elevation of the pumping station and of the WTP were selected based on hydrologic data, flood data in the past 20 years to ensure that it's not affected by climate change and natural disasters in the future.

76. Climate change impacts will be further considered during detailed design. If necessary, proposed adaptation measures will be identified and included in the detailed design (i.e. increase of road elevation, increase of drainage pipe diameter to accommodate more extreme flooding; etc.).

### **D. Pre-construction activities**

77. Since excavation related infrastructure development is one of the main causes of the sudden explosion of UXO in Vietnam, and habits of pipe installation roadwork closed to densely populated areas, is the need to be vigilant to ensure that the pipeline construction area was surveyed for the presence of unexploded ordnance before the excavation take place. 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 perform any civil work. (A budget for the pre-construction survey is provided in the environmental management plan).

### **E. Construction activities**

78. The environmental impacts associated with construction activities, especially for the raw water pipeline and water plants is largely influenced by the location and nature of the construction work, especially digging pipe ditches. The corridor available for the raw water

pipeline is limited geographically by the space along the route that passes through a narrow area. The pipe is usually buried along the local roads.

79. The roadside for pipe ditches is where people live, and the settlement becomes dense when approaching land of pipeline water plant. Thus, excavation activities will occur close to where people live and will cause interruption of services or displacement as well as the kind of nuisance effects, including the improper storage of excavated soil may reduce water quality in nearby rivers. Because construction space is very narrow, plan of laying pipe under road to avoid damage or displacement of adjacent residential building is not feasible. Blocking traffic to lay pipe under the road would be extremely disruptive to the local community. Existing raw water pipeline along roads is shown in Figure 2. The Master plan project.

80. The land disturbance could be mitigated by placing the pipeline under the existing roadbed. However, this is not feasible because the road width is narrow (only 3-4 m wide); excavating the road would completely cut off the traffic in the area. In any case, the road needs to remain unobstructed to provide space for access to the trench excavation works and for the movement of equipment and construction material.

81. Laying pipelines of the size specified for the project would typically require an easement of up to 15 meters wide in order to provide enough space for movement, pipe trench excavation, and temporary storage of excavated materials. However, such a width is not available for considerable lengths of the pipeline route where the distance between the road and the bordering hillside, or between the road and the adjacent houses and establishments, is less than 5 meters. As such, the excavation and handling of excavated material, in particular, need to be properly managed to prevent obstruction to paths or alleys used by the community, silting up of drains from eroding piles of excavated soil, and creating nuisance caused by dust from dry mounds and movement of dump trucks.

82. The trench excavations in some really narrow areas of Thai Hoa have a potential to block all passages from vehicle and restrain the passage for pedestrian. If a close alternate route is not possible, an escort at fixed times should be provided to pedestrian through the work site. Those times would need to be posted so the work could plan with those hours in mind.

83. In the narrow areas, the blockage could require the rerouting of emergency units (fire department, police, and ambulance). Considering the type of emergency, time could be critical and a delay could be life threatening. As such, worksite planning should be provided to the different emergency units so they can planned in advance their route or optimized alternate route should be provided for them.

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

85. A large fraction of the excavated material will be used to backfill the trench after the pipes are laid. As such it is not expected that an excessive amount of spoils from the pipeline construction will need to be disposed. In any case, the final disposal areas for the excess

spoils should be carefully sited so that these are not vulnerable to flooding, and are located on stable slopes to prevent slumping. If possible, the disposal areas should be covered by topsoil and re-vegetated. Around the disposal areas, adequate drains should be installed. The excavation spoils should be treated as a resource and their possible beneficial uses maximized-for instance, as base material if suitable for raising road-top levels in flood-prone sections and for filling in of areas being developed for settlement use

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

87. Because of the narrow road width, and the crowded conditions in some sections of the pipe route, the impact on local traffic could be significant. As it may not be possible in the narrow sections to store the excavated earth on the road itself without blocking traffic, the material would have to be transported to a designated storage site first and, when needed to back fill the trench, would be transported back to the work site. As such, there could be frequent movement of trucks transporting earth material along the road.

88. In view of nearby residential areas, nuisance impacts from earth hauling activities such as noise, exhaust fumes and dust need to be mitigated. Dump trucks carrying spoils should be cleaned regularly, and exhaust emissions checked for compliance with standards, particularly for particulates.

89. To minimize construction impacts overall, work schedules should be well-planned and activities during rush hours near schools and markets should be minimized. Construction and transport equipment used should be of appropriate sizes to fit the limited work spaces; durable wooden or steel plates should be used across trenches and drainage ditches to provide temporary crossings for pedestrians and motorcycles; construction and materials storage sites should be adequately lighted at night; open trenches must be fenced and clearly marked; and adequate sanitation facilities for workers should be provided at the work sites. Contractors must avoid activities producing loud noise and vibration if there is night time construction work necessary.

90. To a large extent, these safeguards are not unique to the project and are provided in existing government decrees and codes of practice regulating construction work. Tender documents for construction should, therefore, require adherence to safeguards as specified in existing laws and regulations, with provisions for calling on the contractor's performance bond as sanction for violations.

91. Overall, the most important impact of the construction of the pipeline is disruption or damage to property. The construction of the pipeline along the region's population will definitely affect existing homes, farms, and a number of public works. However, it should be emphasized that only a few HHs would need to be relocated, due to pipeline passing through the front yard. Where housing is too close to the road and will be damaged by the construction of the pipeline, the HH owner will be compensated either to have the house moved back on viable remaining land or to be relocated if the lot does not permit such move.

92. Even though, under a NPPC, provincial roads are to be provided with a 15 m easement or safety corridor to both sides, the existing HHs along the road and pipeline alignment have long lived there and, consequently, have legal land use rights. They will have to be compensated if parts of their lots are recovered by the government or if portions of their houses are damaged due to the construction works.

93. Based on the survey of HHs and farms along the pipeline route, a few HHs will be affected by the “recovery” of roadside areas to be traversed by pipeline corridor. The term recovery used here mean that the government will pay affected parties (residents and farmers) to gain complete and permanent control of the pipeline corridor. The remaining lengths to be used will not require compensation as these are public lands.

94. The estimated cost of the compensation package is determined by the specific land prices at the time of acquisition issued by the NPPC.

95. A detailed discussion of the dislocation impacts due to construction of both the pipeline and the water treatment plant, including the corresponding compensation and relocation measures to be instituted, is presented in a separate report (RP) focused on resettlement and compensation issues, following ADB guidelines .

96. No historical monuments, temples, shrines, tombs would be destroyed or relocated for the construction of pipelines and water treatment plant. The areas required for the project are located in sites that have been worked before for most of them for agricultural purposes or road building. Trace finds are not impossible but the sites show a very low potential

97. Small impact can be the lowering the water level of wells used by a number of HHs beside pipeline. This is because the pipe trench can prevent ground water from the mountain region to river. However, lowering the water level near the opening trench during the construction period is expected to make the well water can become permanently unusable.

98. It should be noted that the environmental impacts described above are temporary in nature, i.e., during the two-year construction period for the pipeline. The pipeline operation itself is not expected to produce adverse effects, and indeed, a benefit of the pipeline corridor created is that it will provide space for future widening of the provincial road.

99. The construction of raw water pipeline (and the WTP) will not make a significant impact on the flora and fauna, as the construction activity will take place in the existing agricultural sector, residential/urban area.

100. The lay-out of the water distribution network consists of the transmission pipeline from the water treatment plant, the main pipelines to the district service areas newly served or expanded, branch pipelines within the districts, then distribution and service pipes to end-users. The lay-out of the supply network conforms to the general plan for the development of Thai Hoa, projected up to 2025. The main and distribution pipelines from the WTP will be built along the roads (existing and planned).

101. As for the construction or rehabilitation of water distribution network, the location determined by the layout of the water supply system is in concordance with the development master plan for the town in 2020. The main and distribution pipelines will be constructed along the existing route and plans to branch distribution pipe under pavement to minimize impacts on traffic flow.

102. In the case of the build of the raw water pipeline, the negative impacts related to the disorder and nuisance caused by construction activities will mainly be on the residential and commercial infrastructures and people nearby.

103. The same mitigation measures and safeguards as those earlier discussed for the raw water pipeline construction should be applied for the development of the distribution network, summed up below:

- Manage excavation and pipe-laying activities so as to avoid unnecessarily blocking streets or alleys used for mobile and pedestrian traffic;
- Use of temporary spoil storage sites for long periods should be avoided, and (in the dry season) the mounds of spoil should be watered regularly to prevent excessive dust production.
- A large fraction of the excavated material will be used again to backfill the pipeline trenches, and so the excavated soil will be placed on the side of the road until needed for backfilling. Temporary earth piles placed along the roads and pavements should be managed in order to avoid silting up drains/ditches or creating nuisance caused by dust. (Ex: Spoils covered with plastics tarps) At construction areas close to streams or canals, silt traps should be used to prevent clogging the drainage system.
- Disposal areas for the excess excavated soil should be properly sited so that these are not vulnerable to flooding or slumping. If possible, the disposal areas should be re-vegetated. Around the disposal areas, adequate drains should be installed.
- Excavation spoils could be treated as a resource and their possible beneficial uses maximized. As such excavated material is usable for various purposes, it is expected that the deposits in the disposal area will be removed/recovered over time.
- Tender documents for the pipe construction should include provisions to prevent improper methods for excavation and handling of spoils. Contractors should explain such methods which should be part of the criteria for awarding contracts.
- In very narrow streets, it may not be possible to store excavated earth on the road or pavement without completely blocking traffic. In this case, excavated material would have to be transported to a temporary storage site, and then transported back to the construction site for backfilling. In this case, nuisance impacts from earth hauling activities such as noise, exhaust fumes and dust need to be mitigated. Dump trucks carrying spoils should be cleaned regularly, and exhaust emissions checked for compliance with standards, particularly for particulates.
- Noise from jackhammer operation or grinding of concrete or asphalt roads/pavements will be unavoidable, although the nuisance created will be temporary.
- To minimize construction impacts overall, work schedules should be well-planned and activities during rush hours near schools, hospitals, and markets should be minimized. Construction and transport equipment used should be of appropriate sizes in limited work spaces; steel plates should be used across excavated trenches to provide temporary crossings for pedestrians and motorcycles; construction sites should be adequately lighted at night; open trenches must be fenced and clearly marked; and portable toilets for workers should be provided at the major work sites.

104. In addition, project contractors should be required to comply with existing Vietnamese guidelines and regulations for the control of temporary nuisance impacts related to construction works, as listed in Table 6.

**Table 6: Vietnam Laws and Standards for Regulating Construction Impacts**

<b>Relevant Aspect/Impact</b>	<b>Vietnam Guidelines and Standards</b>
Dust emission	QCVN05:2009/BTNMT
Air emission from construction equipment and transport vehicles	TCVN 5947-1; TCVN 6438; TCVN 5939; TCVN 5940
Noise	QCVN26:2011/BTNMT
Vibration	QCVN27:2011/BTNMT
Traffic obstruction	TCVN 4054:1998
Excavation heaps and spoil storage areas	TCVN 5299:1995
Effluent/discharge standards	QCVN40:2010/BTNMT
Hazardous substances	QCVN06:2009/BTNMT

105. In order to minimize disruption of water supply during the rehabilitation of the existing connection, a detailed plan for phasing in the new water supply system will be prepared during the detailed engineering design of the project.

#### **F. Project operation**

106. The raw water treatment process will basically involve two-stages: (1) clarification, and (2) filtration and disinfection. It is proposed to use tube settlers for the clarification stage, as used in a recently commissioned WTP at Hoa Hieu ward. Following clarification, the plan is to use conventional rapid gravity filters for the second stage using sand media (around 1 m deep) and equipped with conventional air-water washing. Aside from the conventional treatment units (receiving tank, reaction tank, settlement tank, filter tank, and clean water tank), other structures to be built are the chemical house, chlorine house, generator house, warehouse, pumping station, and administration office.

107. Chemicals to be used on a regular basis are poly-aluminum chloride (PAC) for flocculation, soda for pH control, and chlorine for disinfection. Of these chemicals, chlorine is the most hazardous if improperly handled. It is estimated that, when the plant is operating at its full 10,000 m<sup>3</sup>/day capacity, the amount of chlorine required is 20 kg/day. The chlorine house is to be built to accommodate 6 chlorine containers, each containing 980 kg. At any given time, there will be 1 working containers.

108. Because chlorine is a very reactive and corrosive material, it can cause severe irritation if workers become exposed. In contact with water, chlorine can create a highly corrosive and dangerous acid mist. Therefore, storage and handling procedures are very important. During WTP operation, the chlorine storage house, storage containers, and associated process equipment need to be clearly marked. Chlorine containers must be kept moisture-free and stored separately from other chemicals.

109. Workers need to wear personal protective equipment such as splash goggles, face shields, gloves, coveralls, and leather boots when handling chlorine. They should be trained on safe work practices and emergency steps when handling the chemical. The plant's operating procedures should include an inspection and maintenance schedule for all chlorine storage and handling equipment, which should also be regularly checked for possible leak.

110. As previously stated, chlorine is a highly reactive substance in its solid form. Calcium hypochlorate, solid chlorine as opposed to sodium hypochlorate, needs to be kept apart from all other chemicals and needs to be handled with care. Since it reacts on contact of organics matter it should be handled with all the protective measures such as long sleeve synthetic gloves, face shield and a synthetic apron worn on top of a fully clothed individual.

111. The storage room should be built with a ventilation system inducing 3 changes of air per hour.

112. Risk of solid chlorine run off and creating a potential risk to the surroundings populations is very unlikely. On the other hand risks to the worker are highly possible. Chlorine storage room door should be closed and locked at all times to prevent or minimize adverse effects on persons, property and the environment.

113. Intervention in case of spills would be to decrease maximum spreading of dust by shutting down the ventilation, if and only if, a proper breathing apparatus is available (tanks, proper filter mask not with carbon cartridges cause it will react with the product). In all cases put a breathing apparatus, protective clothing and gloves. Avoid dry sweeping and to clean the surfaces with compressed air. The whole area should be thoroughly vacuumed. Return the maximum amount of product in a proper container, like an empty used chlorine container, and discard the product. Any product recovered, because it is used for water sanitation, should be discarded. If the package (drum or bag) of the product is damaged, repair it or put it immediately into a recovery synthetic or metal drum to avoid or minimize product loss and contamination of the surrounding environment. Immediately replace damaged containers to prevent product loss and contamination of surrounding atmosphere.

114. 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.

115. 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

116. Apart from the potential hazard associated with handling of treatment chemicals, disposal of sludge and wash water from the treatment process is the most important aspect of the WTP operation that can cause adverse impacts, specifically on the surrounding land and waterways. Sludge is a product of the sedimentation and filtration processes, and it consists of chemical floc, fine particles and reservoir-derived algae removed from the raw water through flocculation. The sludge contains the aluminium-based flocculating agent but is



*not toxic*. The quantity of sludge produced from the Dong Hung WTP is not estimated to be large since the raw water comes from a reservoir in which sedimentation processes would have already removed most of the turbidity.

117. The clarifier sludge (produced as batch discharges from the plant operation) will have few potential beneficial uses, and provision needs to be made for disposal. There are two options for dealing with the sludge: (a) dewatering so that it can be handled easily and disposed as solid waste in a controlled landfill, or (b) discharge in liquid form into the river or spreading on open land. Due to potential environmental impacts related to discharge of sludge in water course, the dewatering option will be implemented.

118. Sludge treatment method of WTP is proposed to be sludge settling tank, sludge after settling will be collected and transferred to permitted empty land (due to no toxic elements owning) or buried in town's landfill.

119. The sludge in the regular batch discharges from the clarification process would normally contain up to 3% solids (by weight). After dewatering, the solids content would increase to about 25 to 30%, and the sludge would have the consistency of cake, which is easier to handle and transport to the landfill. It is estimated that around 10-15 m<sup>3</sup>/day of dewatered sludge would be generated by the WTP.

120. At the existing Thai Hoa WTP, the sludge is not discharged into the river directly-since the plant draws raw water from the same river. Rather, the sludge is allowed to settle in two alternating settling basins; then the thickened sludge is removed for disposal (as regulated by Thai Hoa town PC).

121. For the proposed Dong Hung WTP, the raw water comes from far upstream of the Cu De River. Nevertheless, discharging the treatment sludge into the river is inadvisable given the city's plan to develop it as a tourism attraction, in which case aesthetics and water quality would be an important consideration. Thus, similar to Thai Hoa WTP, the sludge is allowed to settle in two alternating settling basins; then the thickened sludge is removed for disposal (as regulated by Thai Hoa town PC).

122. Table 7 shows the handling and disposal of other kinds of waste expected during the commissioning/testing and normal operation of the WTP.

**Table 7: Mitigation of WTP Wastes**

Stage	Source of Waste	Nature of Waste	Treatment/Disposal
<b>During commissioning</b>	Hydraulic testing water	Usually free of contaminants	Discharge to the nearby water course (an existing channel leading to Cu De River)
	Treated test water during the plant start-up and process adjustment	Process water containing chlorine which may exceed the drinking water quality standard	Discharge to water course after dechlorination if necessary
	Water used for disinfecting tanks	High chlorine residual	Discharge into the nearby water course after dechlorination if necessary
	Filter backwash water	Media fines	Settlement and discharge to nearby water course
<b>During normal operation</b>	Clarification sludge	Regular batch discharges	Sludge to be dewatered through plate pressing (described above), and disposal to landfill
	Filter backwash water	Regular batch discharges; typically 300 mg/l solids content	Recycle
	Wash water from the sand filter	Biological matter, such as algae	To settlement tank, drying and disposal
	Treatment process overflows	Could contain low residual chlorine and suspended solids	Discharge to nearby water course after dechlorination ( as needed )
	Chemical wastes	Dross, flushing, drainage washings, spillages	Neutralize and hold for tanker removal

123. The project takes area of about 2.3ha for construction of Dong Hung WTP. The detailed assessment of the resettlement aspect the water treatment plant site is presented in a separate report (RP).



**Figure 13: Current Land Use at Dong Hung WTP**

124. The operation of the new water supply treatment plant will supply 12.000 m<sup>3</sup>/day developed over two phases beginning 2020 and 2030 and begins since 2014. The additional supply will increase the volume of municipal wastewater generated. Currently, the town is constructing 01 wastewater treatment plant with capacity of 5,000 m<sup>3</sup>/day, located in Long Son ward, and is in phase of detailed design (WB funding). Thus, collection and treatment of wastewater will be definitely done in future.

125. In project area, taking raw water will not have a significant impact on the river flow. River's flow is influenced by rainfall. Respectively, according to climate features of Nghe An, the river flow would change due to seasons. And the remaining flow downstream can reach lower value, but not enough to the river to complete its own functions related to ecology (protection of the species in the water) and socio-economic resources (waterway traffic, fishing, irrigation, etc.). In the worst case, the riverbed downstream of point taking water can be almost dry unless water flows from the side branch.

126. Although the consumption of water will increase by 4 times its actual level, the intake in the river Hieu will not be noticeable. Impact on downstream population from the PS will be insignificant.

127. Source of waste water will increase when water needs of people are met thanks to this project. Normally, people can use 1 to 3 resources of water, and water volume that they discharge into the environment is equal to the amount of water they use. However, safe water is available; the use of this water resource is higher than others. The increased amount of water will cause increased pressure on the environment if they are not discharged and treated accordingly. According to the economic surveying March 2011, families using septic tanks accounted for the highest percentage (40.1%), single compartment latrine (13.5%), vault latrine (35.5%), and other types. The reason they have not been investing in improved sanitation facilities (septic tanks) is due to difficulties in water resource, high investment costs, and low awareness about waste water treatment. Thus, only 40.1% of HHs are considered to treat domestic waste water. Discharge of untreated wastewater or less radical treatment leads to increased risk of pollution to the environment affecting humans and the surrounding environment. Domestic wastewater should be treated before being discharged into the receiving water is required for a developed society. World Bank is currently preparing a wastewater management project in Thai Hoa to be approved in 2014.

## **5. Project sensibility to climate change**

128. Concerning climate change issue, most of the project will not be affected. The only part submitted to long term problems is the collection construction (pumping station 1) location and elevation of the treatment plant is selected based on hydrologic data, flood disaster in the past 20 years to ensure that it's not affected by climate change and natural disasters in the future.

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

### **A. Public Meetings**

150. With support from Environment and Natural Resource Engineering One member Co., Ltd, and Pacific Ocean Engineering., JSC (PCO), public information and consultation activities were conducted along the pipeline corridor and in the WTP plant site. The interviews were conducted using a questionnaire survey also assessed the community's perceptions and concerns about the proposed project (see minutes of meeting in Annex 3 and photos in Annex 4).

151. The survey team conducted the survey and interviews with local residents living along the Hieu River, and close to the WTP site. Seven community leaders were interviewed to collect their views and concerns regarding the potential effects of the project on the community.

152. Surveyed HH were informed of the project's purpose and expected benefits, and the nature of construction activities to be undertaken in the area. Overall, there was no opposition raised against the proposed project. However, respondents and focus group discussants raised concerns that were mostly about: (a) dust, vehicle exhaust smoke, noise, and soil spilled on the road during transport of pipeline excavation materials; (b) wastes from construction and clogging of drains; and (c) worry about low quality water resource to supply to HHs as well as negative impacts on HHs' assets, etc.

**Table 8: Summary Matrix on Public Consultation**

<b>Issues Raised</b>	<b>Project's Answers</b>
a) How you will minimize dust and noise during construction?;	<ul style="list-style-type: none"><li>– Cover the transportation vehicles of construction materials, leveling and waste transportation in the project area to ensure safety, prevent material spillage on transport routes.</li><li>– Watering daily on the main transport routes and leveling area to reduce dust dispersed into surrounding residential areas and on route</li><li>– No burning of the waste or material at the construction site</li><li>– Limit all the activities lead to the noise, high noisy level equipment are not allowed to operate in night shift (from 22PM to 6AM)</li></ul>
b) What will be the impacts on surface water?	<p>surface water will be protected by the following measures</p> <ul style="list-style-type: none"><li>– Grease used for vehicles, construction equipment will be managed and stored in dedicated bin with cover and having the warning signs, away from water sources;</li><li>– Digging of temporary drainage ditch to limit the impact of storm water contains soil and rock, construction materials causing congestion of the drainage sewer or sedimentation of the water catchments in the project areas</li></ul>
c) What will be the impacts on our daily activities during construction?	<p>minimize disruption of daily activities, the following measures will be undertaken:</p> <ul style="list-style-type: none"><li>– Installation of safety warning signs or speed limit for the area of construction and at some intersections on major transportation routes in the project area.</li><li>– Minimize the transport of construction materials in the peak hours.</li><li>– Assign the tracking, monitoring and operation officers of the traffic vehicles and construction equipment on the site</li></ul>

## **B. Consultation with Downstream Communities**

153. 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.

154. Environmental assessment report will be initially submitted project owner listed in the headquarters of the People's Committee of Thai Hoa Town, WSC and 7 wards / communes above projects scheduled from 01/8/2014 – 15/08/2014.

## **C. Disclosure of Information**

155. 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 4 Wards and 6 communes of Thai Hoa town (Quang Phong, Hoà Hiếu Quang Tiến Long Sơn Nghĩa Hoà wards Tây Hiếu. Nghĩa Mỹ Nghĩa Thuận Đông Hiếu Nghĩa Tiến communes.

## **VII. GRIEVANCE REDRESS MECHANISMS (GRM)**

156. The mechanism described below is to solve grievances related to relocation and resettlement of project's community. This mechanism will also be used for grievances related to environmental issues. As a guideline, any complaint to any project's aspects will be solved through negotiation to get agreement. Complaints will be submitted toward 3 levels of entities as described below. THOAWASCO will bear all administrative and legal cost arising from the grievance redress mechanism.

157. The first period place to resolve complaints and grievances is Commune People's Committee. An aggrieved party may appeal or bring their petition to any member of the commune People's Committee, either through the village head or directly to the CPC, in writing or verbally. Grievances can also be given in the consultation meetings or subsequent interviews with local residents during construction. It is part of the responsibility of proposed members of the CPC or the village chief to notify the CPC complaints. CPC will then meet privately with the complainant and will have 15 days from the date of filing of the complaint to settle the complaint. Committee can get the support of the People's Committee of Thai Hoa town in assessing the technical basis of the complaints related to environmental impact. CPC secretariat is responsible for documenting and keeping a record of all complaints filed with the Town's PC.

158. 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.

159. 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.

160. 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.

161. 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.

## **VIII. ENVIRONMENTAL MANAGEMENT PLAN**

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

### **A. Institutional Arrangement and Responsibilities**

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

151. 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. Currently, there are 11 persons assigned to the PMU.

152. The PMU will be responsible for fulfilling the environmental requirements of the project, in particular for incorporating the mitigation measures and safeguards identified in this report in the detailed engineering design of the pipeline, WTP 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.

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

154. Environmental Protection and Research Center (EPRC) will be hired to provide environmental monitoring support during project construction (using as baseline the environment survey that was conducted as part of this IEE), and to conduct follow-up consultations and interviews with local residents to identify concerns or grievances arising during construction.

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

- a. Oversee the implementation of the safeguards related to handling of spoils, water quality protection, public nuisance impacts, unexploded ordnance survey, and public safety;
- b. Coordinate with the Thai Hoa 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.);
- c. Check that the safeguards are adequately addressed in the bidding documents

(instruction to bidders), and in the evaluation criteria for awarding contracts;

- d. Prepare terms of reference (TOR) for the survey of the pipeline route to detect unexploded ordnance(if present in the pipeline work areas);
- e. 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;
- f. Advise the PMU director on environment-related concerns arising during project construction, and recommend corrective measures;
- g. Disseminate to stakeholders the results of environment quality monitoring and implementation of safeguards, especially among HHs or small businesses near the construction sites;
- h. Prepare a quarterly status reports on environment and public safety protection to be submitted (through the PMU director) to the PC.

156. 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

---

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



assigned to THOAWASCO (and supervised by the PMU). The compliance monitoring and auditing will be fully documented, and the findings and recommendations will be sent immediately to THOAWASCO. During the operation phase, THOAWASCO will be responsible for the protection and monitoring of effluent, and the results will be reported to the Thai Hoa town PC.

157. Town PC will conduct monitoring and random testing environment before, during and after construction, as well as in urgent cases. The division will also consider the monitoring report of EPRC. If any unusual case found, 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.

158. 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.

159. 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 procedure 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.

## **B. Summary of Potential Impacts**

The key potential impacts are primarily associated with the construction phase of the project. As previously seen, the potential impacts are summarized in Table 10.

**Table 9: Summary of Key Potential Impacts from IEE**

<b>Construction Phase</b>
1) Excavation work for the pipeline trenches will produce spoil; heaps of excavated soil beside the trench could obstruct community access, and erosion from spoil storage areas could silt up nearby streams and drains. Dry heaps could cause dust nuisance. Soils from specific areas could be contaminated.
2) Obstruction to traffic flow, partial and complete, during raw water pipeline construction, exacerbated by the narrow road and work spaces: <ul style="list-style-type: none"><li>• Local residents could be cut off from the road due to the trench-building;</li><li>• Increased traffic of dump trucks carrying spoils to and from storage areas;</li><li>• Air pollution from excavation and transport equipment;</li><li>• Traffic hazard to pedestrians, especially school children and elderly;</li><li>• Emergency units could face rerouting delays that could be life threatening for specific cases</li></ul>

<b>Construction Phase</b>
3) Nuisance and public safety hazards caused by pipeline excavation and pipe-laying activities in urban areas;
4) Accidental detonation of unexploded ordnance (UXO) during pipeline excavations
<b>Operation Phase</b>
5) 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) Increase in the volume of municipal wastewater generated.

### **C. Mitigation Plan**

160. The mitigation plan in Table 10 addresses the environmental issues and concerns that were raised at the stakeholder meetings during the IEE.

161. The mitigation plan identifies responsible parties, location, and indicative costs, and timing. The mitigation plan combines the construction phase activities common to all components while highlighting activities and mitigations specific to a single component. The mitigation plan needs to be updated to meet the detailed designs of the subproject. monitoring specifications described in Table 11 focuses on the potentially adverse environment-related impacts, based on the assessment presented in Chapter V. Benefits associated with providing adequate and safe water supply will be monitored within the project's overall design framework (i.e., the project logical framework).

**Table 10: Environmental Impact Mitigation Plan**

Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
Pre-construction Detailed Design Phase								
Confirmation of required resettlement & temporary relocation	No community impacts	1. Affected persons well informed well ahead of project implementation.	At intake at Hieu river, along raw water pipeline, at WTP, & along distribution network	Before subproject implemented	See resettlement plan	See resettlement plan	THOAWASCO / PMU <sup>3</sup>	Resettlement committees
Disclosure, & engagement of community	No community impacts	2. Implement information disclosure and activate grievance redress mechanism (see IEE)	At all construction sites.	Beginning of subproject	Quarterly	No marginal cost <sup>4</sup>	THOAWASCO	PMU
GoV approvals	No negative impact	3. Notify DoNRE of project initiation to ensure GoV EIA requirements approved , and obtain required project permits and certificates.	Entire subproject	Before construction	As required	No marginal cost	PPC & DDSC <sup>5</sup>	PMU
Detailed designs	Minimize negative environmental impacts	4. Complete detailed designs of: <b>1)</b> raw water intake and pipeline from Hieu river to Dong Hung WTP; <b>2)</b> new Dong Hung WTP; and <b>3)</b> treated distribution network including: a) updated review of raw water sources at Hieu river to ensure that sufficient and sustainable supplies of <u>treatable</u> raw water will be available to water supply systems long after commissioning stage; 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; 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.	(a-e). Entire subproject area: 1) raw water intake at reservoir & pipeline corridor; 2) Dong Hung WTP; and Treated water distribution network	Before construction initiated	Once with detailed designs documents	No marginal cost	HOAWASCO / DDSC	PMU

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

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

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

Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
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: <b>a)</b> Securing GoV approvals; <b>b)</b> UXO survey & removal; <b>c)</b> Forest clearing, tree/vegetation removal, & site restoration; <b>d)</b> Civil works; <b>e)</b> Cultural chance finds; <b>f)</b> Contaminated spoil identification & disposal; <b>g)</b> Construction materials acquisition, transport, & storage including borrow pit management; <b>h)</b> Erosion & river sedimentation control; <b>i)</b> Construction site drainage; <b>j)</b> Noise, dust & NOx, SOx, CO, CO <sub>2</sub> emissions; <b>k)</b> Worker camp operation; <b>l)</b> Solid and liquid waste disposal; <b>m)</b> Hazardous chemical & waste management; <b>n)</b> Construction & urban traffic (especially along raw water pipeline); <b>o)</b> Utility and Power Disruption; <b>p)</b> Worker and public Safety (especially along raw water pipeline); <b>q)</b> Raw water quantity & quality sustainability; <b>r)</b> Training & capacity development plan; <b>s)</b> WTP chemicals & sludge management; and <b>t)</b> Treated water quality management.	Entire subproject	In parallel with completion of detailed designs	Once, as part of detailed design phase	No marginal cost	THOAWASCO / DDSC	PMU
Develop bid documents	No negative environmental impact	9. Ensure the EMP is included in contractor tender documents to enable contractors to develop their CEMP <sup>6</sup> , and that tender documents specify that implementation of CEMP must be included in cost estimates. 10. The environmental management sub-plans identified in 11) above should be identified in the appropriate contractor tender documents, for the contractor to detail into CEMPs for their	All project areas	Before construction begins	Once for all tenders	No marginal cost	THOAWASCO / DDSC	PMU / DDSC

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

**Document : Initial Environmental Examination Report**

MFF0054-VIE: PFR3 – Thai Hoa Water Supply Subproject – Thai Hoa Town, Nghe An province

Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		bidding documents. 11. Specify in bid documents that contractor must have experience with implementing EMPs, and/or provide staff with EMP experience.						
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 THOAWASCO / 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 / THOAWASCO
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	THOAWASCO / DDSC	THOAWASCO / 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	THOAWASCO / DDSC	Contractor's bid documents
<b>Construction Phase – General Mitigations for all Components of Subproject</b>								
Initiate EMP & sub-plans,	Prevent or minimize impacts	17. Initiate the EMP including individual management sub-plans for the different types of potential impacts identified in pre-construction phase. See sub-plan implementation guidance below.	For all construction sites	Beginning of construction	Once	No marginal cost	THOAWASCO / DDSC	PMU & contractors
Obtain & activate construction permits and licenses	Prevent or minimize impacts	18. Contractors to comply with all statutory requirements set out by DoNRE for use of construction equipment, hazardous waste & chemicals management, and operation of construction plants, e.g., concrete batching.	For all construction sites	Beginning of construction	Once	No marginal cost	THOAWASCO / DDSC	PMU & contractors
Worker camp	Pollution and	19. Locate worker camps away from human settlements. 20. Ensure adequate housing and waste disposal facilities including pit latrines, garbage cans and	All worker camps	Throughout construction	Monthly	No marginal cost	DDSC & PMU	contractor

Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
operation	social problems	recycling bins if services are available. 21. Exceeding prepared food should be offered to local charity (shelters/orphanage/food bank, temple). 22. A solid waste collection program must be established and implemented that maintains a clean worker camps 23. Locate separate pit latrines for male and female workers away from worker living and eating areas. 24. A clean-out or infill schedule for pit latrines must be established and implemented to ensure working latrines are available at all times. 25. Worker camps must have adequate drainage. 26. Local food should be provided to worker camps. Guns and weapons not allowed in camps. 27. Transient workers should not be allowed to interact with the local community. HIV Aids education should be given to workers. 28. Preservatives should be provided if such practice does not interfere with local belief or customs. 29. Camp areas must be restored to original condition after construction completed.		phase				
Training & capacity	Prevention of impacts through education	30. Implement training and awareness plan for THOAWASCO / PMU (Environmental staff) and contractors.	PMU offices, construction sites	Beginning of construction	After each event	No marginal cost	DDSC	DDSC & PMU
Tree and vegetation removal, and site restoration sub-plan	Damage or loss of trees, vegetation, and erosion of landscape	31. Restrict tree and vegetation removal to within designated RoWs. 32. Within RoWs minimize removals, and install protective physical barriers around trees that do not need to be removed. 33. All RoWs to be re-vegetated and landscaped after construction completed. Consult forestry department to determine the most successful restoration strategy and techniques. 34. Recuparate tree logs and make them available for local use.	All construction sites.	Beginning and end of project	Monthly	No marginal cost	DDSC / PMU	contractor

Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
Civil works	Degradation of terrestrial resources	35. All construction sites should be located away forested, plantation, & agricultural areas as much as possible. 36. No unnecessary cutting of trees. 37. All construction fluids such as oils, and fuels should be stored and handled well away from forested and plantation areas. 38. No waste of any kind is to be discarded on land or in forests/plantations.	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PMU	contractor
Civil works	Degradation of water quality & aquatic resources	39. Minimize earthworks & final area of foundation for intake in Hieu river. 40. Hieu river pipeline placement works should be done during dry season. 41. Erosion channels must be built around aggregate stockpile areas to contain rain-induced erosion. 42. Plastic tarps should be used to cover piles to avoid drying and erosion of the piles. 43. Earthworks should be conducted during dry periods. 44. All construction fluids such as oils, and fuels should be stored and handled well away from surface waters. 45. No waste of any kind is to be thrown in surface waters. 46. No washing or repair of machinery near surface waters. 47. Pit latrines to be located well away from all surface waters. 48. No unnecessary earthworks in or adjacent to all water courses. 49. No aggregate mining from Hieu river, or from nearby lakes. 50. All existing irrigation ditches, canals and channels to be protected the same way as rivers and lakes.	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PMU	contractor
		51. As per detailed designs all civil works should be located away from all cultural property and values including cemeteries and pagodas. 52. Chance finds of valued relics and cultural						



**Document : Initial Environmental Examination Report**

MFF0054-VIE: PFR3 – Thai Hoa Water Supply Subproject – Thai Hoa Town, Nghe An province

Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
Cultural chance finds	Damage to cultural property or values & chance finds	<p>values should be anticipated by contractors. Site supervisors should be on the watch for finds.</p> <p>53. 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>54. Work at find site will remain stopped until authorities allow work to continue.</p>	All construction sites	At the start , and throughout construction phase	Monthly	No marginal cost	DDSC & PMU	contractor
Construction materials acquisition, transport, and storage sub-plan	Pollution, injury, increased traffic, disrupted access	<p>55. All borrow pits and quarries should be approved by DoNRE.</p> <p>56. Select pits and quarries in areas with low gradient and as close as possible to construction sites.</p> <p>57. Required aggregate volumes must be carefully calculated prior to extraction to prevent wastage.</p> <p>58. Pits and quarries should not be located near surface waters, forested areas, critical habitat for wildlife, or cultural property or values.</p> <p>59. 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>60. All topsoil and overburden removed should be stockpiled for later restoration.</p> <p>61. All borrow pits and quarries should have a fence perimeter with signage to keep public away.</p> <p>62. 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>63. Unstable slope conditions in/adjacent to the quarry or pit caused by the extractions should be rectified with tree planting.</p> <p>64. Define &amp; schedule how materials are extracted from borrow pits and rock quarries, transported, and handled &amp; stored at sites.</p> <p>65. Define and schedule how fabricated materials</p>	For all construction areas.	Throughout construction phase	Monthly	No marginal cost	DDSC / PMU	Contractor(s)

44

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	80. 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.	All construction sites and worker camps	Throughout construction phase	Monthly	No marginal cost	DDSC, PMU, & DoNRE	contractor
		81. Areas of disposal of solid and liquid residual matter to be determined by DoNRE.						
		82. Disposed of residual matter should be catalogued for type, estimated weigh, and source.						
		83. Construction sites should have large garbage bins.						
		84. 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.						
		85. Solid residual matters should be separated and recyclables sold to buyers in community.						
		<u>Hazardous Waste</u>						
		86. Collection, storage, transport, and disposal of hazardous waste such as used oils, gasoline, paint, and other toxics must follow GoV regulations.						
		87. Wastes should be separated (e.g., hydrocarbons, batteries, paints, organic solvents)						
		88. 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.						
Noise and dust sub-plan	Dust Noise	89. All spills must be cleaned up completely with all contaminated soil removed and handled with by contaminated spoil sub-plan.	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC & PMU	contractor
		90. During construction, a prevention kit consisting of heavy weight oil only absorbent and / or cat litter should be available to prevent infiltrations much as possible.						
Noise and dust sub-plan	Dust Noise	91. Regularly apply wetting agents to exposed soil and construction roads especially in high density areas such as Nam Hai Van section of	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC & PMU	contractor

Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		raw water pipeline just above WTP. 92. Cover or keep moist all stockpiles of construction aggregates, and all truckloads of aggregates. 93. Minimize time that excavations and exposed soil are left open/exposed. Backfill asap. 94. As much as possible restrict working time between 07:00 and 17:00. In particular are activities such as pile driving. 95. Maintain equipment in proper working order 96. Replace unnecessarily noisy vehicles and machinery. 97. Vehicles and machinery to be turned off when not in use. 98. 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.						
Utility and power disruption sub-plan	Loss or disruption of utilities and services such as water supply and electricity	99. Develop carefully a plan of days and locations where outages in utilities and services will occur, or are expected. 100. Contact local utilities and services with schedule, and identify possible contingency back-up plans for outages. 101. Contact affected community to inform them of planned outages. 102. Try to schedule all outages during low use time such between 24:00 and 06:00.	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC, PMU & Utility company	contractor
Erosion sub-plan	Land erosion	103. Berms, and plastic sheet fencing should be placed around all excavations and earthwork areas. 104. Earthworks should be conducted during dry periods. 105. Maintain a stockpile of topsoil for immediate site restoration following backfilling. 106. Protect exposed or cut slopes with planted vegetation, and have a slope stabilization protocol ready. 107. Re-vegetate all soil exposure areas asap.	All construction sites	Throughout construction phase	Monthly	No marginal cost	DDSC & PMU	contractor

**Document : Initial Environmental Examination Report**

MFF0054-VIE: PFR3 – Thai Hoa Water Supply Subproject – Thai Hoa Town, Nghe An province

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	<p>108. Proper fencing, protective barriers, and buffer zones should be provided around all construction sites.</p> <p>109. Sufficient signage and information disclosure, and site supervisors and night guards should be placed at all sites.</p> <p>110. Worker and public safety guidelines published by MoLISA should be followed.</p> <p>111. Population near blast areas should be notified 24 hrs ahead, and evacuated well before operation. Accepted GoV blast procedures and safety measures implemented.</p> <p>112. Speed limits should be imposed on all roads used by construction vehicles.</p> <p>113. Standing water suitable for disease vector breeding should be filled in.</p> <p>114. Worker education and awareness seminars for construction hazards should be given. A construction site safety program should be developed and distributed to workers.</p> <p>115. Appropriate safety clothing and footwear should be mandatory for all construction workers.</p> <p>116. Adequate medical services must be on site or nearby all construction sites.</p> <p>117. Drinking water must be provided at all construction sites.</p> <p>118. Sufficient lighting to be used during necessary night work.</p> <p>119. All construction sites should be examined daily to ensure unsafe conditions are removed.</p>	All construction sites.	Fulltime	Monthly	No marginal cost	DDSC & PMU	contractor
Construction and local vehicle traffic sub-plan	Traffic disruption, traffic block, accidents, public injury	<p>120. Schedule construction vehicle activity during light traffic periods. Create adequate traffic detours, and sufficient signage &amp; warning lights at all construction locations.</p> <p>121. Post speed limits, and create dedicated construction vehicle roads or lanes.</p> <p>122. Inform community of location of construction traffic areas, and provide them with directions on how to best co-exist with construction</p>	All construction sites	Fulltime		No marginal cost	DDSC & PMU	contractor

---

48

Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
	quantity or quality of treated water	<p>includes regular maintenance of treatment system components, and materials supply to ensure treated water production (m<sup>3</sup>/day) always meets WTP design specifications. Incorporate contingency and back-up plans for planned and unplanned system shutdowns.</p> <p>132. 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>133. 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	needed				EPRC / DoH
Operation of raw & treated water pipelines	Local flooding from ruptures	134. 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 Hieu river 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	THOAWASCO / DDSC	THOAWASCO
Operation of WTP	Chemical spills, and pollution from solid and domestic waste	<p>135. As part of O&amp;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>136. With O&amp;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	THOAWASCO	THOAWASCO
Production of WTP sludge	Contamination of environment	<p>137. Review and clarify with DN DoNRE the appropriate landfill location to dispose of the planned dried sludge produced at the WTP.</p> <p>138. 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</p>	At WTP	Continuously	As needed	No marginal cost	THOAWASCO / DoNRE	THOAWASCO



**Document : Initial Environmental Examination Report**

MFF0054-VIE: PFR3 – Thai Hoa Water Supply Subproject – Thai Hoa Town, Nghe An province

Project Activity	Potential Impact	Proposed Mitigation Measure	Location	Timing	Reporting	Estimated Cost (USD)	Responsibility	
							Supervision	Implementation
		accommodate production capacity of WTP. 139. Ensure sludge is covered when transported to designated landfill. 140. Never dump or temporarily store sludge on lands outside landfill site, WTP property, or near water courses. 141. Develop and implement regular sludge quality monitoring to document sludge quality (See Environmental Monitoring Plan)						
Production of treated water	Wastewater production too much for city wastewater management	142. 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	THOAWASCO / DoNRE	THOAWASCO
Operation of entire WS system,	Worker and public injury	143. Educate workers in workplace safety of WS system operation according to MoLISA regulations. Prevent public access to SP and WTP property, Hieu river intake area, and all pipeline areas with fencing and appropriate signage. 144. 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. 145. 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	THOAWASCO	THOAWASCO

## **D. Environmental Monitoring Plan**

162. The environmental monitoring requirements identified in the IEE were carried forward and expanded with more detail into a comprehensive monitoring plan (Table 9). The monitoring plan focuses on all three phases (pre-construction, construction, post-construction operation) of the project and provides environmental indicators, the sampling locations & frequency, method of data collection, responsible parties, and the estimated costs.

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

164. The monitoring budget covers: (a) follow-up perception surveys and consultations with local residents to be commissioned by the PMU, preferably with the Technical Resources and Environment Co., Ltd One Member which conducted the baseline environment/site survey and facilitated the public consultations for the IEE; (b) surface water, groundwater and air quality monitoring during construction; (c) survey of the pipeline trench route to check that there are no UXO that might endanger construction workers;

165. During the operation of the new water treatment plant, water quality monitoring of drinking water taps at various locations in the new or expanded CLWACO service areas will be done routinely by the Environmental Protection Agency of the DoNRE in compliance with Vietnam regulations (with reference to quality standards for drinking water under TCXDVN 33:2008/BXD) and using the agency's own budget.

## **Compliance Monitoring & Reporting**

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

167. 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.

168. 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).

169. A template for monitoring process is presented in Annex 5.

**Table 11: Environmental Monitoring Plan**

Environmental Indicators	Location	Means of Monitoring	Frequency	Reporting	Responsibility		Estimated <sup>7</sup> Cost (USD)
					Supervision	Responsibility	
Pre-construction Phase – Update Baseline Conditions							
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 & THOAWASCO & MB of BN-NR	EPRC	TBD. (for new survey)
Air quality (dust, CO, NOx, SOx, noise, wind, and vibration levels) to supplement baseline air quality data collected during PPTA and reported in IEE Water quality parameters sampled at Hieu river station during PPTA & reported in IEE. Water quality data collected in Hieu river during PPTA & reported in IEE are sufficient.	Representative sites of heavy civil & earthwork including along truck routes  At raw water intake at completed Hieu river	Using field and analytical methods described in QCVN and TCVN standards for ambient air and surface water quality sampling & analysis.	One day and one night measurement	One baseline supplement report before construction phase starts	DDSC & PMU	EPRC	TBD.
Inventory of present and past land uses that could cause contaminated soil.	At all excavation sites, including borrow pits	Survey methods described in QCVN and TCVN standards for land use.	Once	Once	DDSC & PMU	EPRC	TBD.
Analysis of soil quality if required from above (heavy metals (As, Cd, Pb, oil & grease, hydrocarbons).	Possible contaminated lands all sites	Use field and analytical methods described in QCVN and TCVN standards for soil quality sampling & analysis.	D): Once if needed	Once	DDSC & PMU	EPRC	TBD.
Presence of UXO	Potentially located throughout project area	Military to survey and sweep affected areas of UXO	Once	Once	THOAWASCO	military	TBD.
Updated community stakeholder comments & concerns of subproject	Public consultation sites with same stakeholders consulted during IEE	Same format used in IEE for obtaining stakeholder input to subproject	At least once & in conjunction with Grievance Redress Mechanism	For each event	PPC / THOAWASCO	PMU	\$5,000.

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

Environmental Indicators	Location	Means of Monitoring	Frequency	Reporting	Responsibility		Estimated <sup>7</sup> Cost (USD)
					Supervision	Responsibility	
Construction of Raw Water Pipeline, Dung Hung WTP, and Treated Water Distribution Network							
<b>A)</b> Air quality: dust, CO, NOx, SOx, noise, wind, and vibration levels  <b>B)</b> Surface water quality: TSS, heavy metals (As, Cd, Pb,) oil and grease, total & faecal coliform, pH, DO, COD, BOD <sub>5</sub> , temperature, NH <sub>3</sub> , and other nutrient forms of N & P.  <b>C)</b> Analysis of soil quality (heavy metals (As, Cd, Pb, Hg, Mn), hydrocarbons.  <b>D)</b> Domestic and construction solid waste inside & outside construction sites including worker camps.  <b>E)</b> Public comments and complaints  <b>F)</b> Incidence of worker or public accident or injury	A – B): At water quality sites #1 - #4 sampled during PPTA and reported in IEE (Hieu river)  C): At sites where contaminated soil is suspected at excavation areas at all project areas  D): All construction sites and worker camps  E): Using hotline number placed at construction areas  F): At all construction areas	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) Visual observation  E) Information transferred by telephone hotline number  F) regular reporting by contractors/PMU	(A – B): Quarterly during construction periods  C) Once before start of excavation  D) Monthly  E) Continuous public input  F) Continuous	Quarterly	(A - D):		A) \$9,600. /yr
					DDSC / PMU	EPRC	B) \$13,000. /yr
					E & F) & daily observations:		C) \$3,600. /yr
					PPC / THOAWASCO	PMU / contractor	D) With A-C (no marginal cost)  E) \$2,000. / yr  F) No marginal cost
Operation of WTP & Pipeline Network							
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 5 years	Biannual	THOAWASCO		\$1,200.00 / yr
Worker & public injury associated with WTP & pipeline network	On property of WTP, pipelines, and pump stations	Regular record keeping	Continuously	For each event	THOAWASCO		No marginal cost
Treated water quality: total & faecal coliform, pH, DO, NH <sub>3</sub> , NO <sub>3</sub> , 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	THOAWASCO / DoNRE / MoH		\$3,500.00 / yr

**Document : Initial Environmental Examination Report**

MFF0054-VIE: PFR3 – Thai Hoa Water Supply Subproject – Thai Hoa Town, Nghe An province

Environmental Indicators	Location	Means of Monitoring	Frequency	Reporting	Responsibility		Estimated <sup>7</sup> Cost (USD)
					Supervision	Responsibility	
WTP sludge quality: ToC, heavy metals (As, Cd, Pb.), coliforms, pH, BOD, nutrients (N&P), PAC, chlorine,	After removal from sludge drying building and before disposal at designated landfill.	Using field and analytical methods described in QCVN & TCVN standards for water quality monitoring	Quarterly for 5 years	Biannually	THOAWASCO		\$4,500. / yr
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	THOAWASCO		\$1,000. / yr
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	THOAWASCO		1,000\$
	Specifically at Hieu river intake	Photographical record of connecting pipe with ground	Biannually and after storm surges	Biannually			1,500\$ / yr

**E. Budget**

170. The monitoring budget below covers: (a) follow-up perception surveys and consultations with local residents to be commissioned by the PMU, preferably with the Environment and Natural Resource Engineering One member Co., Ltd which conducted the baseline environment/site survey and facilitated the public consultations for the IEE; (b) surface water, groundwater and air quality monitoring during construction; (c) survey of the pipeline trench route to check that there are no unexploded ordnance that might endanger construction workers; (d) a local environment specialist to provide intermittent support to the PMU (in preparing survey TORs, assessment of water and air quality sampling results, drafting of safeguard provisions to be incorporated in construction tender documents and contracts, preparing reports to Thai Hoa town's PC); and (e) cost of orientation-training for PMU staff and community leaders on managing environmental impacts of pipeline construction and related safeguards (to be facilitated by the environment specialist).

171. During the operation of the new water treatment plant, water quality monitoring of drinking water taps at various locations in the new or expanded THOAWASCO service areas will be done routinely by Thai Hoa water supply one member Co., Ltd and using the agency's own budget. Specific programs will also be implemented to insure the safe keeping of all the installations.

**Table 12: Budget for EMP and Monitoring**

<b>Item or Activity</b>	<b>Frequency</b>	<b>Budget (US\$)</b>	<b>Source of Budget</b>
Construction safeguards (as specified in Table 12)	Throughout construction period, including the commissioning of the WTP	To be incorporated in implementation contracts	Loan proceeds
Sampling and testing of surface water, groundwater and ambient air quality along the pipeline construction corridor	every 3 months – every six months during the 2-year construction period	10,000	Loan proceeds
Perception survey and follow-up consultations with local residents	every 3 months – every six months during construction	5,000	Loan proceeds
Survey of pipeline corridor for unexploded ordnance	Once, prior to start of construction	10,000	Loan proceeds
Local environment specialist	Intermittent input: 8 person-months over 2 years	10,000	Loan proceeds
Training and orientation for PMU and community leaders	Once, prior to start of construction	5,000	Loan proceeds
Training for PMU's staff and community's leaders	1 time, before construction	10,000	Loan proceeds
Contingency (in case of construction delay)		10,000	Loan proceeds
<i>Total</i>		50,000	

## **IX. COMMITMENTS OF PROJECT OWNER**

173. Commitment to fulfil measures for waste disposal, minimize other impacts outlined in the agreement: During project implementation, the project owner committed to full implementation of the measures for handling waste, reducing negative impacts on the natural environment and economic-social condition, as follows: (i) Committed to the construction of the wastewater treatment process as BASTAF tanks, portable toilets, ensuring water quality through the system after satisfactory treatment, not causing pollution of surface water and ground water (ii) Committed not cause air pollution due to transportation activities and earthworks, do not let them drop to the ground, not to generate dust from transporting vehicles causing air pollution for HHs along the transport route, (iii) Committed for collection of solid waste in accordance with the provisions of the Decree No. 59/2007/NĐ-CP dated April 09, 2007 of the Government on management of solid waste collection, storage, transport and hazardous waste treatment according to Circular No. 9/2012/TT-BTNMT dated 14/4/2011 of the Ministry of Natural Resources and Environment on hazardous waste management; (iv) committed to good management of staff, not conflict arises with the locals; (v) committed to working closely with local authorities in the matter of water use, security and order and environmental sanitation.

174. Commitment to achieve treatment standards, technical regulations in the current environment: During construction, the project owner committed to ensuring compliance with the standards and Vietnam and international regulations on environmental to ensure air quality, surface water, ground water and soil sediment reaching the standards, including: (i) QCVN 08:2008/BTNMT, National technical regulation on surface water quality; (ii) QCVN 09:2008/BTNMT, National Technical Regulation on groundwater quality; (iii) QCVN 14:2008/BTNMT, National technical regulation on domestic wastewater; (iv) QCVN 05:2009/BTNMT, National technical standards for ambient air quality; (v) QCVN 40:2011/BTNMT, National Technical Regulation on industrial wastewater; (vi) QCVN 26:2010/BTNMT, National technical regulation on noise; (vii) QCVN 27:2010/BTNMT, National technical standards for vibration.

1. Commitment to fulfil measures for environmental protection under the provisions of the current law of Vietnam: The project owner is strictly committed to the Environmental Protection Act issued by the National Assembly on 29/11/2005.; Decree No. 80/NĐ-CP dated 09/8/2006 of the Prime Minister on enforcement of environmental protection guidelines; Decree 21/NĐ-CP dated 28/02/2008 of the Prime Minister to modify and supplement a number of articles of Decree 80/NĐ-CP dated 09/8/2006; Decree No. 29/2011/NĐ-CP dated 18/4/2011 of the Government on environmental impact assessment strategies, environmental impact assessment and environmental protection commitment; Circular No. 26/2011/TT-BTNMT dated 18/7/2011 Ministry of Natural Resources and Environment guiding a number of articles of Decree No. 29/2011/NĐ-CP dated 18/4/2011 of the Government on environmental impact assessment strategies, environmental impact assessment and environmental protection commitment; and Decree 201/2013/ND-CP on stricter regulations for effective water resource management including associated consultation of communities.



## **X. CONCLUSION AND RECOMMENDATIONS**

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

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

177. Project construction will not have a significant impact on the flora and fauna, as the pipeline and WTP construction works will take place in existing agricultural and settlement/urban areas. No historical relics will be demolished or relocated by the pipeline and WTP construction.

178. Potential adverse effects of sludge production during project operation have been avoided by incorporating sludge dewatering in the design of the water treatment plant.

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

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

## Annex 1: Overall Project Implementation Schedule

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

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

## Annex 2: Analysis of environmental components testing



CÔNG TY TNHH MTV KỸ THUẬT TÀI NGUYÊN VÀ MÔI TRƯỜNG  
PHÒNG THÍ NGHIỆM PHÂN TÍCH MÔI TRƯỜNG  
Địa chỉ: số 236 - Đường Phong Đình Cảng - TP. Vinh - Nghệ An  
Điện thoại: 0386.250.236/ Fax: 0383.592198

Giấy ĐKKD số: 29009202967- Sở KH&ĐT Nghệ An ngày 07/7/2008  
Quyết định công nhận PTN phù hợp tiêu chuẩn ISO17025:2005 số 437/QĐ-CNCL  
ngày 30/6/2011 của Văn phòng Đăng ký chất lượng – Bộ Khoa học và Công nghệ



### KẾT QUẢ PHÂN TÍCH

Số: PN.84 / PTN – TNMT

1. Tên khách hàng: Công ty TNHH một thành viên cấp nước Thái Hoà
2. Địa chỉ: Khối Liên Thăng, phường Hoà Hiếu, thị xã Thái Hoà, Nghệ An
3. Vị trí lấy mẫu: + NN1: Mẫu tại đền ông Đệ Tứ, sát khuôn viên nhà máy nước Thái Hoà hiện tại, khối Liên Thăng, phường Hoà Hiếu, Toạ độ điểm giếng (571168, 2138122)  
+ NN2: Mẫu nước nhà ông Sinh, xã Nghĩa Mỹ, thị xã Thái Hòa, giáp khu đất quy hoạch xây dựng nhà máy nước tại đồi Đông Hưng, toạ độ (574477, 2134780).
4. Phương pháp lấy mẫu/ Bảo quản mẫu: TCVN 6663-11:2011
5. Ngày lấy mẫu: 17/09/2012.
6. Ngày phân tích: 18/9/2012+24/9/2012
7. Loại mẫu: nước dưới đất Số lượng mẫu: 02 Thể tích mẫu: 2.000ml
8. Tình trạng mẫu: Mẫu lấy đầy bình, nước trong, không có mùi lạ
9. Ký hiệu mẫu: N1+N2

TT	Thông số	Đơn vị	Phương pháp phân tích	Kết quả	
				N1	N2
1	pH	-	Đo nhanh	6,8	6,8
2	Độ dẫn điện	mS/cm	Đo nhanh	0,6	0,3
3	DO	mg/l	Đo nhanh	1,5	0,8
4	Độ đục	NTU	Đo nhanh	3	1
5	Độ cứng (CaCO <sub>3</sub> )	mg/l	TCVN 2672-78	6,8	6,8
6	COD	mg/l	TCVN 6491-1999	3,1	2,9
7	TSS	mg/l	TCVN 6625-2000	89,3	76,1
8	Cd	mg/l	TCVN 6193:1996	0,0004	0,0003
9	Pb	mg/l	TCVN 6193:1996	0,0025	0,0039
10	Zn	mg/l	TCVN 6193:1996	0,009	0,018
11	Mn	mg/l	TCVN 6002:1995	0,098	0,054

Mẫu KK2:

TT	Thông số	Đơn vị	Kết quả							
			6h-8h	8h-10h	10h-12h	12h-14h	14h-16h	16h-18h	18h-20h	20h-22h
	<i>Vị khí hậu</i>									
1	Nhiệt độ	°C	23,5	25,7	26,9	27,8	28,9	25,3	23,8	22,1
2	Độ ẩm	%	81	83	82	79	79	78	76	75
3	Vận tốc gió	m/s	2,1	1,8	1,2	1,3	1,9	2,1	2,6	2,4
4	Hướng gió	-	ĐN	ĐN	ĐN	ĐN	ĐN	ĐN	ĐN	ĐN
5	Áp suất	mbar	998	997	998	999	998	997	997	998
	<i>Thông số khí</i>									
6	PM10	µg/m <sup>3</sup>	31,6	30,2	30,1	30,1	30,5	30,2	32,1	31,8
7	TSP	µg/m <sup>3</sup>	106	98	123	108	114	105	99	98
8	CO	µg/m <sup>3</sup>	986	995	1061	1011	1152	976	1017	1065
9	NO <sub>2</sub>	µg/m <sup>3</sup>	45,3	38,1	36,5	34,5	48,1	46,9	43,3	47,1
10	SO <sub>2</sub>	µg/m <sup>3</sup>	69,4	63	63,4	65,4	60,6	58,2	59,4	60,2

Mẫu KK3:

TT	Thông số	Đơn vị	Kết quả							
			6h-8h	8h-10h	10h-12h	12h-14h	14h-16h	16h-18h	18h-20h	20h-22h
	<i>Vị khí hậu</i>									
1	Nhiệt độ	°C	23,5	24,6	29,7	30,8	30,4	26,1	25,4	24,5
2	Độ ẩm	%	81	80	83	79	80	80	81	78
3	Vận tốc gió	m/s	1,6	1,8	2,1	2,2	2	1,9	1,6	1,5
4	Hướng gió	-	ĐN	ĐN	ĐN	ĐN	ĐN	ĐN	ĐN	ĐN
5	Áp suất	mbar	999	998	999	1000	999	998	998	999
	<i>Thông số khí</i>									
6	PM10	µg/m <sup>3</sup>	31,6	30,2	30,1	36,1	35,5	30,2	32,1	31,8
7	TSP	µg/m <sup>3</sup>	98,3	96,1	101,3	102,5	131	98,5	96,2	95,7
8	CO	µg/m <sup>3</sup>	879	987	1015	1065	985	788	978	1051
9	NO <sub>2</sub>	µg/m <sup>3</sup>	45,3	46,1	39,1	40,2	41,2	48,1	46,2	40
10	SO <sub>2</sub>	µg/m <sup>3</sup>	54,1	61,2	63,5	70,6	45,2	47,1	50,6	51,9

**Mẫu KK4:**

TT	Thông số	Đơn vị	Kết quả							
			6h-8h	8h-10h	10h-12h	12h-14h	14h-16h	16h-18h	18h-20h	20h-22h
	Vĩ khí hậu									
1	Nhiệt độ	°C	20,3	24,5	26,6	26,5	24,1	23,6	22,8	21,3
2	Độ ẩm	%	81	83	83	78	80	79	78	76
3	Vận tốc gió	m/s	1,3	1,5	1,7	2	1,5	1,9	1,3	0,8
4	Hướng gió	-	ĐN	ĐN	ĐN	ĐN	ĐN	ĐN	ĐN	ĐN
5	Áp suất	mbar	1002	1001	1002	1003	1002	1001	1001	1002
	Thông số khí									
6	PM10	µg/m <sup>3</sup>	31,6	30,2	30,1	26,1	25,5	30,2	32,1	31,8
7	TSP	µg/m <sup>3</sup>	127	105	112	131	145	154	138	108
8	CO	µg/m <sup>3</sup>	986	972	1015	997	1054	1104	948	1087
9	NO <sub>2</sub>	µg/m <sup>3</sup>	59,8	52,2	47	49	62,1	61,2	48,2	45,5
10	SO <sub>2</sub>	µg/m <sup>3</sup>	45,3	38,2	37,1	40,5	39,1	38,4	35,5	40,1

**TRƯỞNG PHÒNG THÍ NGHIỆM**

**Nguyễn Mạnh Hà**

Ngày 25 tháng 9 năm 2012

**GIÁM ĐỐC**

**Phạm Anh Tuấn**

**Chú thích:**

- Kết quả này không được sao chép từng phần ngoại trừ toàn bộ, nếu không được sự đồng ý bằng văn bản của Lãnh đạo công ty.
- \*: Chỉ tiêu được thực hiện bởi nhà thầu phụ.
- Kết quả chỉ có giá trị đối với mẫu do khách hàng mang đến.
- Nếu khách hàng không có phản hồi lại, sau 05 ngày kể từ ngày trả kết quả PTN sẽ hủy mẫu theo quy định.



CÔNG TY TNHH MTV KỸ THUẬT TÀI NGUYÊN VÀ MÔI TRƯỜNG  
PHÒNG THÍ NGHIỆM PHÂN TÍCH MÔI TRƯỜNG  
Địa chỉ: số 236 - Đường Phong Định Công - TP. Vinh - Nghệ An  
Điện thoại: 0386.250.236/ Fax: 0383.592198

Giấy ĐKKD số: 29009202967- Sở KH&ĐT Nghệ An ngày 07/7/2008  
Quyết định công nhận PTN phù hợp tiêu chuẩn ISO17025:2005 số 437/QĐ-CNCL  
ngày 30/6/2011 của Văn phòng Đăng ký chất lượng – Bộ Khoa học và Công nghệ



## KẾT QUẢ PHÂN TÍCH

Số: PO.38 / PTN – TNMT

1. Tên khách hàng: Công ty TNHH một thành viên cấp nước Thái Hòa
2. Địa chỉ: khối Liên Thắng, phường Hòa Hiếu, thị xã Thái Hòa
3. Vị trí lấy mẫu:
  - + O1: lấy tại khuôn viên nhà máy nước Thái Hoà hiện tại, phường Hoà Hiếu, thị xã Thái Hoà. Tọa độ (271127, 2138006)
  - + O2: mẫu lấy tại đường giao thông khối Liên Thắng, phường Hoà Hiếu, thị xã Thái Hoà. Tọa độ (571279, 2137973)
  - + O3: Mẫu lấy tại vị trí quy hoạch xây dựng nhà máy nước Đồng Hưng, xã Nghĩa Mỹ, thị xã Thái Hoà. Tọa độ (574337, 2134889)
  - + O4: Mẫu lấy tại đường giao thông xã Nghĩa Mỹ, thị xã Thái Hoà, tọa độ (574318, 2134606)
4. Phương pháp đo: Sử dụng máy đo EXTECH
5. Ngày lấy mẫu: 17-20/9/2012
6. Ngày phân tích: 21/9/2012+24/9/2012
7. Loại mẫu: Mẫu ồn
8. Tình trạng mẫu: Mẫu đo tại hiện trường
9. Ký hiệu mẫu: O1-O4

### Mẫu O1:

Thời gian đo	Kết quả								
	Lần 1			Lần 2			Lần 3		
	Laeq	Lamax	L50	Laeq	Lamax	L50	Laeq	Lamax	L50
6 h	75,9	108,2	78,9	76,3	97,2	78,3	73,1	95,4	73,9
7 h	76,5	98,8	78,3	78,1	104,3	78	77,2	100,3	74,7
8 h	75,5	96,9	76,2	80,5	111,3	77,6	74,3	98,1	74,6
9 h	70,6	73,0	72,2	77,3	102,1	77,6	75,5	99,7	73,7
10 h	75,8	101,6	75,9	77,9	101,8	78,3	75,9	95,4	79,5
11 h	79,2	105,4	77,7	76	94,7	77	76	105,5	77,9
12 h	74,6	89,4	79,2	80,6	108,9	79,2	78,2	98,7	79,8
13 h	76,5	112,1	76,2	91,8	110,4	95,2	76,7	104,8	78,2
14 h	78,5	111,2	77,5	79,3	103,8	79,4	77	94,8	79,2
15 h	76	102,2	76,3	80,5	107	80,8	75,7	94,6	77,4
16 h	75,8	104,8	75,5	82,1	112,8	82	77	96,1	78,1
17 h	74,5	100,8	74,8	83	111,3	80,4	78,5	105,5	81,2
18 h	76,6	107,3	75,2	77,7	95,4	79,3	78,1	103,4	78,6
19 h	74,1	99,5	76,1	78,1	93,2	79,4	82	108,3	81,1
20 h	74,8	97,1	77,1	80,8	109,8	80,7	71,2	97,5	72,9
21 h	81,8	112,1	80,7	79,7	105,2	79,6	71,6	101,6	70,9
22 h	82	111,1	79,5	77,6	93,6	79	73,1	95,6	75,5

Mẫu O2:

Thời gian đo	Kết quả								
	Lần 1			Lần 2			Lần 3		
	Laeq	Lamax	L50	Laeq	Lamax	L50	Laeq	Lamax	L50
6 h	58,2	90,5	61,2	58,6	79,5	60,6	55,4	77,7	56,2
7 h	58,8	81,1	60,6	60,4	86,6	60,3	59,5	82,6	57
8 h	57,8	79,2	58,5	62,8	93,6	59,9	56,6	80,4	56,9
9 h	52,9	55,3	54,5	59,6	84,4	59,9	57,8	82	56
10 h	58,1	83,9	58,2	60,2	84,1	60,6	58,2	77,7	61,8
11 h	61,5	87,7	60	58,3	77	59,3	58,3	87,8	60,2
12 h	56,9	71,7	61,5	62,9	91,2	61,5	60,5	81	62,1
13 h	58,8	94,4	58,5	74,1	92,7	77,5	59	87,1	60,5
14 h	60,8	93,5	59,8	61,6	86,1	61,7	59,3	77,1	61,5
15 h	58,3	84,5	58,6	62,8	89,3	63,1	58	76,9	59,7
16 h	58,1	87,1	57,8	64,4	95,1	64,3	59,3	78,4	60,4
17 h	56,8	83,1	57,1	65,3	93,6	62,7	60,8	87,8	63,5
18 h	58,9	89,6	57,5	60	77,7	61,6	60,4	85,7	60,9
19 h	56,4	81,8	58,4	60,4	75,5	61,7	64,3	90,6	63,4
20 h	57,1	79,4	59,4	63,1	92,1	63	53,5	79,8	55,2
21 h	64,1	94,4	63	62	87,5	61,9	53,9	83,9	53,2
22 h	64,3	93,4	61,8	59,9	75,9	61,3	55,4	77,9	57,8

Mẫu O3:

Thời gian đo	Kết quả								
	Lần 1			Lần 2			Lần 3		
	Laeq	Lamax	L50	Laeq	Lamax	L50	Laeq	Lamax	L50
6 h	57,4	89,8	60,4	57,9	78,8	59,8	54,6	77,0	55,4
7 h	58,1	80,4	59,8	59,6	85,9	59,5	58,7	82,0	56,2
8 h	57,0	78,6	57,8	62,0	92,9	59,1	55,8	79,7	56,1
9 h	52,1	54,5	53,7	58,8	83,7	59,1	57,0	81,4	55,3
10 h	57,3	83,2	57,4	59,4	83,4	59,8	57,4	77,0	61,1
11 h	60,8	87,0	59,2	57,5	76,3	58,6	57,5	87,1	59,4
12 h	56,1	71,0	60,8	62,1	90,6	60,8	59,7	80,3	61,4
13 h	58,1	93,8	57,8	73,4	92,0	76,8	58,3	86,4	59,7
14 h	60,0	92,8	59,0	60,9	85,4	61,0	58,6	76,4	60,8
15 h	57,5	83,8	57,9	62,0	88,7	62,3	57,2	76,2	58,9
16 h	57,3	86,4	57,0	63,7	94,5	63,5	58,6	77,7	59,6
17 h	56,0	82,4	56,3	64,6	92,9	61,9	60,0	87,1	62,7
18 h	58,2	88,9	56,7	59,2	77,0	60,9	59,6	85,1	60,1
19 h	55,6	81,1	57,6	59,6	74,8	61,0	63,5	89,9	62,6
20 h	56,3	78,7	58,6	62,3	91,5	62,2	52,7	79,1	54,4
21 h	63,3	93,8	62,2	61,3	86,8	61,2	53,1	83,2	52,4
22 h	63,5	92,7	61,1	59,1	75,2	60,5	54,6	77,2	57,0

Mẫu O4:

Thời gian đo	Kết quả								
	Lần 1			Lần 2			Lần 3		
	Laeq	Lamax	L50	Laeq	Lamax	L50	Laeq	Lamax	L50
6 h	58,3	90,7	61,3	58,8	79,7	60,7	55,5	77,9	56,3
7 h	59,0	81,3	60,7	60,5	86,8	60,4	59,6	82,9	57,1
8 h	57,9	79,5	58,7	62,9	93,8	60,0	56,7	80,6	57,0
9 h	53,0	55,4	54,6	59,7	84,6	60,0	57,9	82,3	56,2
10 h	58,2	84,1	58,3	60,3	84,3	60,7	58,3	77,9	62,0
11 h	61,7	87,9	60,1	58,4	77,2	59,5	58,4	88,0	60,3
12 h	57,0	71,9	61,7	63,0	91,5	61,7	60,6	81,2	62,3
13 h	59,0	94,7	58,7	74,3	92,9	77,7	59,2	87,3	60,6
14 h	60,9	93,7	59,9	61,8	86,3	61,9	59,5	77,3	61,7
15 h	58,4	84,7	58,8	62,9	89,6	63,2	58,1	77,1	59,8
16 h	58,2	87,3	57,9	64,6	95,4	64,4	59,5	78,6	60,5
17 h	56,9	83,3	57,2	65,5	93,8	62,8	60,9	88,0	63,6
18 h	59,1	89,8	57,6	60,1	77,9	61,8	60,5	86,0	61,0
19 h	56,5	82,0	58,5	60,5	75,7	61,9	64,4	90,8	63,5
20 h	57,2	79,6	59,5	63,2	92,4	63,1	53,6	80,0	55,3
21 h	64,2	94,7	63,1	62,2	87,7	62,1	54,0	84,1	53,3
22 h	64,4	93,6	62,0	60,0	76,1	61,4	55,5	78,1	57,9

TRƯỞNG PHÒNG THÍ NGHIỆM

Nguyễn Mạnh Hà

Ngày 25 tháng 9 năm 2012

GIÁM ĐỐC

Phạm Anh Tuấn

**Chú thích:**

- Kết quả này không được sao chép từng phần ngoại trừ toàn bộ, nếu không được sự đồng ý bằng văn bản của Lãnh đạo công ty.
- \*: Chỉ tiêu được thực hiện bởi nhà thầu phụ.
- Kết quả chỉ có giá trị đối với mẫu do khách hàng mang đến.
- Nếu khách hàng không có phản hồi lại, sau 05 ngày kể từ ngày trả kết quả PTN sẽ hủy mẫu theo quy định.

BM 19.01 – Lần ban hành: 01 – Ngày soát xét:

Trang: 3/3





CÔNG TY TNHH MTV KỸ THUẬT TÀI NGUYÊN VÀ MÔI TRƯỜNG  
PHÒNG THÍ NGHIỆM PHÂN TÍCH MÔI TRƯỜNG  
Địa chỉ: số 236 - Đường Phong Đình Cảng - TP. Vinh - Nghệ An  
Điện thoại: 0386.250.236/ Fax: 0383.592198

Giấy ĐKKD số: 29009202967- Sở KH&ĐT Nghệ An ngày 07/7/2008  
Quyết định công nhận PTN phù hợp tiêu chuẩn ISO17025:2005 số 437/QĐ-CNCL  
ngày 30/6/2011 của Văn phòng Đăng ký chất lượng – Bộ Khoa học và Công nghệ



## KẾT QUẢ PHÂN TÍCH

Số: PM.209 / PTN – TNMT

- Tên khách hàng: Công ty TNHH một thành viên cấp nước Thái Hoà
- Địa chỉ: Khối Liên Thăng, phường Hoà Hiếu, thị xã Thái Hoà, Nghệ An
- Vị trí lấy mẫu:
  - + NM1: Mẫu lấy tại trạm bơm lấy nước cho nhà máy hiện tại, mẫu nước sông Hiếu, toạ độ (571003, 2138082).
  - + NM2: Mẫu lấy tại sông Hiếu, dưới trạm bơm lấy nước cho nhà máy hiện tại 450m về phía hạ lưu, toạ độ (511037, 2137663).
  - + NM3: Mẫu nước lấy tại hồ Vinh, xã Nghĩa Mỹ, toạ độ (574029, 2134788).
- Phương pháp lấy mẫu/ Bảo quản mẫu: TCVN 6663-6:2008
- Ngày lấy mẫu: 17/09/2012, mẫu lấy từ 7h đến 8h.
- Ngày phân tích: 18/9/2012-24/9/2012
- Loại mẫu: nước dưới đất Số lượng mẫu: 03 Thể tích mẫu: 2.000ml
- Tình trạng mẫu: Mẫu lấy đầy bình, nước trong, không có mùi lạ
- Ký hiệu mẫu: M1-M3

TT	Thông số	Đơn vị	Phương pháp phân tích	Kết quả		
				M1	M2	M3
1	Nhiệt độ	°C	Máy đo nhanh	20,6	21,0	20,7
2	pH	-	TCVN 6492-1999	7,1	6,9	6,8
3	Độ đục	NTU	TCVN 6184:2008	12	19	10
4	Độ dẫn điện	mS/cm	Máy đo hiện trường	0,8	1,1	0,6
5	TSS	mg/l	TCVN 6625-2000	64,9	63,2	17,8
6	DO	mg/l	TCVN 5499-1995	4,2	3,5	3,6
7	COD	mg/l	TCVN 6491-1999	12,6	13,5	12,9
8	BOD <sub>5</sub>	mg/l	TCVN 6001-1995	5,6	5,3	6,6
9	NH <sub>4</sub> <sup>+</sup>	mg/l	TCVN 5988-1995	1,25	0,97	1,47
10	CN <sup>-</sup>	mg/l	TCVN 7723:2007	kphđ	kphđ	kphđ
11	Cu	mg/l	TCVN 6193-1996	0,0170	0,0098	0,0128
12	Pb	mg/l	TCVN 6193-1996	0,0083	0,0125	0,0091
13	Zn	mg/l	TCVN 6193-1996	0,125	0,198	0,132
14	Fe	mg/l	TCVN 6177:1996	0,98	0,74	0,72
15	Hg	mg/l	TCVN 6626:2000	kphđ	kphđ	kphđ
16	As	mg/l	TCVN 6626:2000	0,0015	0,0009	0,0011

17	Cd	mg/l	TCVN 6197-1996	0,0009	0,0024	0,011
18	Cr <sup>6+</sup>	mg/l	TCVN 6658:2000	0,0013	0,0009	0,0008
19	E-coli	MPN/100ml	TCVN 6187-1-1996	32	25	28
20	Dầu mỡ	mg/l	TCVN 5070-1995	0,003	0,006	0,003
21	Coliform	MPN/100ml	TCVN 6187-1-1996	3.550	3.500	3.450

Ghi chú: “KPHĐ”: Không phát hiện được.

**TRƯỜNG PHÒNG THÍ NGHIỆM**



**Nguyễn Mạnh Hà**

Ngày 25 tháng 9 năm 2012

**GIÁM ĐỐC**



**Phạm Anh Tuấn**

**Chú thích:**

- Kết quả này không được sao chép từng phần ngoại trừ toàn bộ, nếu không được sự đồng ý bằng văn bản của Lãnh đạo công ty.
- \*: Chỉ tiêu được thực hiện bởi nhà thầu phụ.
- Kết quả chỉ có giá trị đối với mẫu do khách hàng mang đến.
- Nếu khách hàng không có phản hồi lại, sau 05 ngày kể từ ngày trả kết quả PTN sẽ hủy mẫu theo quy định.



CÔNG TY TNHH MTV KỸ THUẬT TÀI NGUYÊN VÀ MÔI TRƯỜNG  
PHÒNG THÍ NGHIỆM PHÂN TÍCH MÔI TRƯỜNG  
Địa chỉ: số 236 - Đường Phong Đình Cảng - TP. Vinh - Nghệ An  
Điện thoại: 0386.250.236/ Fax: 0383.592198

Giấy ĐKKD số: 29009202967- Sở KH&ĐT Nghệ An ngày 07/7/2008  
Quyết định công nhận PTN phù hợp tiêu chuẩn ISO17025:2005 số 437/QĐ-CNCL  
ngày 30/6/2011 của Văn phòng Đăng ký chất lượng – Bộ Khoa học và Công nghệ



## KẾT QUẢ PHÂN TÍCH

Số: PM.209 / PTN – TNMT

- Tên khách hàng: Công ty TNHH một thành viên cấp nước Thái Hoà
- Địa chỉ: Khối Liên Thăng, phường Hoà Hiếu, thị xã Thái Hoà, Nghệ An
- Vị trí lấy mẫu:
  - + NM1: Mẫu lấy tại trạm bơm lấy nước cho nhà máy hiện tại, mẫu nước sông Hiếu, toạ độ (571003, 2138082).
  - + NM2: Mẫu lấy tại sông Hiếu, dưới trạm bơm lấy nước cho nhà máy hiện tại 450m về phía hạ lưu, toạ độ (511037, 2137663).
  - + NM3: Mẫu nước lấy tại hồ Vĩnh, xã Nghĩa Mỹ, toạ độ (574029, 2134788).
- Phương pháp lấy mẫu/ Bảo quản mẫu: TCVN 6663-6:2008
- Ngày lấy mẫu: 17/09/2012, mẫu lấy từ 16h đến 17h.
- Ngày phân tích: 18/9/2012-24/9/2012
- Loại mẫu: nước dưới đất Số lượng mẫu: 03 Thể tích mẫu: 2.000ml
- Tình trạng mẫu: Mẫu lấy đầy bình, nước trong, không có mùi lạ
- Ký hiệu mẫu: M1-M3

TT	Thông số	Đơn vị	Phương pháp phân tích	Kết quả		
				M1	M2	M3
1	Nhiệt độ	°C	Đo nhanh tại hiện trường	22,7	23,8	23,8
2	pH	-	Đo nhanh tại hiện trường	7,0	7,0	6,9
3	Độ đục	NTU	Đo nhanh tại hiện trường	16	10	12
4	Độ dẫn điện	mS/cm	Đo nhanh tại hiện trường	0,9	1,2	0,8
5	TSS	mg/l	TCVN 6625-2000	67,2	61,9	16,7
6	DO	mg/l	TCVN 5499-1995	3,8	3,7	4,1
7	COD	mg/l	TCVN 6491-1999	14,1	14,8	17,4
8	BOD <sub>5</sub>	mg/l	TCVN 6001-1995	6,1	5,4	9,5
9	NH <sub>4</sub> <sup>+</sup>	mg/l	TCVN 5988-1995	1,41	1,02	1,46
10	CN <sup>-</sup>	mg/l	TCVN 7723-2007	kphđ	kphđ	kphđ
11	Cu	mg/l	TCVN 6193-1996	0,0131	0,0110	0,0119
12	Pb	mg/l	TCVN 6193-1996	0,0085	0,0110	0,0095
13	Zn	mg/l	TCVN 6193-1996	0,130	0,113	0,164
14	Fe	mg/l	TCVN 6177-1996	0,95	1,35	0,80
15	Hg	mg/l	TCVN 6626-2000	kphđ	kphđ	kphđ

16	As	mg/l	TCVN 6626:2000	0,0011	0,0009	0,0012
17	Cd	mg/l	TCVN 6197-1996	0,0012	0,0020	0,0015
18	Cr <sup>6+</sup>	mg/l	TCVN 6658:2000	0,0010	0,0012	0,0010
19	E-coli	MPN/100ml	TCVN 6187-1-1996	30	24	29
20	Dầu mỡ	mg/l	TCVN 5070-1995	0,004	0,006	0,003
21	Coliform	MPN/100ml	TCVN 6187-1-1996	3.600	3.400	2.600

Ghi chú: “KPHĐ”: Không phát hiện được.

**TRƯỞNG PHÒNG THÍ NGHIỆM**

**Nguyễn Mạnh Hà**

Ngày 25 tháng 9 năm 2012

**GIÁM ĐỐC**

**Phạm Anh Tuấn**

**Chú thích:**

- Kết quả này không được sao chép từng phần ngoại trừ toàn bộ, nếu không được sự đồng ý bằng văn bản của Lãnh đạo công ty.
- \*: Chỉ tiêu được thực hiện bởi nhà thầu phụ.
- Kết quả chỉ có giá trị đối với mẫu do khách hàng mang đến.
- Nếu khách hàng không có phản hồi lại, sau 05 ngày kể từ ngày trả kết quả PTN sẽ hủy mẫu theo quy định.



CÔNG TY TNHH MTV KỸ THUẬT TÀI NGUYÊN VÀ MÔI TRƯỜNG  
PHÒNG THÍ NGHIỆM PHÂN TÍCH MÔI TRƯỜNG  
Địa chỉ: số 236 - Đường Phong Đình Cảng - TP. Vinh - Nghệ An  
Điện thoại: 0386.250.236/ Fax: 0383.592198

Giấy ĐKKD số: 29009202967- Sở KH&ĐT Nghệ An ngày 07/7/2008  
Quyết định công nhận PTN phù hợp tiêu chuẩn ISO17025:2005 số 437/QĐ-CNCL  
ngày 30/6/2011 của Văn phòng Đăng ký chất lượng – Bộ Khoa học và Công nghệ



## KẾT QUẢ PHÂN TÍCH

Số: PN.84 / PTN – TNMT

- Tên khách hàng: Công ty TNHH một thành viên cấp nước Thái Hoà
- Địa chỉ: Khối Liên Thắng, phường Hoà Hiếu, thị xã Thái Hoà, Nghệ An
- Vị trí lấy mẫu: + NN1: Mẫu tại đền ông Đệ Tứ, sát khuôn viên nhà máy nước Thái Hoà hiện tại, khối Liên Thắng, phường Hoà Hiếu, Toạ độ điểm giếng (571168, 2138122)  
+ NN2: Mẫu nước nhà ông Sinh, xã Nghĩa Mỹ, thị xã Thái Hòa, giáp khu đất quy hoạch xây dựng nhà máy nước tại đồi Đông Hưng, toạ độ (574477, 2134780).
- Phương pháp lấy mẫu/ Bảo quản mẫu: TCVN 6663-11:2011
- Ngày lấy mẫu: 17/09/2012.
- Ngày phân tích: 18/9/2012-24/9/2012
- Loại mẫu: nước dưới đất Số lượng mẫu: 02 Thể tích mẫu: 2.000ml
- Tình trạng mẫu: Mẫu lấy đầy bình, nước trong, không có mùi lạ
- Ký hiệu mẫu: N1-N2

TT	Thông số	Đơn vị	Phương pháp phân tích	Kết quả	
				N1	N2
1	pH	-	Đo nhanh	6,8	6,8
2	Độ dẫn điện	mS/cm	Đo nhanh	0,6	0,3
3	DO	mg/l	Đo nhanh	1,5	0,8
4	Độ đục	NTU	Đo nhanh	3	1
5	Độ cứng (CaCO <sub>3</sub> )	mg/l	TCVN 2672-78	6,8	6,8
6	COD	mg/l	TCVN 6491-1999	3,1	2,9
7	TSS	mg/l	TCVN 6625-2000	89,3	76,1
8	Cd	mg/l	TCVN 6193:1996	0,0004	0,0003
9	Pb	mg/l	TCVN 6193:1996	0,0025	0,0039
10	Zn	mg/l	TCVN 6193:1996	0,009	0,018
11	Mn	mg/l	TCVN 6002:1995	0,098	0,054

12	As	mg/l	TCVN 6182:1996	kphđ	kphđ
13	Fe	mg/l	TCVN 6177:1996	0,48	0,34
14	Hg	mg/l	TCVN 5991:1995	kphđ	kphđ
15	Coliform	MPN/100ml	TCVN 6187-1:1996	1	2
16	E.coli	MPN/100ml	TCVN 6187-1:1996	kphđ	kphđ

Ghi chú: “KPHĐ”: Không phát hiện được.

**TRƯỞNG PHÒNG THÍ NGHIỆM**



**Nguyễn Mạnh Hà**

Ngày 25 tháng 9 năm 2012

**GIÁM ĐỐC**



**Phạm Anh Tuấn**

**Chú thích:**

- Kết quả này không được sao chép từng phần ngoại trừ toàn bộ, nếu không được sự đồng ý bằng văn bản của Lãnh đạo công ty.
- \*: Chỉ tiêu được thực hiện bởi nhà thầu phụ.
- Kết quả chỉ có giá trị đối với mẫu do khách hàng mang đến.
- Nếu khách hàng không có phản hồi lại, sau 05 ngày kể từ ngày trả kết quả PTN sẽ hủy mẫu theo quy định.

**Annex 3: Minutes of public consultation**

**MINUTES OF PUBLIC MEETINGS IN NGHIA MY COMMUNE, THAI HOA TOWN  
BIÊN BẢN HỌP THAM VẤN CÔNG ĐỒNG VỀ MÔI TRƯỜNG TẠI XÃ NGHĨA MỸ, THỊ XÃ THÁI  
HÒA**

**DATE: 15/8/ 2013**

**TIME AND LOCATION: NGHIA MY CPC, 9H30 AM**

**PARTICIPANTS :**

1. Representatives of Nghia My CPC(Chairman of CPC, Environmental officers , Vice Chairwoman of Women's Union, Fatherland Front Committee ): 4 persons
2. Representatives of some households in Dong Hung hamlet - Nghia My commune
3. PMU: Safety officers, technical officers (3 persons)
4. PCO Consultants:  
Nguyen Thi Thuy: Environment – Resettlement Expert  
Nguyen Van Luong: Technical expert  
Nguyen Hong Nhung: Environment officer

**PURPOSE OF MEETING:**

- To inform to the related parties and households in the project area of the negative impact on the environment by the construction of the Dong Hung water plant and the Environment policy of the project.
- To get feedback from the participants about the impacts and mitigation measures for negative impacts to the residential area.

**MEETING CONTENTS:**

CPC Officers: Summary introduction of the participants and project.

Mr. Hung: Technical Manager (PMU) to introduction briefly of the project and sponsor.

PCO consultant: Mrs. Thuy gives the presentation and chair of the meeting

- Summary introduction of project and work items (capital source, items, goals, regulations and effectiveness of the project )
- Summary of environmental impacts and mitigation measures of environmental impacts for households in the area of Dong Hung hamlet.
- Discussion: The contribution recommendations and explanation of the Client and Consultant unit.

**DISCUSSION OF PARTICIPANTS AND FEEDBACK OF CLIENT/CONSULTANT**

**Comment 1: The request for clarification of measures to minimize the impact of dust and noise during construction**

**Answer:** The main measures to minimize the impact of dust and noise during construction as follows :

- Cover the transportation vehicles of construction materials, leveling and waste transportation in the project area to ensure safety, prevent material spillage on transport routes.
- Watering daily on the main transport routes and leveling area to reduce dust dispersed into surrounding residential areas and on route

- No burring of the waste or material at the construction site
- Limit all the activities lead to the noise, high noisy level equipment are not allowed to operate in night shift (from 22PM to 6AM).
- Overall, the project is primarily positive impact on the environment and provides clean water, improvement of health for the local people. Some of the negative environmental impacts such as dust, noise, solid waste in construction; sludge, noise, a small amount of wash wastewater in the operation phase will be implemented by the mitigation measures. There are separate environmental assessment reports which are reviewed with the project regarding affected assets (trees, crop etc.).

**Comment 2: Request the Client and Consultant Unit of the project to clarify the impacts and mitigation measures for water environment**

**Answer:** Measures to minimize the impact on the water environment will be applied in the process of implementing the project as follows:

- Grease used for vehicles, construction equipment will be managed and stored in dedicated bin with cover and having the warning signs, away from water sources;
- Digging of temporary drainage ditch to limit the impact of storm water contains soil and rock, construction materials causing congestion of the drainage sewer or sedimentation of the water catchments in the project areas.

**Comment 3: To clarify the measures to ensure the safety of daily living activities of the households in the project area**

**Answer:**

- For activities affecting transportation, the Client will require construction contractors to implement the following measures: Installation of safety warning signs or speed limit for the area of construction and at some intersections on major transportation routes in the project area.
- Minimize the transport of construction materials in the peak hours.
- Assign the tracking, monitoring and operation officers of the traffic vehicles and construction equipment on the site.

**Other comments:**

- Totally agree and support project, because this is clean water project, improve water conditions for households, particularly some areas that have very deep groundwater, and groundwater is contaminated lime (hard water)
- Agree with the implementation of the project, however, must make sure that it's not effect to the crop, live-stocks or water quality which is being used.
- Expect the project is implemented soon and the quality of water supply meets the current standards, not affect to the people's health

***The meeting was ended at 11:00 in the same day.***





CÔNG TY CỔ PHẦN KỸ NGHỆ THÁI BÌNH DƯƠNG

PACIFIC OCEAN ENGINEERING JOINT STOCK COMPANY

Địa chỉ VPGD: số 15B, ngõ 53, phố Hoàng Cầu, phường Ô Chợ Dừa, Đống Đa, Hà Nội

Tel: 043 511 3999; Fax: 0436 248 891; Email: pcohc@vnn.vn Website: www.pco.com.vn

## NỘI DUNG HỌP CỘNG ĐỒNG

**Tên cuộc họp:** Tham vấn môi trường Dự án mở rộng hệ thống cấp nước Thị xã Thái Hòa

**Thời gian:** 9h30' ngày 15/08/2013

**Địa điểm:** UBND xã Nghĩa Mỹ

**Thành phần:** Đại diện UBND xã Nghĩa Mỹ  
 - Ủy ban phụ trách môi trường xã Nghĩa Mỹ  
 - Chuyên gia môi trường Công ty Cổ phần Thái Bình Dương  
 - Một số hộ gia đình sống xung quanh khu vực Dự án (xóm Đông Hưng, Nghĩa Mỹ)

**Nội dung:** Giới thiệu Dự án Cấp nước Thị xã (nguồn vốn, hạng mục, mục tiêu, nguyên tắc và hiệu quả của Dự án...)  
 - Tác động của các tác động môi trường và biện pháp giảm thiểu các tác động môi trường đến các hộ dân khu vực xóm Đông Hưng  
 - Thảo luận, cái ý kiến đóng góp

**Ý kiến thảo luận:** +) Tác động do bụi trong quá trình thi công:  
 - Che chắn từng cơ, đảm bảo an toàn, tránh rơi vãi vật liệu.  
 - Không đốt chất thải hoặc nguyên vật liệu tại công trường.  
 +) Tác động do tiếng ồn, rung:  
 Hạn chế tại các các hoạt động dân ồn tiếng ồn, cái phải lên có mức ồn lớn thông qua việc hoạt động ban đêm (từ 22h - 6h)  
 +) Tác động đến chất lượng nước mặt:  
 - Phải mở sổ địa cho cái phục vụ, thiết bị thi công phải tuân thủ quy định, từ 2 nơi có mái che, cách xa nguồn nước.  
 - Phải nước rửa thoát nước tạm thời để hạn chế tác động do chảy nước mưa chảy tràn nên theo sát sát, rất lưu ý chúng



để biến soát tài sản, hiện trạng, quá trình thi công  
 +) Ảnh hưởng tới hoạt động giao thông vận tải:  
 Đặt biển báo xung quanh khu vực xây dựng, cấp cấp tư  
 túc và cảnh báo về an toàn.  
 Hạn chế tối đa việc vận chuyển vật liệu xây dựng trong  
 giờ cao điểm.  
 Lưu con hồ theo dõi, quản sát và điều hành phục vụ  
 tham gia giao thông và phục vụ thi công bên công trình.  
 +) ý kiến của người dân:  
 Đồng ý với việc thi công dự án, tuy nhiên phải  
 tránh việc không gây ảnh hưởng tới hoa màu, vật nuôi  
 hoặc chất lượng nước trong sử dụng.

**Kết luận:** Hoàn toàn đồng ý với việc triển khai và thi công  
 Dự án Cấp nước Thai Hoa, không có ý kiến từ chối  
 hoặc yêu cầu nào khác.

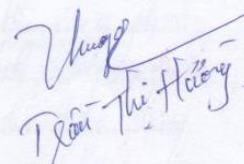
Cuộc họp kết thúc vào hồi 11 giờ 00' cùng ngày!

Chủ đầu tư  
  
 Phạm Văn Việt

Đơn vị tư vấn

UBND xã/phường  
  
 Cao Thị Hương

Đại diện cộng đồng

  
 Trần Thị Hương



**CÔNG TY CỔ PHẦN KỸ NGHỆ THẢI BÌNH DƯƠNG**  
**PACIFIC OCEAN ENGINEERING JOINT STOCK COMPANY**  
 Địa chỉ VIQG: số 158, ngõ 53, phố Hoàng Cầu, phường Ô Chợ Dừa, Đống Đa, Hà Nội  
 Tel: 043 511 3899; Fax: 0436 248 891; Email: [peohc@vnn.vn](mailto:peohc@vnn.vn) Website: [www.pro.com.vn](http://www.pro.com.vn)

## DANH SÁCH THAM DƯ

Nội dung: .....

Thời gian: ..... ngày ..... Địa điểm: UBND xã Nghĩa Mỹ .....

[illegible]

Người lập biên



**Annex 4: Some pictures of public consultation**



*Consultation meeting in Nghia My commune*

*Interview with households in Đông Hưng village, Nghia Mỹ commune*



*Consultation meeting in Tây Hiếu commune*



*Consultation meeting in Nghia Tiến commune*

## Annex 5: Template for Safeguards Monitoring Report

### I. Summary:

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

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

### II. Safeguards Monitoring Report

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

#### 1. Introduction and Project Overview

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

#### 2. Environmental Performance Monitoring

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

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

**b. Issues for Further Action**

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

**c. Other activities**

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

**3. Involuntary Resettlement Performance Monitoring****a. Summary of Compliance with RP Requirements**

RP Requirements	Compliance status Yes/No/Partial	Comment or Reasons for Compliance, Partial Compliance/Non-Compliance	Issues for Further Action <sup>8</sup>
Establishment of personnel in PMU/PIU			
Public consultation and socialization process		Provide information on: <ul style="list-style-type: none"> <li>• Public consultation, participation activities carried out</li> <li>• Inclusive dates of these activities</li> </ul> To be elaborated on in Item 5	
Land area to be acquired is identified and finalised			
Land acquisition completed			
Establishment of Resettlement Site(s)		Please state: <ul style="list-style-type: none"> <li>• Number of AHs to be relocated as per agreed RP</li> <li>• Number of AHs already relocated</li> <li>• Number of houses built</li> <li>• Status of installation of community facilities to be provided as per agreed RP</li> </ul>	
Compensation payments for affected assets is completed		Please state: <ul style="list-style-type: none"> <li>• Total Number of Eligible AHs and APs (as per agreed RP)</li> <li>• Number of AHs and APs compensated as of this monitoring period</li> <li>• Total Budget allocation as per agreed RP</li> <li>• Total budget disbursed to AHs as of this monitoring period</li> </ul>	
Transport assistance for relocating affected HH		As above	

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

Additional assistance to vulnerable affected household		Please state: <ul style="list-style-type: none"> <li>Total Number of vulnerable AHs and APs (as per agreed RP)</li> <li>Agreed forms of assistance as per RP</li> <li>Number of AHs and APs assisted as of this monitoring period</li> </ul>	
Income Restoration Program		Please state progress per income restoration feature/activity and actual period of implementation	
Temporary impacts have been addressed (affected properties restored to at least pre-project conditions)		Please state: <ul style="list-style-type: none"> <li>Total Number of AHs affected by temporary impacts as per agreed RP</li> <li>Actual Number of AHs and total area affected by temporary impacts (if this differs from the projected number, such as in cases of unforeseen project impacts)</li> <li>Status of restoring affected property</li> </ul>	
Capacity building activities			

**b. Issues for Further Action**

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

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

**a. OHS for worker**

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

**b. Public Safety**

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

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

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

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

**6. Grievance Redress Mechanism****Summary:**

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

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

**7. Conclusion**

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

**8. Attachments**

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