SFG1604 REV

PEOPLE'S COMMITTEE OF BINH DUONG PROVINCE
VIETNAM URBAN WATER AND WASTEWATER PROJECT
ADDITIONAL FINANCING

ENVIRONMENTAL &SOCIAL IMPACTS ASSESSMENT AND MANAGEMENT PLAN

(ESIA/ESMP)

Final

Subproject

Drainage and Wastewater Systems in Di An Town Binh Duong Province

February 2016

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ABBREVIATIONS

AHH	Affected Households
BIWASE	Binh Duong Water, Sewerage and Environmental Company Limited
CPC	Commune People's Committee
CSC	Construction Supervision Consultant
DPC	District People's Committee
DONRE	District Department of Natural Resources and Environment
DOC	District Department of Construction
DPI	District Department of Planning and Investments
ESIA	Environmental and Social Impacts Assessment
HH	Households
HW	Highway
GOV	Government of Vietnam
MONRE	Ministry of Natural Resources and Environment
PMU	Project Management Unit
PPC	Provincial People's Committee
QCVN	Vietnamese National Standard
SEMP	Social and Environmental Management Plan
STD	Sexual Transmitted Diseases
UXO	Unexploded Objects
VUWWP	Vietnam Urban Water and Wastewater Project
WB	World Bank
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

cmd	Cubic meter per day

USD = United States Dollars
VND = Vietnamese currency, Dong

SUMMARY

Background

Di An town is part of the South Binh Duong area which comprises of Thu Dau Mot City and four towns namely Thuan An, Di An, Ben Cat and Tan Uyen. Di An is bordered with Ho Chi Minh city to the south and the west, with Dong Nai province to the north and the east. The town has a total land area of 60 km^2 and a population of 381,000 people by 2014. Two third of Di An's population came from other provinces to work mainly in the towns' industrial sector.

Di An has some drains and sewers installed town long time ago, however, many streets still do not have proper drains or sewers. As the result, flooding happens regularly after rains at 25 locations. Untreated wastewater discharged into existing drains and streams in the town then to Dong Nai and Sai Gon rivers has been causing environmental pollution, negatively affecting the lives and the health of local people. Particularly, untreated wastewater generated in Di An town has been also causing negative impacts on the raw water quality in Dong Nai and Sai Gon rivers, the important sources of domestic water supply (supplying 2 millions cubic meters per day), as these two rivers are bordered with the South Binh Duong area.

The Drainage and Sewer Master Plan of the South Binh Duong area was approved in 2003. Accordingly, a wastewater treatment plant (WWTP) capacity 17,650 m^3/d was built in Thu Dau Mot city and put into operation in 2014 and the second WWTP capacity 17,000 m^3/d is under construction in Thuan An City (Financed by JICA). The third WWTP capacity 20,000 m^3/d in phase 1 (to the year 2020) and construction of some drainage pipes was proposed to be built in Di An town under the Additional Financing of the Vietnam Urban Water and Wastewater Project (VUWWP) financed by the World Bank.

The Project Owner is the Binh Duong Water Supply – Sewerage – Environment Co., Ltd., represented by its PMU, managed the preparation and construction of a new water treatment plant capacity 20,000 m^3/d under the parent project. For the additional financing, PMU recruited the Consultant from the Binh Duong center of Natural resources and Environmental Monitoring to prepare the Environmental and Social Impacts Assessment (ESIA) and Environmental and Social Management Plan (ESMP) for the proposed drainage and wastewater treatment systems for Di An town.

The Proposed Investments

The proposed Binh Duong Additional Financing subproject will be implemented in Di An Town, Binh Duong province. The proposed project comprises of three civil works components: 1) construction of sewers collection system in Di An Town; 2) Construction of a wastewater treatment plant capacity 20,000 m^3/d; 3) construction of a drainage system;

i) Component 1: Construction of new wastewater collection system in four wards including Di An, Tan Dong Hiep, Dong Hoa and An Binh ward. Sewers diameters from 10 cm to 1m will be installed at depth from 1 to 5 m. Seven pumping stations will also be built at seven locations with a total land of 1506 m^2, the size of each pumping station is from 77 to 338 m^2.

ii) Component 2: Construction of a wastewater treatment plant (WWTP) capacity 20,000 cubic meters per day (cmd) by the year 2020. The WWTP will be built in Tan Dong Hiep Ward. Wastewater will be treated using combines physical, chemical and ASBR biological treatment processes. Treated wastewater will be discharged into T4 channel, then Cai Cau stream and finally to the Dong Nai River. The distance from the discharge point of the WWTP to the Dong Nai River is about 8km. The treated wastewater will meet Vietnamese National Standard on Treated Wastewater Quality QCVN 14: 2008/BTNMT (Table 1).

Designed untreated and Treated wastewater quality

Parameter	**Unit**	**Untreated WW**	**Treated WW**
pH	-	5-9	5-9
BOD_5 (20 ^0C)	mg/l	200	30
TSS	mg/l	225	50
Total N	mg/l	40	30
Total P	Mg/l	6	6
Total Coliforms	MPN/100 ml		3000
Other parameters			Equal or lower than the values in QCVN 14:2008/ BTNMT (Table 1, Col. A2)

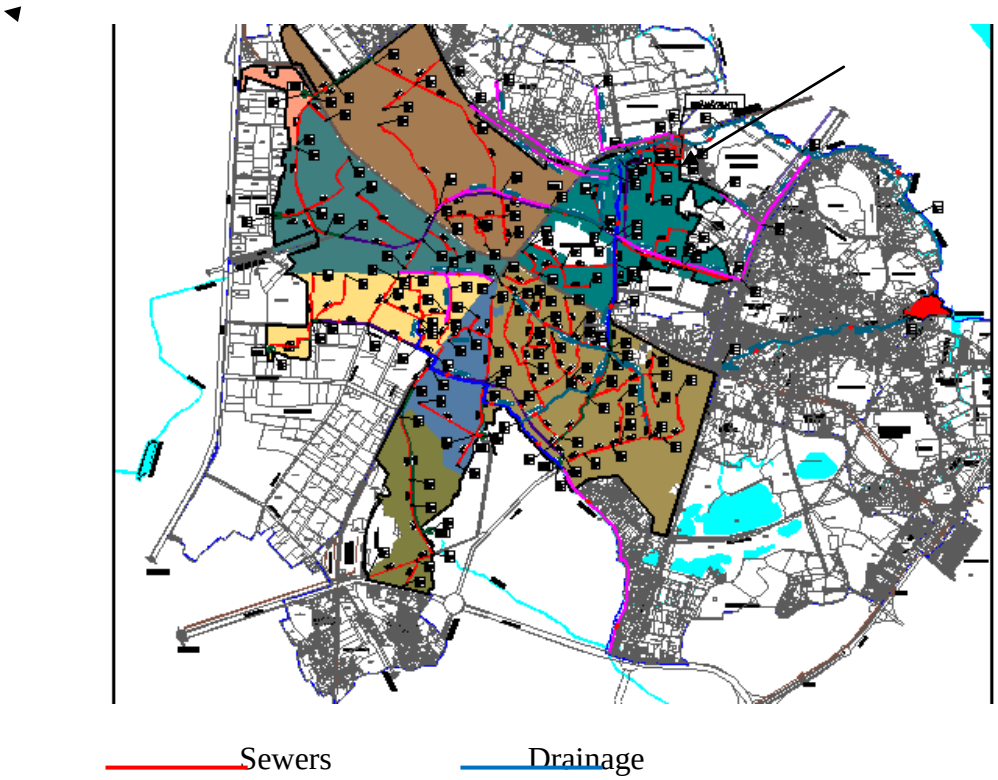
To accommodate the long term designed capacity at 60,000 cubic meters per day (cmd), land area and some structures of the wastewater treatment plant such as administration building, pumping stations, intake and treated wastewater receiving channels will be designed at that capacity at this stage.

iii) Component 3: Construction and rehabilitation of the drainage system. The Scope of work includes construction of new boxed culverts along T4, T5B and Tran Hung Dao Streets; improvement of the existing Cai Cau stream (other name Siep stream) from Km0 to Km2 + 020) and the Lo O Stream. Total serviced area is 1690 ha;

The project's estimated investment cost is 2.516.142.697.214 VND, equivalent to approximately 115 millions USD. The proposed subproject will be financed by the World Bank and GOV counterpart fund.

This Environmental and Social Impacts Assessment (ESIA) and Environmental and Social Management Plan (ESMP) assess the potential environmental and social impacts and risks and propose measures to manage the risks and mitigate the potential negative impacts together with monitoring plan and implementation arrangements as presented below.

Map showing Project Components



The Potential Impacts and Mitigation Measures

Overall, the project will bring positive socio-environmental and health impacts and economical benefits when the project put the stormwater drainage and wastewater systems into operation. The new stormwater drainage built in Tran Hung Dao street, the two boxed drains along T5B and T4 routes, the rehabilitated Cai Cau channel and Lo O stream will bring about better stormwater drainage capacity for the project area. Flooding problems, particularly at 25 locations in the catchments of Cai Cau and Lo O streams where flooding occur frequently will be addressed. Flooding risk in the areas along the Provincial Road 743A, particularly at the intersection with the north-south railway will be reduced when surface run off together with the treated wastewater from the WWTP can follow the T4 channel to the Cai Cau stream. Inundation problem in the Tran Hung Dao street will also be addressed by the new sluices built along the Tran Hung Dao street and the T5B channel which is connected with the Nhum stream. When flooding issues and risks are addressed, obstructions to traffic and daily life activities, environmental pollution problems as well as traffic safety risks associated with flooding will be eliminated. Construction of T4 and T5B boxed drains and the rehabilitation of the Cai Cau and Lo O streams will also contributes to improve sanitation conditions in the area.

When the new sewer pipeline system and the Tan Dong Hiep Wastewater Treatment Plant is put into operation, wastewater from residential areas will be collected and treated before being discharged into waterbodies. Surface and groundwater pollution related to uncontrolled/untreated wastewater in the serviced areas will be reduced. Environmental condition and urban land scape in the project area would be improved.

However, there are also some potential negative impacts and risks during pre-construction, construction and operation phases of the proosed investments. The key pre-construction impacts and risks include safety risks related to unexploded materials that may be left at the WWTP site from the war, 57 households, one company and five organisations will be affected with land acquisition in which 23 households will be relocated. Construction impacts are mostly localised and temporary: i) increased levels of dust, noise; ii) generation of solid waste, particularly approximately 1 million cubic meters of excavated and dredging materials; iii) increased turbidity and sediments in water sources; iv) traffic disturbance and increased traffic safety risks; v) interrupt existing infrastructure and public services; vi) Health, safety and environmental issues related to the workers and the public; vii) social disturbance; and ; ix) 258 households will be temporarily affected due to the construction of stormwater drainage system.The key concerns during operation phase of the wastewater treatment plant would be odour generation (mainly from H_2S, NH_3 and VOC), sludge generation and system failure risk.

The ESIA team worked closely with the feasibility consultants to inform them about the potential impacts and risks, discussed and agreed on the incorporation of the mitigation measures as well as environmental solutions into project proposals, engineering design, construction and operation.

The proposed mitigation measures are summarised below.

Total 57 households will be affected by the Project, among these 23 households will be relocated due to the acquisition of 6.8 ha of land at the wastewater treatment plant in Tan Dong Hiep ward. Binh Duong PPC issued Decision No. 2749/QĐ-UBND dated 25 October 2015 approving compensation and support plan for the proposed Di An Wastewater Treatment Plant. It is expected that relocation will be completed in February 2016, the 23 households to be resettled will be relocated to the city's resettlement area which was used for various projects in the town. The acquisition of 1.506 m^2 for the construction of the pumping stations affects three companies and two organisations. Households temporarily affected by trading activity caused by construction will be supported at 5,000,000 VND/household. AHs will receive supports and allowances as part of the compensation plan, according to the standards and regulations of the Government of Vietnam, including support for stable life, job training allowances, and other special allowances for the poor and vulnerable people with total amount of VND 18,591,704,883. More details please see RAP.

The following measures has been proposed for incorporation into project proposals and detail engineering design:

- Engineering solutions combined with greening by vegetation will be applied for the protection of slops on the Cai Cau and Lo O streams;
- Wastewater will be treated using combined physio-chemical and ASBR biological treatment technology.
- The treatment units within the WWTP will be sited in compliance with the Vietnamese National Standard QCVN 01:2008. This standard requires the WWTP that has biological and odor treatment units and no sludge drying lagoon must have a buffer zone of at least 30 m wide. For project, the minimum distance from some treatment units to the nearest residential buildings:

Item	Distance (m)
Pumping station	50 m
Intake	75 m
Sludge thickening unit	110 m
Sludge drying bed	125 m

To meet QCVN 01:2008/BXD requirements, the WWTP will have a buffer zone of at least 30 m wide from the nearest residential area in which 10 m wide green corridor will be created.

- The units such as the wastewater intake, pumping station, sludge dewatering and compaction within the WWTPs that generates the most odors (VOC, H_2S,NH_3 etc.) will be sited in the northeast of the WWTP which is furthest from the residential area. These units will also be designed in contained buildings. The gases generating odors will be collected and treated using Chemical Scrubber (which includes two chemical treatment towers, the same as in the existing odor treatment unit in Thu Dau Mot WWTP of Binh Duong.
- A 10 m wide green corridor and grass land will be established within the WWTP to create green landscape at the WWTP and separate the concrete buildings with the roads and residential areas near the front of the WWTP.
- Structures that are potentially be built at depth in contact with groundwater which has corrosive potentials due to relative low pH (4-4.5) will be designed with non-corrosive materials
- Toilet, washing, and showers areas will be included in the administration building for the operators to use after working shifts. The administrative building shall be designed in such a way that maximise lighting using natural lights, water and electrical equipment will be energy-saving types.
- Sludge will be transported to the existing composting plant at the South Binh Duong Solid Waste Treatment Complex for composting or brick making
- Along the channels for drainage of Lo O spring and Cai Cau canal, the channel slopes will be designed with concrete boxes for planting vegetation;
- Inclusion of an automatic monitoring system to monitor flow rate at intake and discharge point, flow, pH, COD, TSS, and EC. Having an automatic monitoring system is critical as it allows timely detection of problems if encountered, to ensure the system is operated in a stable manner. At the same time, it also facilitate the monitoring of treated wastewater discharge by environmental management agency. Monitoring Data will be shared with the Binh Duong DONRE. .
- Larsen sheet piles will be applied to reinforce and protect the slopes of pipe trenches to prevent landslide and erosion when excavation depth is 3m or deeper

The Project planned a budget of 560 millions VND (22,700 USD equivalent) to contract a specialised force to carry out UXO clearance before site clearance is started.

To avoid safety risks during site clearance, the Project owner will work with power company to plan for power cut off and inform the affected households prior to site clearance. Workers will be provided with safety cloths and carry out demolition with cares. Timber trees and fruits would be collected for beneficial use to reduce the amount of biomass to be disposed off at the South Binh Duong disposal site. The landscape would be partly compensated with the proposed 10 m wide green corridor to be set up along the fences of the proposed WWTP. Top soil would be retained as much as possible for planting the trees at the green corridor surrounding the proposed WWTP.

The measures proposed to address construction impacts include:

The approximately 1 million cubic meters of excavated and dredging materials which confirmed to have heavy metals under allowable limits will mostly be reused for ground levelling at the Tan Binh resettlement site and the Tan Dong Hiep quarry.

As Di An has long history and is popular to guest workers, there are large number of workers accommodation which is adequate in terms of sanitation, health and safety for the workers in the town, the contractors will be required to hire existing available accommodation to use. Therefore, it is likely that only small contractor's office will be set up at the proposed WWTP site with adequate sanitation facilities. Registering the list of workers to local authorities and informing affected communities about construction schedules are some measures to manage potential social impacts

The disturbed roads will be resurfaced after pipe installations is completed. All costs associated with these mitigation measures were included into the total project costs.

For other construction-related potential impacts and risks, The ESMP proposed a comprehensive Environmental Specifications (ES) for inclusion into bidding documents and construction contracts. It requires the contractor to prepare site-specific Environmental Management Plans based on the proposed mitigation plan set out in the ES. Examples of the mitigation measures included in the ES are: i) the contractor is required to provide safety and environmental training for the workers including informing them about the project's worker's codes of practices, provide adequate protective clothings such as hats, shoes, gloves etc. for the workers to use; ii) protect the disturbed areas with signboards and fences, and restrict access to these areas; iii) implement measures for dust control and maintain sanitation conditions such as cover the trucks during transportation, water dusty areas, daily clean up the access road near the WWTP and the residential areas, ensure that excavated materials must be transported away from disturbed areas within 24 hours; iv) control surface runoff within WWTP construction site to prevent water pollution and sedimentation in nearby drains and streams; v) periodically maintain construction plants and equipment; vi) provide and maintain temporary access to roadside buildings if access is disrupted; schedule construction activities to avoid sensitive hours and days at schools, markets, churches, pagodas etc. Prepare Chance Find Procedures; vii) reinstate the sites after construction; viii) contract an authorised dealer to collect and handle hazardous wastes such as used oil and fuels, or return them to the suppliers; ix) maintain good communication with local authorities and communities etc.

In addition to the measures incorporated into feasibility study and engineering design, some of the potential impacts and risks during operation phase will be addressed as part of operational procedures:

- Packaging materials of the chemicals used during operation phase will be returned to the supplier. The South Binh Duong Waste Treatment Complex will be contracted to collect and treat the wastes, including hazardous wastes generated during operation phase.
- The operators will be trained on workplace environment, health and safety as part of operation. Administration building includes washing and shower facilities for the operators to use.

Summary of Project Environmental and Social Impacts, Risks and Mitigation Measures

IMPACTS/RISKS	MITIGATION MEASURES
PRE-CONSTRUCTION	
Acquire 6.8 ha of land at the WWTP and 1506 m^2 of land for pumping stations and Interceptors: 57 households affected, in which 23 households will be relocated	• RAP prepared. Approximately 18 billions VND (approximately 840,000 USD) has been budgeted for compensation and support to permanently and temporarily affected households • 5 millions VND per business household affected temporarily by construction • Permanently affected households will also be supported with land plot for resettlement, transitional allowance, rent allowance, livelihood stabilisation and training for job change
Loss of vegetation cover and trees: 1107 fruit and timber trees will be cut down	• contract the Di An Public Works Unit or the South Binh Duong Waste Treatment Unit for handling the wastes
Dust and noise from demolition activities (1,950 m^2 of existing houses) and waste transportation	• Wet/water/cover disassembling work and trucks, • Stockpile will be transported to disposal sites within 24 hours. • Speed limit at 40 km/h • Contractors use equipment with the low noise level • No noise –generated activities 10 pm to 6 am.
Generation of 182 tones of biomass as waste	• Follow GOV Decree No. 59/2007/ND-CP dated 09 April 2007 on solid waste management • Reusable or recyclable materials
Interrupt existing services such as power/water supply	• coordinate with Power authority • Inform community at least two days in advance
Safety risk related to unexploded materials from the war, demolition of existing structures	• 560,000,000 VND (25,600 USD equivalent) budgeted for UXO clearance before site clearance. Work place safety rules will be applied
CONSTRUCTION	
Dust, noise, vibration	• use machines meets TCVN 6438-2005 • Arrange vehicles washing areas; • Water the access road daily along 200 m of access road from WWTP, along road sections with medical centres and schools; • Cover vehicle transporting loose materials and temporary storage areas; • Apply speed limit at 40 km/h or less • maintain noise level at or below 90db. • Avoid noisy operations in sensitive time • Inform communities in advance if work at night
Increased sediments in surface water, water pollution risk	• ensure the effluent meets QCVN 08:2008/BTNMT – National Standard on Surface Water Quality. • Control excavation and filling activities. • Create and maintain the ditches NS sedimentation traps at WWTP. • Load construction materials and wastes at least 200m from any water body. • Minimise ground disturbance • used oil and lubricants are stored properly. • An area for vehicle washing is established at the entrance and exit of the WWTP site. Sedimentation trap/manhole will be included to allow setting of solids before wastewater is discharged into the

IMPACTS/RISKS	MITIGATION MEASURES
	environment; • Reinstate all disturbed areas before construction is completed.
Construction waste generation	• Minimise waste generation, reuse and recycle. • Surplus excavated soil will be used for levelling excavated areas at Tan Dong Hiep quarry; • contract with licensed solid waste dealers to collect and transport municipal solid waste • Waste oil and waste containing oil will be collected and stored in accordance with MONRE Circular 36/2015/TT-BTNMT • Clean up and reinstate disturbed areas when construction is finished.
Hazardous waste	• Arrange electric lines in safe manner • Oil, fuel and chemicals will be stored at least 10 m from workers' accommodation and Contractor's Site office. Hazardous materials must be stored on water-proofed floor, bound and roofed. • Warning signs placed at that storage area
Traffic Disturbance and Safety risk	• Place signboard, fences, signal lights • Apply speed limits. • Cover Trucks, clean up materials near the WWTP • Avoid park machines and trucks on the road • Arrange staff to direct traffic • Disturb half of road surface each time for pipe installation when possible • ensure for lighting in the night
Damage or interrupt existing infrastructure/ services	• Control loads of trucks used • Repair, rebuild damaged infrastructure
Health and Safety risks for workers	• Train workers on safety, environmental and health • Provide protective cloth and equipment • Provide mosquito net to prevent dengue fevers. • Fence WWTP construction sites
Health and Safety risks for local residents	• Install and maintain fences, reflective bans and sign boards surrounding excavated areas. • Provide adequate lighting at nigh time at these locations
Social Disturbance	• Carry out pipe installation in stages • Construction materials are loaded in clean and tidy manner. all the wastes and residual materials will be collected and transported away before completion • Create temporary access when access is blocked
Erosion control	• Choose non-corrosive materials for structures that may be in contact with groundwater
Landslide/ soil subsidence	• Apply Larsen pile sheets in excavated holes/trenches from 2.5 m deep
Artifacts exposed	• Chance find procedures developed
OPERATION	
Odor from treatment units of the WWTP	• Addressed by siting and design/engineering measures • Buffer zone 30 m wide and 10 m wide green corridor
Sludge generation: 1142kg/d when the WWTP is operated at 20,000 m^3/day	• Sludge will be contained in the roofed areas roofed drying unit. BIWASE will transport sludge to the South Binh Duong Solid Waste Treatment Complex for composting or brick-making.
Hazardous waste wasted oil; chemical, packaging	• The WWTP register the source of hazardous waste with DONRE. Hazardous waste will be contained in the barrels/contained house

IMPACTS/RISKS	MITIGATION MEASURES
materials	and labeled in accordance with current regulations. Packaging materials of the chemical will be returned to the supplier. All hazardous waste will be transported to and disposed of at the South Binh Duong Solid Waste treatment Complex by licensed dealers.
System Failure Risks	• The Workers shall be required to strictly follow the Operational and Maintenance Procedure of the WWTP. • A standby generator for the wastewater treatment plant will be included at the WWTP for use in case of electric cut-off. • Regularly monitor of the treatment system. • If microorganism are death in the ASBR, untreated wastewater at the intake will be collected and stored in ten hours, microorganism from the Thu Dau Mot and Thuan An WWTPs will be used to restore the microorganism in Di An WWTP

The sensitive receptors of some potential impacts and mitigation measures are summarised below

Object	Sensitive Impacts	Mitigation measures
Di An Medical Center	Dust, Noise affect healthcare activities	Carry out construction in stages Clean up the site every day
Anh Sao and Hoa Quynh Kindergartens Dong Hoa Primary School Dong Hoa Secondary School Tan Dong Hiep Secondary school Dong Thanh and Hoa Hong Kindergartens Nhi Dong Primary School, Bup Sen Hong Kindergarten Hoa Trang Nguyen Kindergarten Hoang Yen, Hoa Lu Kindergarten Hanh Phuc and Hoa Ban Do Kindergarten, Hoa Anh Dao Preschools Vo Truong Toan Secondary School	Dust, Noise affect teaching activities and children' sleeps Traffic disturbance Traffic safety Safety risks	Install fence and barriers Avoid noisy activities sensitive hours Arrange staff to direct traffic at peak hours Carry out construction in stages Avoid transportation of materials and wastes during peak hours Clean up the site every day
Agricultural product market Vinatex supermarket in Di An Section 5 market in Di An Tan Long market Song Than Trade Center Big C Di An	Affect businesses, shopping activities	Inform community in advance Carry out construction in stages Avoid transportation of materials and wastes during peak hours Clean up the site every day
Dong Hoa residential area and supermarket		Inform community in advance Carry out construction in stages Clean up the site every day
Tran Hung Dao, Hai Ba Trung, Nguyen Tri Phuong, Le Hong Phong streets Road to Dong An residential area	Traffic disturbance Traffic safety	Install fence and barriers Arrange staff to direct traffic at peak hours Carry out construction in stages

Object	Sensitive Impacts	Mitigation measures
No. 21, West East 1 streets, provincial road 743A , National highway 1K		
War Soldiers cemetery in DT 743 street	Noise Visual impacts Spiritual impacts	Schedule construction avoid festival or religious events Carry out construction in stages Clean up the site daily Implement good site management practice
Van An Pagoda in Nguyen Tri Phuong Street		
Phap An, Bui Buu, An Linh Pagodas in Truong Tre St.		
Di An church Tran Hung Dao St.		

Environmental Monitoring and Supervision, Implementation Arrangements

Environmental Quality including surface water quality, wastewater quality will be monitored during pre-construction, construction and operation phases (detailed in Chapter 8).

The detail engineering design consultants will be responsible to incorporate environmental mitigation measures into detail engineering design, cost estimations and other relevant project documents including construction bidding documents and contracts, and construction supervision contracts.

The Contractor will be required to prepare and implement a site-specific SEMP, which is subjected to review and approval by the Construction supervision consultant, in accordance with the Project's Environmental Specifications to be included in the bidding documents and construction contracts. The World Bank Group Guidelines on Environmental, Health and Safety will be applied in the SESMPs.

Environmental Monitoring and Supervision tasks will be adhered to the construction supervision contracts. The Construction Supervision Consultant (CSC) will review and approve SEMP and other environmental-related plans and variation proposals submitted by the contractors. When non-compliance are detected or there are complaints, the CSC will direct the contractors to implement the corrective actions and report to the Project Owner. The CSC will be responsible to report on environmental compliance as part of monthly progress report. Six monthly reports will also be prepared and submitted to relevant Vietnamese Environmental Management authority.

Binh Duong PMU with outstanding environmental management performance records in the parent project will be responsible for the overall coordination, monitoring and management of the AF project's ESMP implementation. Binh Duong PMU will also be responsible for reporting to the Bank's Task team and relevant environmental management authorities about the project's environmental performance on regular basis. The World Bank task team will monitor and supervise ESMP implementation periodically

1. FOREWORD

1.1. Context

The South Binh Duong region includes Thu Dau Mot City and four towns: Ben Cat, Tan Uyen, Thuan An and Di An with total land area of 592 km^2 (accounts for 22% of the total land area of Binh Duong Province) and population of over 1 million people (accounts for 67.47% of the province's total population). This area is bordered with the Dong Nai River to the east, with the Saigon River to the west and Highway 1A to the south. This area has the most number of industrial parks, urban centres and residential areas in Binh Duong Province.

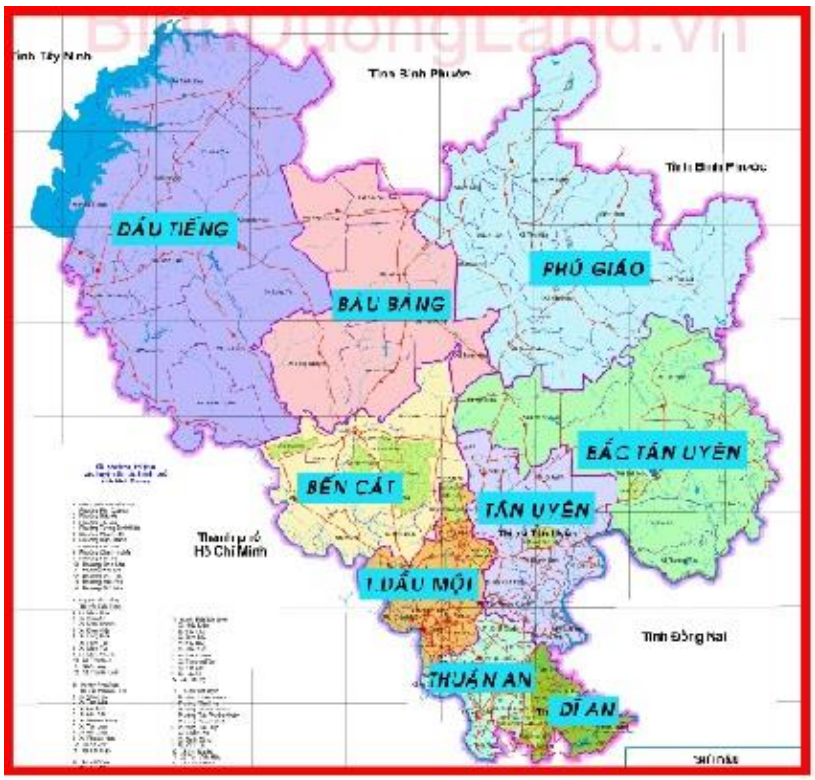


Figure 1-1. Location of Di An Town in Binh Duong Province

The existing combined drainage and sewer system in Di An Town were constructed at different time. There are no existing drains along many streets, or drains have been blocked causing flooding problems in the town. As their is no existing sewers, untreated wastewater has been led to existing drains then directly discharged to streams and rivers. Such practice has been negatively affecting urban landscape, causing environmental pollution and affecting the health of local people in which two third are poor guest workers from other provinces working in Di An town. Currently, storm water and waste water from over 80% land area of Di An Town has been finally discharged to the Dong Nai river, and the remaining 20% has been discharged to the Saigon river. These two rivers are particularly important sources of raw drinking water which has been supplying 2 millions cubic meters of raw water each day for Ho Chi Minh City, Dong Nai and Binh Duong province.

The Masterplan on Drainage, Sewer and Sanitation of the South Binh Duong area has been approved by the Provincial People's Committee (PPC) at Decision No. 4058/QD-CT dated

October 20, 2003. Subsequently, some projects were proposed and implemented in accordance with the approved Masterplan. Among these were the Water Environment Improvement Project (WEIP) for the South Binh Duong area. Under phase 1 of WEIP, a municipal wastewater collection and treatment system with capacity of 17,650 cubic meters per day(cmd) was built for Thu Dau Mot City and put into operation in May 2013. At present, wastewater treatment plant (WWTP) has been operating stably, the quality of the treated wastewater meets the Vietnam National Standard QCVN 14:2008/BTNMT, Column A (applicable for treated wastewater discharged into raw domestic water supply source). Under Phase II of WEIP, the second wastewater collection and treatment system with capacity of 17,000 cmd for Thuan An Town has been under construction.

The Project covering the construction of the drainage and sewerage collection and treatment system for Di An town has been proposed under the World-Bank funded Vietnam Urban Water and Wastewater Additional Financing Project. The Project aims at protecting water quality in the Dong Nai and Saigon rivers in accordance with the approved drainage and wastewater treatment masterplan of South of Binh Duong region.

This project is in line with the Prime Minister's Decision No.1930/QD-TTg dated 20/11/2009 on the development orientation of the Vietnam urban drainage and Industrial Zones to the year 2025 with visions to the year 2050. The Project is also compliance with the basic objective of the Masterplan on Drainage, Sewerage and Industrial Wastewater in the Dong Nai river catchment to the year 2030 which was approved by the Prime Minister in Decision No.1942/QD-TTg dated 29/10/2014. This masterplan set out the objectives to reduce flooding in urban areas and expand serviced areas up to 80% by 2020, increasing wastewater collection and treatment rate up to 60% in 2020 for Class III cities or higher, 40% in 2020 for Class IV and V cities, gradually replacing subsidies with service charges and set up the wastewater treatment plant in operation.

The Master plan on sewerage in Southern Binh Duong area was approved in October 2003 at Decision No.4058/QD-CT; The Socio-economic Master plan of Binh Duong province to the year 2020 with vision to 2030 was also available. The Masterplan for Di An Town approved in 2009 proposed 3 locations for wastewater treatment plans (WWTP), one in the Northeast, one in the Southeast and one in the east of Di An Town. However, the actual scope and locations of the WWTP in the project has been changed compared to the approved masterplan due to rapid socio-economic development and urbanization in Di An town. Urban status in 2015 is very different from the orientation set out in the approved masterplan. Due to the limitations of available financial resources, this proposed project only cover wastewater collection for center areas, densely populated and commercial centers, administrative centres of Di An ward, Tan Dong Hiep ward and a part of An Binh ward, Dong Hoa ward, will be collected to the plant located in Northeast Tan Dong Hiep ward. The rest of the An Binh ward, Dong Hoa ward and Tan Binh ward will be implemented in the following phases.

The two remaining wards with a small population, difficult collect wastewater due to scattered residential areas, unstable, affected by major traffic projects such as the Eastern bus station, Metro project, My Phuoc - Tan Van road project and the other projects of warehouse - ports. Binh An ward and Binh Thang ward will be collected for treatment plant located in the Southeast at a later phase.

1.2. Overview of Environmental and Social Impacts Assessment

The Project's Environmental and Social Impacts Assessment (ESIA) and Management Plan (ESMP) has been prepared in parallel with the feasibility study of the project in order to identify and assess the potential impacts, and propose plan for prevention and avoidance, minimisation and control of the potential negative social and environmental impacts that may occur during project implementation. The environmental friendly solutions aiming at sustainable development has also been considered in the project.

The ESIA report has been made follow Safeguard Policy on social environment of World Bank and related policies of Vietnamese Government.

1.3 Scope of ESIA

Research on Environmental and Social Impacts Assessment includes following activities:

- ❖ Collect data on physical, biological and social – economic conditions of the project area.
- ❖ Screen impacts are possibly happened during pre-construction, construction period and operation period.
- ❖ Propose measures for mitigation of negative impacts.
- ❖ Consult with affected community about the impact and solution for minimization;
- ❖ Propose Environmental and Social Management Plan (ESMP) and mechanism for implementation of the ESMP.

1.4 ESIA methodology

The ESIA report has been made basing on application of following methods: data synthesizing method, field survey method, public consultation method, comparison method.

(1) Data synthesizing method

The report has applied the solutions: summary and analysis of information, document, data in order to supply the information to serve for the for the period in implementation of the Report for assessment of the environmental and social impacts. The basic documents including:

- ✓ Description of the project " Construction of Drainage and Wastewater System in Di An town – Binh Duong province", Binh Duong Water Supply – Sewerage – Environment Co., Ltd, 2015;
- ✓ Description of the project "drainage system in Di An Wad and Tan Dong Hiep Industrial Park of Di An Town, Binh Duong province", Department of Agriculture and Rural development, 2015;
- ✓ Report on social economy of Di An Town in 2014;
- ✓ Report on actual status of environment in Binh Duong province in 2014, Department of Natural Resources and Environment of Binh Duong province;
- ✓ Statistical Year Book of Binh Duong province in 2014, General Statistic Office of Binh Duong province;

(2) Field survey method

- This method will be applied during the survey on project area conducted in July, 2015 until November, 2015.

- Survey and sampling of the background environment before carrying out the project;
- Survey of project area to identify potential impacts of the project on people and social economy;

(3) Public consultation method

During the period for establishment of the report, the consultant worked closely with the technical consultant and Project Management Unit of the project to conduct consultations with local authorities and the potentially affected local people to brief them about the project, the main contents of the ESIA and ESMP Reports including the key potential impacts, mitigation measures, monitoring and supervision. Consultation meetings was participated by the local authorities, Fatherland Front Committee and representatives of the households in the project area. The Project Management Unit will disclose the ESIA and ESMP of the project on its website, Information Board of Binh Duong PPC and project CPCs after the report has been approved by relevant authorities.

(4) Comparison method

Synthesis of the data collected, compared with the national technical standards on environment by the Minister of Natural Resources and Environment issued . From which to draw conclusions about the impact of investment activity of construction and operation of the project on the environment, and propose measures to minimize the impact of environmental pollution .

1.5 ESIA Preparation Team

Binh Duong Center of Natural resources and Environmental Monitoring has been recruited to prepare the ESIA and ESMP of the project. ESIA team includes following members:

Table 1-1List of ESIA team members

No	Name	Qualifications	Tasks
1	Mr. Tran Thanh Quang	Master of Environmental Management	Team leader
2	Ms Le Thi Phu	Master of Environmental Management	Leading sampling and analysing
3	Mr. Nguyen The Tung Lam	Master of Environmental Management	Synthesizing the ESIA report
4	Mr. Tran Dung Quoc	B.Sc in Biology	Organizing and conducting sampling activities
5	Mr. Nguyen Chi Cuong	B. Sc in Chemistry	Organizing and conducting analysing activities
6	Mr. Pham Quang Chanh	Environmental Engineer	field survey, socioeconomic conditions appraisal
7	Mr. Tran Le Nhat Giang	B. Sc Environmental Science	Writing Chapter 5,7,8
8	Ms Doan Thi Thuy Nga	Engineer, Environmental Management	Writing Chapters 1-4,6, 9

The ESIA consultant has been closely collaborating with the project's owner, Binh Duong Water Supply – Sewerage – Environment Co., Ltd, and the FS consultant, Water Supply, Sewerage and Environment Consultancy JSC (WASE), during ESIA preparation process.

2. PROJECT DESCRIPTION

2.1 Project Name

The Project name is "Drainage and Wastewater Systems in Di An Town, Binh Duong Province (herein after called "Project" or "The Project").

2.2 Project Owner

The Owner of the Project is the Binh Duong Water Supply, Sewerage and Environment Company Limited (BIWASE). The Project Steering Board (PSB) and the Project Management Unit (PMU) will, on behalf of the Project Owner, be responsible for the preparation, implementation and management of the Project.

The Representative of the Project Owner is Mr. Nguyen Van Thien, Chairman cum CEO. The contact address of the Project Owner is 11 Ngo Van Tri Street, Phu Loi Ward, Thu Dau Mot City, Binh Duong Province. Telephone number is 84-(0)650-3827789; Email address: binhduong@biwase.com.vn,Website: www.biwase.com.vn

2.3 Project Description

The Drainage and Wastewater Systems Project for Di An Town includes four main components described below

Component 1: Construction of wastewater collection network (estimated cost of 31.5million US dollars). This component will build the wastewater collection network in following wards Di An, Tan Dong Hiep and a part of An Binh, Dong Hoa, with a total area of 1,642 hectares and a served population of 187.100people. Scope of work under this Component includes: i)detailed design, supervision, quality control of network works, ii) build collection networks, connections, pumping stations, iii) installation of operating equipment, related PS equipment.

Component 2: Construction of a wastewater treatment plant (estimated cost of 18.7 million US dollars). The specific objective of this component is to build a wastewater treatment plant with capacity of 20,000 m^3/day. The WWTP will be built in Tan Dong Hiep Ward, and Wastewater will be treated using combines physical, chemical and ASBR biological treatment processes. Treated wastewater will be discharged into T4 channel, then Cai Cau stream and finally to the Dong Nai River. The treated wastewater will meet Vietnamese National Standard on Treated Wastewater Quality QCVN 14: 2008/BTNMT (Table 1, Column A).

Component 3: Construction of storm water drainage systems (estimated cost of 33.2 million US dollars). This component is to build stormwater drainage network including drains and open ditches with a total length of 10.112m serving for drainage services. The scope of work includes construction of new boxed culverts along T4, T5B and Tran Hung Dao Streets; improvement of the existing Cai Cau stream (other name Siep stream) from Km0 to Km2 + 020) and the Lo O Stream. Total serviced area is 1690 ha

Component 4: Procurement of materials, specialized equipment and institutional building (estimated cost of 2.2 million US dollars)

Detail descriptions of Components 1, 2 and 3 are described below.

2.3.1Wastewater Collection Component

As there is no existing sewers in Di An town, the Project will built a new wastewater collection system for seven sub-basins described in Table 2-1 below.

Table 2-1 Wastewater Collection Sub-Basins

Basin	Service Area	Land Area	Route/streets	Pump station
1	Tan Dong Hiep Ward. Borders with Ly Thuong Kiet Street to the South, Metro to the North, Song Than 1 Industrial Park (IP) to the West and Railway to the East	264 ha, in which 140 ha needs pump station	Nguyen An Ninh Street	G1-1, Q = 29.70 l/s G1-3, Q = 16.50 l/s
2	Tan Dong Hiep Ward. Borders with Le Hong Phong Street to the North, DT 743C Street to the South, railway to the East and Song Than IP to the West	About 327.95 ha	Main routes: Le Hong Phong Street, 743C Street	P1-1, Q = 226.50 l/s
3	Di An Ward Borders with 2nd sub-basin to the North, Street 21 of Song Than 2 IP to the South, Nguyen An Ninh Street and railway to the East and Street No 18 to the West	142 ha, in which 65.03 ha needs pump station	Street No 21 and some internal roads of residence area	G1-2, Q = 29.20 l/s
4	Di An Ward Borders with Ly Thuong Kiet Street to the North, Street No 9 to the South, Song Than 1 IP to the West, Truong Tre Street and Linh Xuan Ward, Thu Duc District HCM City to the East	115 ha 28ha needs pump station	Street No 21	G1-4, Q = 11.7 l/s
5	An Binh Ward Borders with Street No 9 to the North, National way 1A to the South, Truong Tre Street to the East and Song Than railway station to the West	139 ha	Nguyen An Ninh Street	G1-4, Q = 28.40 l/s
6	Dong Hoa Ward Borders with Metro to the North, Thu Duc District of HCM City to the South, Truong Tre Street to the West, National Way 1K to the East	416 ha	Tua Go Ma Street	P1-2, Q = 383.2 m3/s
7	Tan Dong Hiep Street Borders with My Phuoc - Tan Van Street to the North, Metro to the South, National way 1K to the East, Nguyen An Ninh Street to the West	220.60 ha		

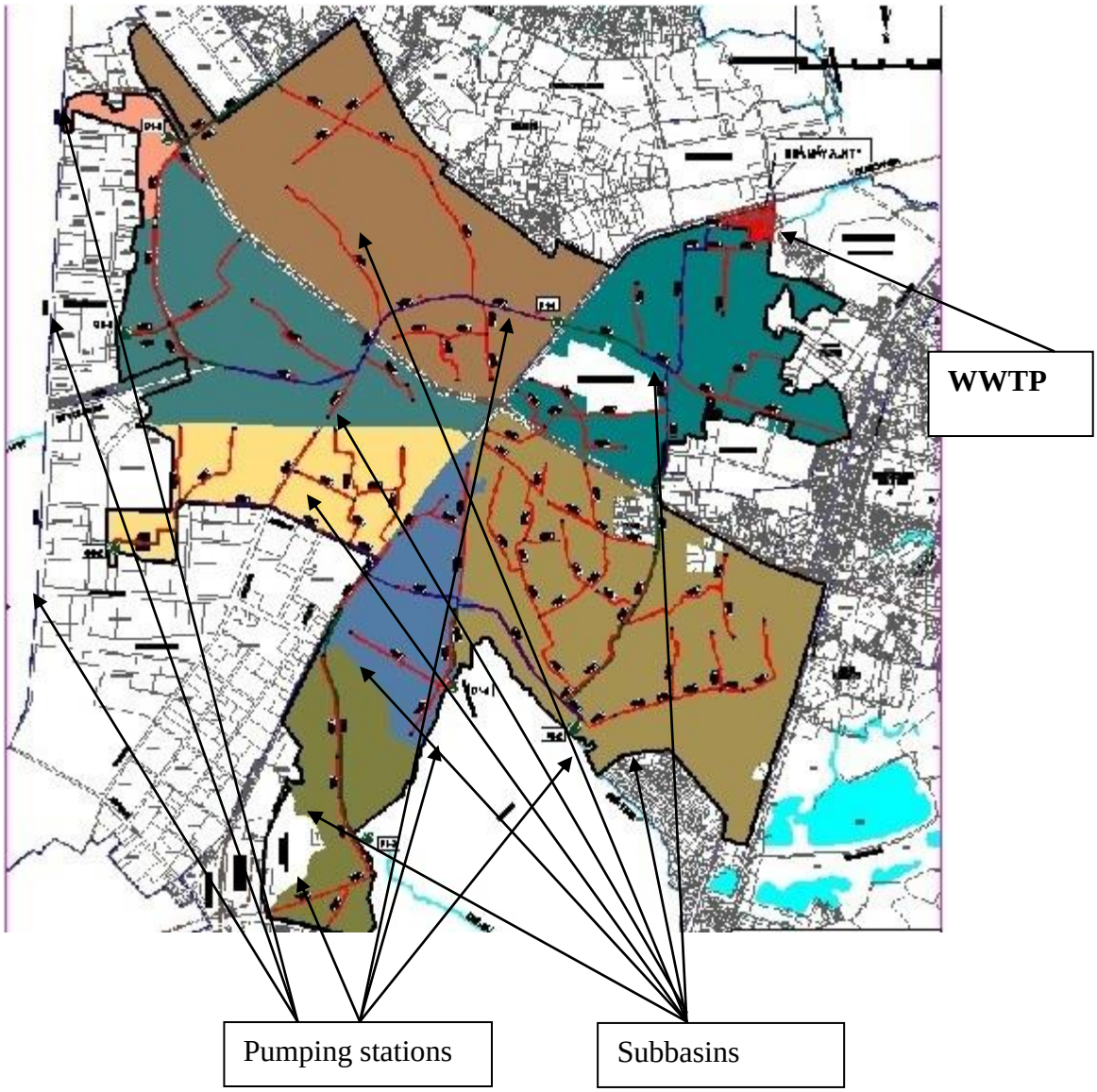


Figure 2-1.Location Map of Wastewater Component

Wastewater collection system includes primary, secondary and tertiary sewers in which secondary and tertiary pipes are collection pipes. Primary (or main) pipe routes include:

- Route #1 includes Provincial Road (PR) 743B (connected with secondary sewers in Tan Dong Hiep and Tan Binh Wards - sub-basins 1, 2 and 7), joins with Route #2 pipes at the junction between PR 743 and Hai Ba Trung street before joining the WWTP. Route 1 is 4,360m long, the pipe diameters range from D400 to D1000.

- Route #2 starts from the No 21 road near Song Than 1 IP (receiving wastewater from sub-basins 3, 4, 5 and 6 before entering P1-2 pumping station) through Tua Go May street to the WWTP. Route 2 is 4,200m long, diameter ranges from D400 to D800.

Table 2-2Wastewater collection Pipes

Item	Installation Depth (m)	Quantity (m)	Item	Installation Depth (m)	Quantity (m)
Primary Pipes					
HDPE DN400, PN8	1 – 5	9,958	Concrete D800, H30	1 – 5	3,625
HDPE DN500, PN8	1 – 5	2,969	Concrete D1000, H30	1 – 5	1,510
HDPE DN600, PN8	1 – 5	2,525			
Secondary Pipes					
uPVC connecting gasket PN8, DN200	1 – 5	2,921	uPVC connecting gasket PN8, DN300	1 – 5	28,149
Pressure pipe					
HDPE DN200	1 – 5	2,540	HDPE DN500	1 – 5	650
HDPE DN250	1 – 5	820	HDPE DN600	1 – 5	2,100
HDPE DN400	1 – 5	1,750			
Tertiary sewers					
uPVC D150 PN8	0.8- 2	120,000	uPVC D100	0.8- 2	200,000
Manholes, D800-1200	1 – 5	772 pcs			
Note: When installation depth is ≥3m, Larsen sheet piles will be used for slop protection					

The photo below illustrates secondary and tertiary (connected to households) sewer system.

Figure 2-2.Secondary and Tertiary Sewer Collection system

Source: Environmental Education Center – Duc Ninh Waste Water Treatment Plant, Dong Hoi

b- Wastewater Pumping Stations

As the Project's serviced area is relatively large while natural ground elevations makes gravitational transmission not feasible, 7 pumping stations were proposed at locations shown in Figure 2-1. Table 2-3 below presents basic information about the pumping stations.

Table 2-3 Pumping Stations

No	Pumping station	Pump selection (1 backup)					Location (Ward)	Land Area (m^2)
		No. of pumps (piece)	Q (m^3/h)	H (m)	Capacity			
					1 pump (kW)	Station (kW)		
1	G1-1	2	13.7	16.0	85.96	85.96	Tan Dong Hiep	115
2	P1-1	2	119.9	9.0	423.12	423.12	Tan Dong Hiep	338
3	G1-2	2	20.2	13.0	103.05	103.05	Di An	77
4	P1-2	2	217.0	24.0	2041.84	2041.84	Dong Hoa	332
5	P1-3	2	37.7	25.0	369.71	369.71	Binh An	236
6	G1-3	2	11.4	12.0	53.75	53.75	Tan Dong Hiep	213
7	G1-4	2	17.8	12.0	83.66	83.66	Di An	95
	Backup							100
Total								1,506

Each pumping station has dimensions L x B x H = 24.0m x 15.8m x 7.65 m. Pumping chamber is 6.5m deep underground. The pump house will be reinforced concrete protected with metal roof. At least 2 pumps will be installed at each station. These pumps are operated automatically and in turns in order to reduce the number of start up of each pump. Booster pumping stations will be installed pipes for overflow discharge in case of emergency. Coarse screen will be installed at each pumping station to remove garbage from inflow wastewater. Pumping station will be designed with anti-corrosion concrete.

2.3.2 Wastewater Treatment Plant (WWTP)

The WWTP will be constructed at Tan Dong Hiep Ward of Di An Town. The WWTP is next to the Cai Cau stream. Under the Project, treatment units will be designed at built with the plant's designed capacity at 20,000 cmd. However, some items such as the administrative building, pumping station, intake, treated wastewater receiving streams (T4 and Cai Cau streams) etc. will be designed and built to accommodate the plant's future capacity at 60,000 cmd. The treated wastewater will meet Vietnamese National Standard on Treated Wastewater Quality QCVN 14: 2008/BTNMT (Table 1, Column A).

Table 2-4 Untreated and Treated Wastewater Quality

No	Indicator	Unit	Untreated wastewater	Treated wastewater (column A, QCVN 14: 2008/BTNMT)
1	pH	-	5-9	5-9
2	BOD_5 (20 ^{0}C)	mg/l	200	30
3	Total Suspended Solids (TSS)	mg/l	225	50
4	Total Nitrate	mg/l	40	30
5	Total phosphorous pho	Mg/l	6	6
6	Total Coliforms	MPN/100 ml		3000
	Others			lower or equal to the value at QCVN 14:2008/BTNMT (table 1, col A).

Wastewater will be treated at the WWTP by combined physical, chemical and ASBR biological treatment processes described below.

Wastewater from sources follows the collection pipeline network and pumping station to the intake at the WWTP where garbage will be screened, sand will be sedimented and scums are removed. After that, wastewater will come through physio-chemical treatments then to ASBR bio-treatment unit. Finally, treated water will be disinfected by UV ray, led to stablilisation pond and discharged into T4 canal and Cai Cau stream, then through the Tan Van stream to the Dong Nai river. The distance from the discharge point to the Cai Cau stream is about 10 meters and to the Dong Nai river is 7400 m.

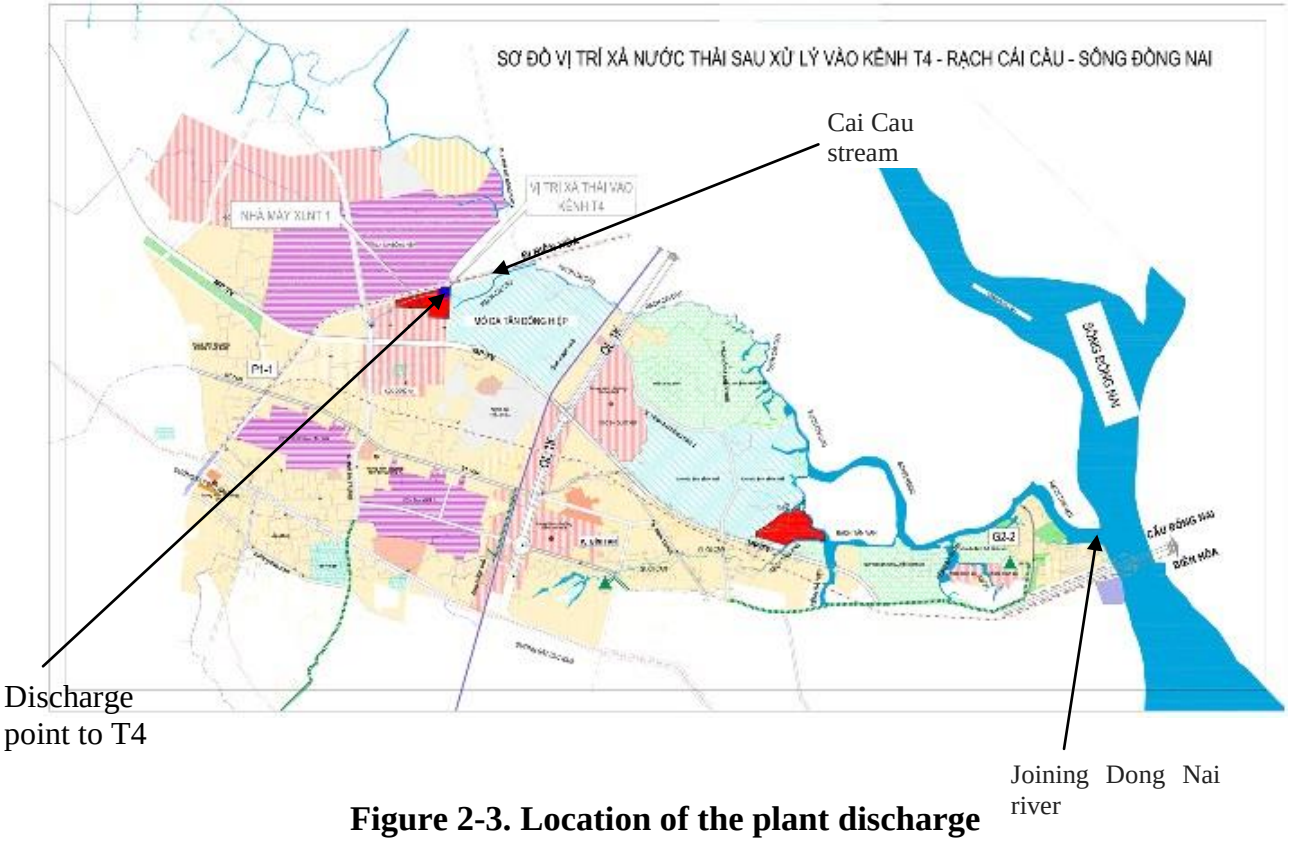


Figure 2-3. Location of the plant discharge

The WWTP has a odor treatment unit to treat the smelly gases generated from the intake, regulating pond, sludge compaction unit, sludge drying unit and ASBR biological tanks. Sludge from the intake and residual activated sludge from ASBR tank will be led to the sludge thickening and holding units, then to centrifugal compaction machine. It is estimated that at operating capacity of 20,000 cmd, each day 1,142 kilograms of dry sludge will be generated from the WWTP. The dried sludge will be transported in specialised trucks every three days to the existing South Binh Duong Solid Waste Treatment Complex for composting or brick production. This Complex is located in Ben Cat Town, Binh Duong province, owned and being operated by BIWASE.

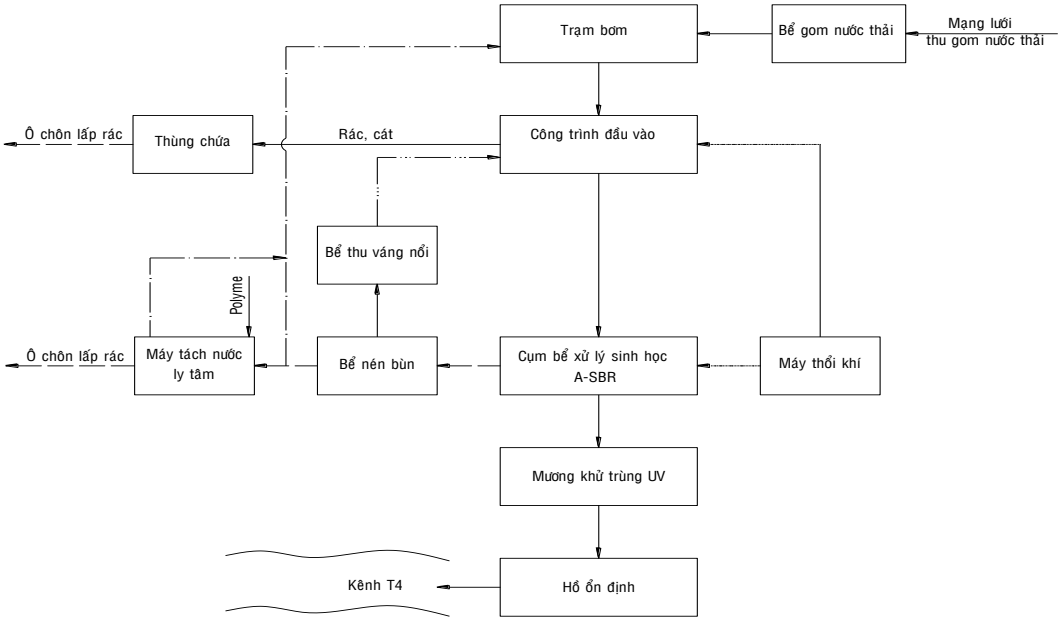


Figure 2-4.Wastewater Treatment Processes

The treatment units and structures of the wastewater treatment plant are described in Table 2-5below:

Table 2-5Components of the WWTP

Unit	**Dimension (LxBxH)**	**Note**
Intake	34.4m x 17.8m x 14.05 m	Reinforced concrete
ASBR tank	75.0m x 38.0m x 7.0 m	Reinforced concrete covered by steel frame roofed with metal sheet
Sludge thickener (2 tanks)	7.4m x 7.4m x 8.8 m	
Disinfection	27.1m x 6.41m x 5.9 m	Reinforced concrete
Sludge drying	19.9m x 15.4m x 13.1 m	Reinforced concrete covered by steel frame roofed with metal sheet
Odour treatment	27.25m x 16.8m x 5.55 m	covered by steel frame roofed with metal sheet
Power house and electrical substation	25.1m x 19.8m x 8.35 m	- Brick wall, painted wall
Administration building and laboratory	40.2m x 14.6m x 17.40 m	- 4 holes brick wall, painted wall
Warehouse	39.0m x 24.5m x 8.4 m	One storey house, steel frame, corrugated steel roof
Parking area	45.5m x 24.5m x 8.4 m	One storey house, steel frame, corrugated steel roof
Internal roads	- B 4-5 m.	Curb: made by stone concrete, stone 10x20. Pavement structure: made by asphalt concrete

Gate and fence	Gate: B=5.0m wide. In front fence: 115m long, 2.4m high, brick basement on 0.6m ground beam. Other sides' fence: 1,065m long, 2.4m high.	Gate: Pillars are by steel concrete, granite – veneered. Doors made by structural steel and plated steel. Fence: made by brick on steel concrete ground beam, binding with concrete pillar.
Drainage	Reinforced concrete storm water drains D400-1200 Treated wastewater from stabilised pond is led through 13 m long reinforced concrete ditch D1000, then to Siep stream by reinforced concrete drain D1200	- storm water drainage shall collect rainwater within the WWTP and discharge to Siep stream.
Trees	10 m wide corridor	aspoplar, almond....species
Fire detection and fighting	Smoke detection, alarms, portable extinguisher and fire hydrants	

Waste water after treatment from stabilization pond will be reused for tree watering, fire fighting, cleaning within the WWTP.
A 10 m wide green corridor and grass land will be established within the WWTP (along the fences) to create green landscape and separate the concrete buildings with the roads and residential areas near the front of the WWTP.

Structures that are potentially be built at depth in contact with groundwater which has corrosive potentials due to relative low pH (4-4.5) will be designed with non-corrosive materials.

Toilet, washing, and showers areas will be included in the administration building for the operators to use after working shifts. The administration building shall be designed in such a way that maximise lighting using natural lights, water and electrical equipment will be energy-saving types.

Access Roads and Buffer zone

The WWTP will be accessible through PR743B and My Phuoc – Tan Van road. The treatment units within the WWTP will be sited in compliance with the Vietnamese National Standard QCVN 01:2008. This standard requires the WWTP that has biological and odor treatment units and no sludge drying lagoon must have a buffer zone of at least 30 m wide. For project, the minimum distance from some treatment units to the nearest residential buildings:

Table 2-6 Buffer Zones of WWTP Treatment Units

Item	**Distance (m)**
Pumping station	50 m
Intake	75 m
Sludge thickening unit	110 m
Sludge drying	125 m

To meet QCVN 01:2008/BXD requirements, the WWTP will have a buffer zone of at least 30 m wide from the nearest residential area in which 10 m wide green corridor will be created.

2.3.3 Drainage Component

The drainage system of the Project consists of 3 new boxed drains routes on T4, T5B, Tran Hung Dao Street, and the rehabilitation of the existing Cai Cau Stream and Lo O Streams.

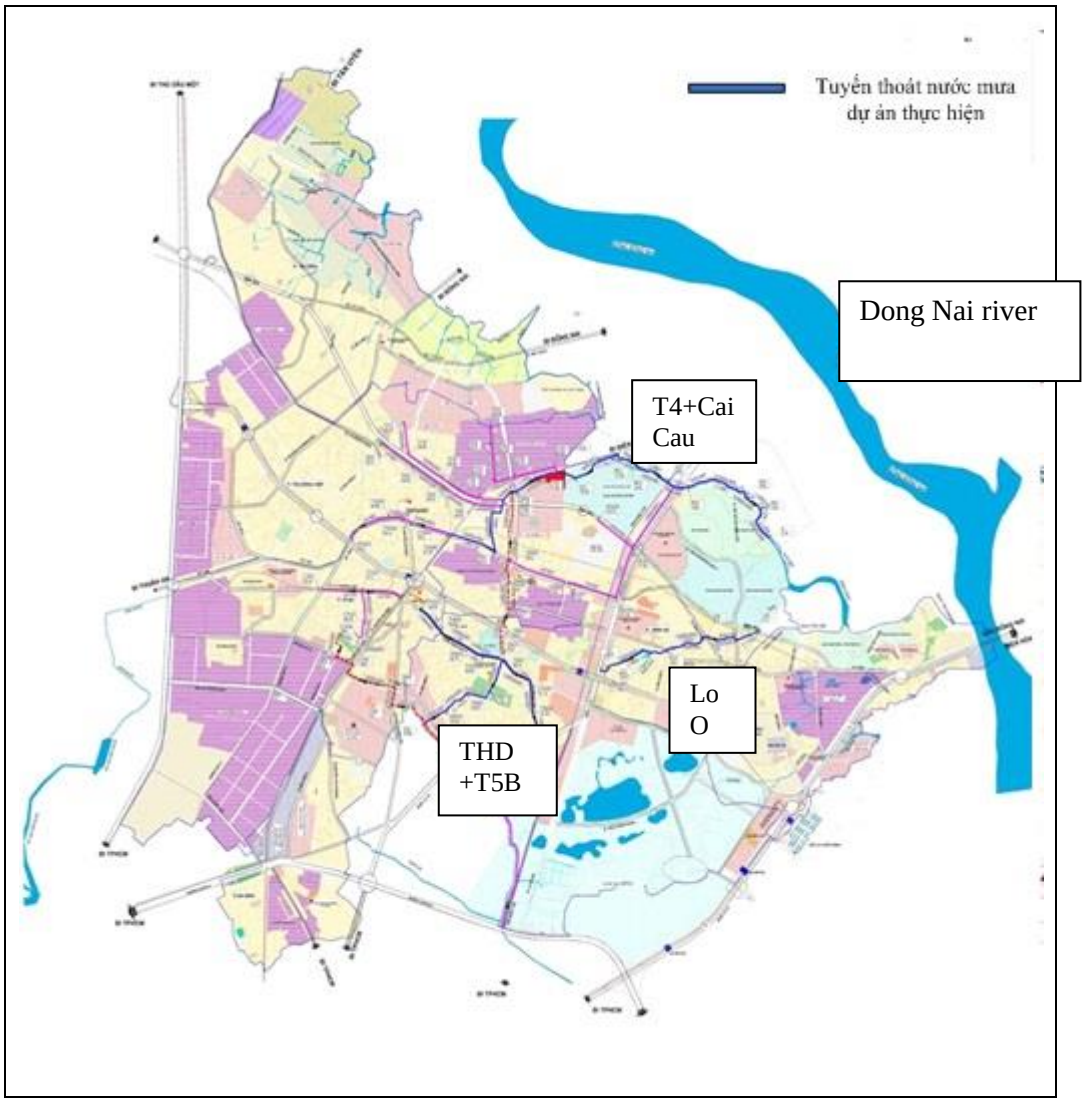
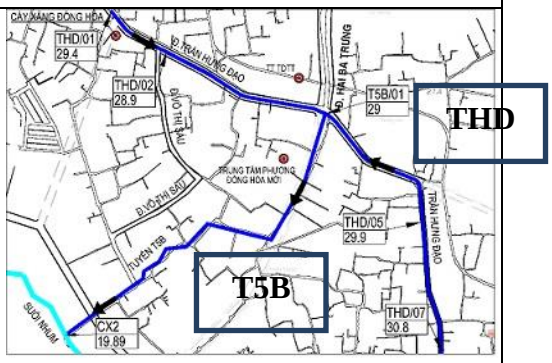
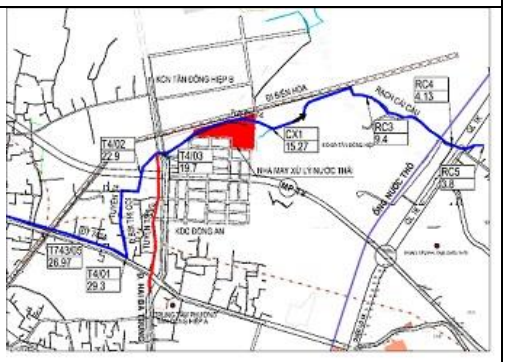
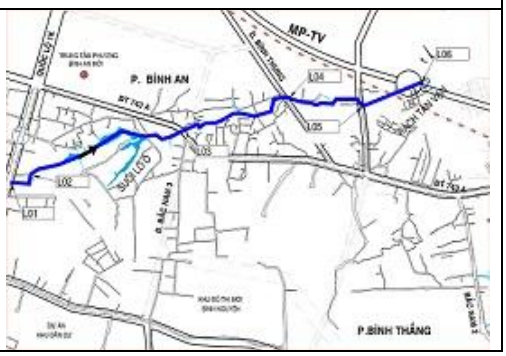


Figure 2-5. Proposed Project Locations

Basic technical parameters and the locations of these drains are presented in Table 2-7 below:

Table 2-7 Drainage Designed Parameters

Route	Dimension (m)	Length (m)	Map
Tran Hung Dao (THD) – Sluice		**2.485**	
K0+00÷K0+330	2x2	330	
K0+330÷K1+220	2.5x2.5	890	
K2+485÷K1+855	1.6x2	630	
K1+855÷K1+220	2x2	635	
T5B – Boxed drain		**1.547**	
K0+00÷K1+547	2x2x2.5	1547	
T4 - Boxed drain		**2.180**	
K0+00÷K1+450	2x2.5x2.5	1450	
K1+450÷K1+560	2x2.5x3	110	
K1+650÷K2+180	3x3.5x3.5	620	
Cai Cau stream – open channel		**2050**	
K0+000÷K1+170	13x3.5	1170	
K1+170÷K1+650	14x3.5	680	
K1+650÷K2+20	16x3.5	200	
Lo O stream- Open canal		**1.750**	
K0+990÷K1+620	8x3	630	
K1+620÷K2+740	10x3	1120	

Installation depth will be from 0.7 m from the ground to the top of the drains.

2.3.4 Earthwork Volumes

The quantity of earthwork, mainly excavation and filling, during construction phase of the Project components are shown in Table 2-8 below.

Table 2-8 Earth Work Volumes

No	Item	Top soil removal (m^3)	Excavation(m^3)	Filling(m^3)	Residual soil to be disposed (m^3)
1	WWTP	20,000	92,730	201,800	45,000
2	Main pipelines		102,000	32,000	70,000
3	Secondary pipelines		95,000	41,000	54,000

No	Item	Top soil removal (m^3)	Excavation(m^3)	Filling(m^3)	Residual soil to be disposed (m^3)
4	Tertiary pipelines		330,000	160,000	170,000
5	Pumping stations		1,840	1,000	840
6	T4 boxed drain		190,000	80,000	110,000
7	T5B boxed drain		350,000	160,000	190,000
8	Cai Cau stream		400,000	180,000	220,000
9	Tran Hung Dao street		140,000	70,000	70,000
10	Lo O stream		70,000		70,000
	Total	**20,000**	**1,771,570**	**925,800**	**999,840**

The volume of soil to be disposed off is estimated based on the differences between the excavated volumes and the volume reusable for refill.

2.3.5 Construction Plants and Labours

The estimated quantity and type of construction plants and the number of workers to be mobilized during operation phase will be varied based on construction progress, as indicated in the Table 2-9 below[1].

Table 2-9 Estimated Resources Used for Construction

No	Item	Unit	2016	2017				2018		
			Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
I	**Construction of the drainage:** total number of workers is 140 people, including 75 direct workers and 65 drivers of trucks, road rollers and bulldozers									
1	Excavator	piece	10	13	10	10	13	10	13	10
2	Truck, 13T load	piece	10	13	10	10	13	10	13	10
3	Bulldozer	piece	30	40	30	30	40	30	40	30
4	Rammer	piece	10	13	10	10	13	10	13	10
5	Compactors	piece	5	7	5	5	7	5	7	5
6	Concrete mixer	piece	1	1	1	1	1	1	1	1
7	Watering machine	piece	5	7	5	5	7	5	7	5
8	Water pump 2HP	piece	10	13	10	10	13	10	13	10
II	**Construction of Sewers:** total number of workers is 140 people, including 75 direct workers and 65 drivers of trucks, road rollers and bulldozers									
1	Trailer	piece	10	10	10	13	13	13	13	13
2	10T Road roller	piece	10	10	10	13	13	13	13	13
3	15T Truck	piece	30	30	30	40	40	40	40	40
4	Needle vibrator	piece	10	10	10	13	13	13	13	13
5	Paving machine	piece	5	5	5	7	7	7	7	7
6	Watering machine	piece	1	1	1	1	1	1	1	1

[1]According to the actual construction experience of projects Wastewater Thu Dau Mot

No	Item	Unit	2016	2017				2018		
			Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
7	Water pump 2HP	piece	5	5	5	7	7	7	7	7
III	**Construction of pumping stations**									
	Trailer	piece	10	Needle vibrator			piece		10	
	15T Truck	piece	10	Water pump 2HP			piece		5	
	Concrete mixer	piece	15	Worker			people		20	
IV	**Construction of WWTP**									
	Worker	people	75 - 100	75 - 100	100 – 150	150 - 200	150 - 200	100 - 150	75 - 100	
1	Excavating equipment	piece	14	14	20	30	30	20	14	
2	Bulldozer	piece	7	7	10	15	15	10	7	
3	Road roller	piece	7	7	10	15	15	10	7	
4	15T Truck	piece	35	35	50	75	75	50	35	
5	Stamping machine	piece	28	28	40	60	60	40	28	
6	Bitumen sprayer	piece	7	7	10	15	15	10	7	
7	Concrete mixer	piece	7	7	10	15	15	10	7	
8	Concrete pumping machine	piece	21	21	30	45	45	30	21	

2.3.6Water and Electricity Supply

WWTP construction site will be connected with the South Binh Duong 22kV electrical lines as source of power supply. Water will be supplied the pipe network connected to the existing Di An Water Treatment Plant. For construction of pipeline network and pumping stations, the contractor will use water trucks to deliver water to construction sites.

2.3.7Ancillary Items

For WWTP, the Contractor shall arrange two containers as the Contractor's Site Office. One prefabricated building with the area of 150 m^2 shall be used as material storage area. The workers will rent accommodation which is available plenty in Di An town.

2.3.8 Borrow Pits and Sources of Raw Materials

Filling materials will be bought by the contractors from the existing borrow pits in Binh Duong and Dong Nai provinces. Other construction materials will be purchased from dealers/suppliers in Binh Duong province.

Filling materials for elevating the ground at the WWTP will be red gravel soil from the existing Tan My borrow pit, sand from existing sand pit on Dong Nai river and stones from the existing Nui Nho and Tan Dong Hiep quarries.

To prevent the use of illegally exploited materials, the contractors shall be required to buy materials from the following licensed borrow pits and quarries.

Table 2-10Descriptions of Existing Borrow Pits and Quarries

No	Material	Pit/ Quarry	Description	License Status
1	Filling materials: soil, and pebble	Tan My Borrow Pit	• Located in Tan My Commune, Bac Tan Uyen district, about 15 km from WWTP • Soil exploited belongs to sedentary earth layer – generated from decomposition of lava. • High, indefinite reserve. • Easy to exploit. • Soil is delivered to construction's site by truck on asphalt road	• Exploiting by Dong Hoa Company Limit under license issued by the Binh Duong PPC at Decision No 50/QĐ-UBND dated 06/08/2013
2	Rock and crushed stones	Nui Nho Quarry	• Situated in Binh An Ward, Di An Town. • Storage four millions cubic meter; exploitation capacity is one million cubic meter per year; has 30 screen disintegrators with a capacity of 150 – 250 tons per hour; provide rocks for production of concrete and asphalt. • open cast mining by rock bursting technique, delivered to construction's site by truck on asphalt road in average distance of 30 km.	• Exploiting by Da Nui Nho JSC under license issued by the Binh Duong PPC at Decision No 14/QĐ-UBND dated 06/06/2014
3		Tan Dong Hiep Andesit Stone Quarry	• Situated in Tan Dong Hiep Ward, Di An Town. • Exploit reserve is 9 millions m3; capacity 1 million m3/year; has a series of screen disintegrators with a capacity of 150 – 250 tons per hour; provide rocks for production of concrete and asphalt. • Rock is open cast mining by rock bursting technique, delivered to construction's site by truck on asphalt road in average distance of 30 km.	• Exploiting by Binh Duong's Mining and Construction Company under the license issued by Binh Duong PPC at Decision No 90/GP.UBND dated 21/11/2005.
1		Hoa Tân An Quarry	• Located in Thuong Tan commune, Bac Tan Uyen district. • Storage 3.5 millions cubic meters, currently exploiting 0.5 millions cubic meter annually, has 30 screen disintegrators with a capacity of 150 – 250 tons per hour; provide rocks for production of concrete and asphalt.	• Operated by Hoa Tan An Limited Company under licenses issued by Binh Duong PPC at Decisions no. 08/GP.UBND dated 31/12/2013 and 50/GP.UBND dated 15/8/2011.
5	Black sand, Coarse sand, Medium sand	Dong Nai Sand Pit	• Situated in territory of Tan Hung, Tam Phuoc Commune of Long Thanh District and Long Tan, Dai Phuoc Commune of Nhon Trach District, Dong Nai province. About 2 – 10 km	• Exploited by licensed Dong Nai's Sand Exploitation Company by

No	Material	Pit/ Quarry	Description	License Status
			from the WWTP • Exploit area is about 3.92 km^2, capacity is about 1 million m^3/year. • Convenient delivery by land from the pit next to Dong Nai Bridge and National Way 1A to the construction's site.	specialised machines. •
6	Steel, Steel concrete pile UST D500		« 3 of February »/2 Construction – Investment JSC or another registered operators	
7	Cement, brick, paint …		Material stores in Di An Town	

2.3.9 Disposal Site

As discussed in Section 2.3.4, in addition to the estimated 700,000 cubic meters of excavated materials reused for refill, it is estimated that 929,840 m^3 of excavated materials will need to be dealt with. Among these, 20,000 m^3 of top soil from the WWTP will either be used for planting trees in the green corridor at the WWTP or used by the Urban Environmental Company for tree planting elsewhere. To the maximum extend, the excavated materials from pipeline channels will be reused for ground levelling at the Tan Binh resettlement site of Di An town and at the existing Tan Dong Hiep quarry. Residual amount will be transported to the South Binh Duong Solid Waste Treatment Complex for covering municipal wastes in landfill cells. Excavated materials will be transported on paved roads to final disposal sites on properly covered trucks capacity 5, 10 or 15 tonnes.

The *South Binh Duong Solid Waste Treatment Complex* (hereinafter referred to the Complex) has land area of 75ha. It is located at Quarter 1B, Chanh Phu Hoa Ward, Ben Cat Town, Binh Duong province. The Complex has been licensed with Binh Duong PPC and the Ministry of Natural Resources and Environment (MONRE):

- Business Registration Certificate No 3700145694 dated 7/2/2006 issued by Binh Duong Provincial Department of Planning and Investment. The 10th Revision dated of this Certificated was dated 19/11/2012;
- Decision No 237/QĐ-BTNMT dated 02/03/2005 by MONRE approving EIA report of the project "Southern Binh Duong's Solid Waste Treatment Complex";
- Decision No 2449/QĐ-BTNMT dated 28/12/2011 by MONRE approving the EIA report of the project "Investment of a New Industrial Wastes Incinerators in South Binh Duong's Solid Waste Treatment Complex";
- Decision No 541/QĐ-UBND dated 18/02/2011 by Binh Duong PPC approving the project "Raising capacity of South Binh Duong's Solid Waste Treatment Complex by 420 ton/day";
- Decision No 171/QĐ-BTNMT dated 07/02/2013 by MONRE approving the EIA report of the project "Raising capacity of Southern Binh Duong's Solid Waste Treatment Complex by 420 ton/day";

- Decision No. 43/QĐ-BTNMT dated 08 January 2016 of MONRE approving EIA for the project "Increasing the Capacity of the Nam Binh Duong Solid Waste Treatment Complex'
- Hazardous Wastes Management License No: 5-7-8.028.VX (original) dated 19/10/2012 by MONRE;

The *Tan Binh Resettlement Site* belongs to Tan Binh ward, Di An town, Binh Duong province. The planned land area for the site is 32 ha. Currently it is vacant land, natural ground level is 2.5-3 m lower than the existing road surface. To level this site, between 800,000 to 960,000 m^3 of filling would be needed.

Tan Dong Hiep stone quarry is located in Tan Dong Hiep ward, Di An Town. It has the reserve of 9 million m^3, the exploitation capacity is 1 million m^3/year. Currently the quarry has been being operated by the Binh Duong Mineral and Construction Joint Stock Company (BIMICO). under license issued by Binh Duong PPC at Decision No. 90/GP.UBND dated 21/11/2005. The quarry operation is expected to be finished in 2016 for closure. Filling material is needed for site reinstatement.

2.4 Project Implementation Schedule

The Project Implementation Schedule is presented in Table 2-11 below.

Table 2-11Project Implementation Schedule

Main Tasks	2015				2016				2017				2018				2019		Months
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	
Project preparation and approval		1	3	2															6
Recruit design consultant				2															2
Detail design, prepare biding documents					3	3													6
Ground leveling, build the fence of WWTP						3	3												6
Construct the drainage system								3	3	3	3	3	3	3	3				24
Construct the WWTP								3	3	3	3	3	3	2					20
Construct wastewater collection system								3	3	3	3	3	3	3	3				24
Connect with household									3	3	3	3	3	3	3	3	3	3	30

2.5. Costs and Source of Financing

The estimated investment cost of the project to cover design capacity to the year 2020 is 2.516.142.697.214 VND, equivalent to approximately 115 millions USD. The proposed subproject will be financed by the World Bank and GOV counterpart fund. In which, the cost of drainage component is USD 33.2 million, of the sewerage network is USD 31.5 million and that of WWTP construction is USD 18.7 millions USD.

3. LEGISLATION FRAMEWORK

3.1. Environmental Legislations

3.1.1. Vietnamese Environmental legislations

- Environment Law No 55/2014/QH13 approved by the National Assembly on 23 June 2014, put into effect from July the 1st, 2015.
- Decree No 18/2015/NĐ-CP dated 14/02/2015 Regulating on environmental protection planning, strategic environmental assessment, environmental impacts assessment and environmental protection plan;
- Circular No 27/2015/TT-BTNMT dated 29/05/2015 on strategic environmental assessment, environmental impacts assessment and environmental protection plan;
- Law on Cultural Heritage No 28/2001/QH10 approved by the National Assembly of Vietnam in 19/06/2001 in the 9th meeting;
- Revised Law on Cultural Heritage approved by the National Assembly on 18/06/2009 in the 5th meeting;
- Labour Law No 10/2012/QH13 approved by the National Assembly on 16/06/2012 in the 3rd meeting;
- Law on Water Resources No 17/2012/QH13 approved by the National Assembly on 21/06/2012 in the 3rd meeting;
- Decree No 38/2015/NĐ-CP dated 24/04/2015 Regulating on waste and wasted materials management;
- Resolution of Binh Duong PPC No 33/2010-HD9ND dated 10/12/2010 about Environmental protection plan of Binh Duong province for the period of 2011-2015.
- Decision No 181/QĐ-UBND dated 17-1-2011 by Binh Duong PPC on the issuance of Environmental Protection Plan of Binh Duong province for the period of 2011-2015 specifying targets, specific tasks, solutions and implementation arrangements.
- Decision No 855/QĐ-UBND dated 21-3-2011 by Binh Duong PPC on the establishment of Environmental Steering Board of Binh Duong Province.
- Urban development program of Binh Duong province for the period of 2011 – 2015, vision to 2020, No 19- Ctr /TU, dated 20/7/2011.
- Decision No 370/CP-CN, dated 09/4/2002 by GOV on programming of the 3rd drainage and wastewater sub-project in Southern Binh Duong urban areas.
- Decision No 157/2008/QĐ-TTg of GOV dated 01/12/2008 on the establishment of Dong Nai River Basin's Management Committee.

Applicable standards and technical requirements:

- QCVN 05:2013/BTNMT: National Technical Standard on ambient air quality.
- QCVN 06:2009/BTNMT: National Technical Standard on ambient air quality for some toxic substances.
- QCVN 26:2010/BTNMT: National Technical Standard on ambient air quality for noise pollution.
- QCVN 08:2008/BTNMT - National Technical Standard on surface water quality.
- QCVN 09:2008/BTNMT - National Technical Standard on underground water quality.
- QCVN 03:2008/BTNMT - National Technical Standard of heavy metals in the soil.
- QCVN 19:2009/BTNMT – National Technical Standard on dust and industrial waste gases for inorganic substances.
- QCVN 20:2009/BTNMT – National technical requirement on industrial waste gases for some organic substances.
- QCVN 07:2009/BTNMT- National Technical Standard on hazardous wastes.
- QCVN 14:2008/BTNMT- National Technical Standard on domestic waste water.
- Construction standard - QCXDVN 01: 2008/BXD issued by Ministry of Construction follow the Decision No 04/2008QD-BXD dated 3/4/2008.

3.1.2. WB Social and Environment Safeguard Policies

Besides the demand for environmental assessment and ratification of Vietnam government, The project will also comply with the World Bank environmental and social safeguard policies. These following Safeguard Policies will be triggered to the Project:

- Environmental Assessment(OP 4.01);
- Physical Cultural Resources (OP.4.11);
- Involuntary Resettlement (OP4.12)
- Public Consultation and Disclosure
- The World Bank Group Guidelines on Environmental, Health and Safety issued in 1998.

According to Operational Policy OP 4.01, Environmental Assessment (ESIA) and Environmental Management Plan (ESMP) have to be prepared in order to identify and assess the potential environmental and social impacts, based on which the mitigation measures are proposed to avoid or minimize the potential negative impacts and risks, promoting the beneficial effects.

3.2 Social Legislations

- Land Law approved by the National Assembly of Vietnam in 29/11/2013.
- Decree No 43/2014/NĐ-CP dated 15/5/2014 of the Central Government regulating the implementation of some articles of the Land Law.
- Decree No 44/2014/NĐ-CP dated 15/5/2014 issued by the Central Government regulating on land price.
- Decision No 1076/QĐ-UBND dated 23/04/2012 of Binh Duong PPC approving of construction planning of WWTP belong to the project "Building drainage system and waste water treatment system of Di An Town".
- Decision No 4480/QĐ-UBND dated 31/12/2014 of Binh Duong PPC on approval of the budget for purchasing land for resettlement of the project "Building drainage system and waste water treatment system of Di An Town".
- Decision No 2641/QĐ-UBND dated 23/10/2014 on approval of land price list for resettlement of the project "Building drainage system and waste water treatment system of Di An Town" owned by Binh Duong Water Supply – Drainage – Environment Co., Ltd.
- Dispatch No 840/TB-UBND dated 19/08/2013 of the People's Committee of Di An District announcing on land reclamation for compensation, ground clearance of the project "Building drainage system and waste water treatment system of Di An Town".
- Dispatch No 193/UBND-KTN dated 19/01/2012 of Binh Duong PPC on permission for Binh Duong Water Supply – Drainage – Environment Co., Ltd planning, setting out landmarks and compensating land for building WWTP at Tan Dong Hiep Ward, Di An Town.
- Dispatch No 1805/UBND-KTN dated 28/06/2012 of the Binh Duong PPC on permission for Binh Duong Water Supply – Drainage – Environment Co., Ltd making land compensation proposal for building WWTP at Tan Dong Hiep Ward, Di An Town.
- -Decision No 40/2010/QD-UBND dated 11/11/2010 of People's Committee of Binh Duong province regulating the norms for preparation of cost estimation, application and settlement of funds for implementation of compensation, support and resettlement for land recovery in Binh Duong province;
- - Decision No 51/2014/QD-UBND dated 12/18/2014 of People's Committee of Binh Duong province on promulgating regulations on policies and procedures for compensation, support and resettlement for land recovery in Binh Duong province.
- - Decision No. 64/2014/QD-UBND dated 22/12/2014 of People's Committee of Binh Duong province on promulgating regulations on table of land prices in 2015 in Binh Duong province;
- - Decision No 25/2015/QD-UBND dated 07/22/2015 of People's Committee of Binh Duong province on promulgating regulations on compensation rate, support of assets on the acquired ground for land recovery in Binh Duong province.

4. BASELINE CONDITIONS

4.1 Physical Conditions

4.1.1 Geographic Location

Binh Duong Province is located in the South East of Vietnam, at coordinates $10^{o}51'46"$ to $11^{o}30'$ North latitude, $106^{o}20'$to $106^{o}58'$ East longitude. Binh Duong Province is bordered with Binh Phuoc Province to the north, with Ho Chi Minh City to the south, with Dong Nai Province to the east, and with Tay Ninh Province and Ho Chi Minh City to the west.

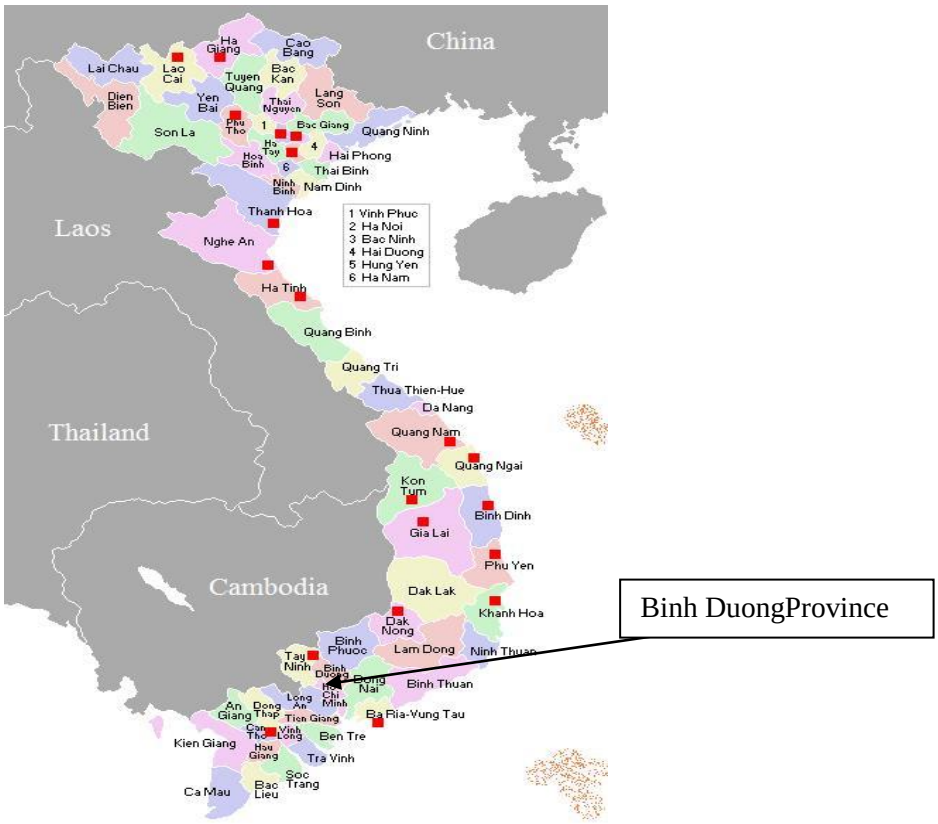


Figure 4-1.Location Map of Binh Duong Province

Binh Duong Province is located in between the two major rivers of Vietnam's Southeastern Region, i.e. the Saigon River and the Dong Nai River. The Town is the gateway to Ho Chi Minh City, located 25km from Ho Chi Minh City center, has the main national highways 13, 14, 1 and 1K running through. Binh Duong Province is only 15km from Tan Son Nhat International Airport and is only 10 - 15 km from ports.

Binh Duong Province has total land area of 2,694 km^2, accounting for 0.83% of the nation's total land area. The province's total population in 2014 is 1,873,558 people, population density is 695 persons/km^2. Binh Duong Province has nine administrative units including the Thu Dau Mot City as the province's economic, political and cultural center, the South Binh Duong

urban area covering four towns namely Thuan An, Di An, Ben Cat and Tan Uyen, four northern districts including Dau Tieng, Bau Bang, Bac Phu Giao and Bac Tan Uyen.

Di An Town is located in between Ho Chi Minh City, Bien Hoa City and Thu Dau Mot Town, in the Northeast corner of Binh Duong Province. Di An is bordered with Tan Uyen town of Binh Duong province to the North, with districts 9 and Thu Duc of Ho Chi Minh city to the South, with Bien Hoa city of Dong nai province and District 9 to the East, and with Thu Duc district and Thuan An town of Binh Duong Province to the West. Di An town is located in the junctions between regional roads with Asian Highway and National highways 1K and 1A. The Town is also located at the gateway between Ho Chi Minh city and the provinces in Mekong Delta.

Di An town has land area of approximately 60 km^2. The Town's population by December 2014 is 387,552 persons and 100% of the population are urban. Population density is about 6,465 person/km^2. The town comprises of 7 wards in which Di An is the center of the town. Currently, 90% of the town's population are living in five wards namely Di An, Tan Dong Hiep, Dong Hoa, An Binh and Tan Binh. 10% of the population is living in Binh ward and Binh Thang wards.. The annual physical population growth rate is high, there are the years with growth rate of more than 10% due to the large influx of workers from other provinces to come and work in the town.

4.1.2 Topography

Topographically, Di An area is relative flat with about 85% of the land area having ground elevation ranges from 34 to 38m. The remaining 15% of land in the Northeast region and part of the South has more complicated topography. The Terrance in the eastern region which is bordered with Tan Binh Ward of Bien Hoa city is steep toward the east, ground elevation changes from 18m to about 2 to 3m. The suburban areas of Bien Hoa city are currently lowland with rice field. The north - eastern regions of Tan Dong Hiep Ward with has ground elevation ranging from 5 to 6m, currently is a quarry. The Northern area of Binh An and Binh Thang wards, bounded by Bien Hoa city, is the low land area with ground elevation from 2 to 3m. Chau Thoi Mount is the highest mountain in the Binh Duong, Ho Chi Minh City and Bien Hoa, 85m above mean sea level. However, the land area occupied by the mountain area is quite small, about 23 ha.

Table 4-1 Topographical condition of Di An Town

Area	Topographical condition
Di An Ward, situated in the west of Di An Town. The ward is the center of the Town which is relatively developed	Ground elevation varies from 35.10 to 27.0 m.
Tan Binh Ward, situated in the North of the Town.	Relatively flat, lower from west to the east
Tan Dong Hiep, situated in the center of the Town.	Highest at the center, lower to the South and the East.
Binh An Ward, bordered with to Tan Dong Hiep ward, situated in the Southeast of the Town.	Relatively flat, lower from west to east
Binh Thang Ward, situated in the South East of the Town.	Lowest at the bank of Dong Nai river, lower is from Southwest to Northeast.

Area	**Topographical condition**
Dong Hoa Ward, located in the south of the Town.	Relatively flat except for stone quarries.
An Binh Ward, situated in the Southwest of the Town	Flat, lowering from the North to the South

4.1.3 Climate

Di An has typical western mountainous climate with two distinct seasons. It is hot, humid and rainy in summer and cold, dry in winter. The prevailing wind directions are the Northeast and Southwest monsoon. Air temperature is high and even all year round, monthly averaged temperature is 27.5^0C. Annual average air humidity is 83 %.

Annual rainfall is relatively high. The average annual rainfall in 12 years from 2001 to 2014 is 1,937 mm. On average, there are from 158 to 179 rainy days each year. Rainy season lasts from May to October and makes up more than 84% total annual rainfall. Rainfall is not evenly distributed through the year but concentrates in September and October which causes flooding in the low lying areas along the Dong Nai river. Dry season lasts from November to April of the following year makes up less than 16% of total annual rainfall. Precipitation varies greatly from year to year. Monitoring data of 13 years show that the lowest annual rainfall was 1,226 mm and the highest annual rainfall reach 2,287 mm.

4.1.4 Hydrology

The rivers and streams in Di An town are briefed below:

The Dong Nai river is sourced from the mountainous in Langbiang highland as part of the South Truong Son mountain range in Lam Dong province, at 2000 m altitude. The total length of Dong Nai river is 610 km, there are two branches namely Da Dung and Da Nhim in the upstream. The river follows North East – South West as main direction passing through Lam Dong, Dak Lak, Dak Nong, Binh Phuoc, and Dong Nai provinces, then Hochiminh City and Long An province. The section of Dong Nai river that runs in Binh Duong province starts at Hieu Liem T-junction to the Hoa An bridge with the length of 46.95 km. The river passes Hieu Liem, Lac An, and Thuong Tan Bac communes in Tan Uyen district, Uyen Hung town, Bach Dang and Thanh Phuoc communes of Tan Uyen district, and Binh Thang ward of Di An town. The section running through the southeastern part of Di An has the Dong Nai bridge and Binh Duong port. The river cross section at this section is about 200m wide and 6to 8 m deep near river bank in Di An. The distance from the WWTP discharge point to the Dong Nai river is about 8 km.

Downstream of Di An town, the Dong Nai river confluences with the Saigon river in Nha Be district of Hochiminh City then the river is divided into two big branches again: the Long Tau river which then runs into the Can Gio estuary, the Nha Be river which then emptied into the East Sea through Xoai Rap river mouth. The Saigon river is sourced from Loc Ninh commune (near the border with Cambodia) of Binh Phuoc province, passing Tay Ninh and Binh Duong provinces and HochiminhCity, then joins the Dong Nai at Nha Be District, Hochiminh City.

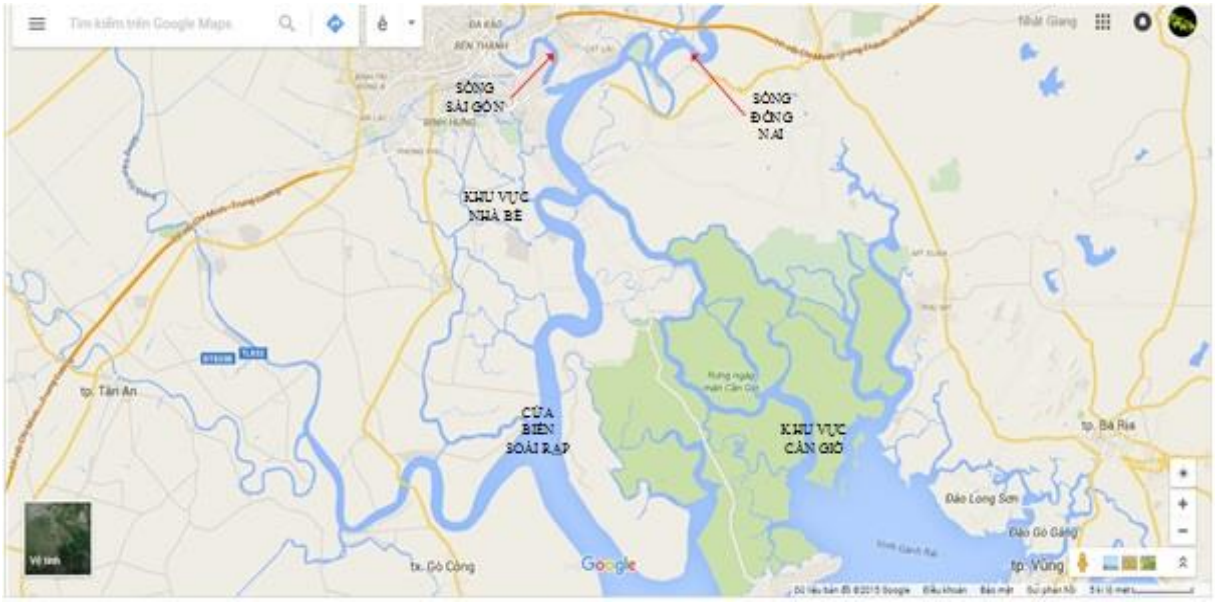


Figure 4-2.Confluence of Saigon river and Dong Nai river

Gauged water level at Bien Hoa and Tan Uyen hydrological stations on Dong Nai river from 2011 to 2012 showed that Dong Nai river is affected by the tide of the East sea. However, in flood season (from June to November), the river is less influenced by tide than in dry season, especially in September, the flow from the upstream is high so the influence of tide on the flow of Dong Nai river is negligible. The average flow in Dong Nai rive which is regulated by the Tri An hydropower plant in the flood season is 669 m^3/s; the total flow in dry season is 3,169 million m^3, the average flow is 242 m^3/s.

At Tan Uyen hydrological station, the annual mean water level is 78.6 cm, the highest and lowest water levels are 308.4 cm and 4.6 cm, respectively. The high water level frequently occurs in the flood season (from August to November). At Bien Hoa station, the annual mean water level is 34.8 cm, the highest and lowest water levels are 159.9 cm and -22.4cm, respectively.

- Cai Cau stream (also called Siep stream) starts in Dong An Hamlet in the Eastern of Tan Dong Hiep Ward. It runs through the northern part of the Chau Thoi mountain, being natural border between the Binh An and Binh Thang wards with and Bien Hoa City, then it is emptied into Dong Nai river. The stream section passing Tan Dong Hiep Ward is often a dry stream with the width varies from 3 to 8m, then widen to 20 to 30m when reaching Binh An Ward. The section in Binh An and Binh Thang wards is about 50 to 60m wide before reaching the Dong Nai river. The section in Binh An and Binh Thang Wards is situated on low land area so that flow is influenced by semidiurnal tide of Dong Nai river. The distance from the WWTP discharge point to the Cai Cau stream is about 10 meters.
- Ba Lo stream has 3 branches:
  - Lo O stream starts from Southwestern of Binh An ward and follows west-east direction. The stream is about 2.5km long and 4 to 15m wide.
  - Ba Kham canal and Muong Cai canals.

- There area also many small streams such as Ong Cuoc, Cay Da, Cay Truong streams in Tan Binh Ward. They run eastward, pass Tan Hanh ward of Bien Hoa City. The length of these stream ranges from 500m to 1,400m.
- Nhum stream is natural boundary between Dong Hoa Ward of Di An Town and Thu Duc District of Ho Chi Minh City. It is located at the Southwestern of Di An Town. The stream section in Dong Hoa Ward is 3 to 8m wide. The stream runs from North to South, passes Thu Duc District to District 9 of Ho Chi Minh City. The stream is drainage canal for Dong Hoa Ward, southern part of Di An Town and Linh Xuan Ward of Thu Duc District.

4.1.5 Geotechnical Characteristics

Basically, geologic structure of most area of Di An Town is formed by ancient alluvium deposit comprises of coarse and medium fine formations (semi clay layers mixed with feralite gravels was found at many places). These materials have been accumulated in a long time, forming thick strata; geological age of these strata ranges from Pleistocene to Miocene. Bed rock is found at not deep elevation.

High land areas in Di An and other wards have strong geotechnical formations with compressive strength of more than 2 kg/cm^2. At many areas, there are thick layers of rock. At the existing quarries in Dong Hoa, Binh An and Tan Dong Hiep ward, the exploitable stone layer is 40m thick and are still being exploited. The low land areas in the southeastern of the town which is close to Dong Nai River and the eastern part of Tan Binh ward have weak foundation.

4.2 Environmental Baseline

4.2.1. Air Quality and Noise

Air Quality data presented in the Table 4-2 shows that ambient air quality in Project area is relatively good with all parameters meet Vietnamese National Standard on Ambient Air Quality QCVN 05:2013/BTNMT. However, dust level near Nguyen Van Tam household (GS/1959) and the junction between WWTP access roads and Tan Dong Hiep Street (GS 1960) has high concentrations of dust due to the impacts of the nearby exiting quarry and traffic. Measured noise levels varies from 56.7 to 79.6 dB. Noise levels at the proposed pump stations mostly exceed Vietnamese standard QCVN 26:2010/BTNMT 0,3 to 9,6dB due to traffic noise.

Table 4-2Air Quality and Noise Levels in the Project area

No	Sample	PM 10 $\mu g/m^3$	CO $\mu g/m^3$	SO_2 $\mu g/m^3$	NO_X $\mu g/m^3$	NH_3 $\mu g/m^3$	H_2S $\mu g/m^3$	Noise dB	Air Temperature	Humidity
1	Gs/1873	49	241	22	29	6	7	69.7	32	58
2	Gs/1874	47	267	21	28	6	6	68.9	32	59
3	Gs/1959	283	512	43	49	14	13	59.2	29	68
4	Gs/1960	265	501	42	47	13	12	62.5	30	72
5	GS/2888	3	124	21	18	5	4	64.5	30	72
6	GS/2889	6	186	25	25	6	5	59.4	30	71
7	GS/2890	4	133	22	20	6	5	60.3	31	72

No	Sample	PM 10 µg/m^3	CO µg/m^3	SO_2 µg/m^3	NO_X µg/m^3	NH_3 µg/m^3	H_2S µg/m^3	Noise dB	Air Temperature	Humidity
8	GS/2891	3	127	19	18	5	4	63.1	30	71
9	GS/2892	4	142	22	20	6	4	65.2	31	70
10	GS/2886	5	109	20	20	6	3	58.3	31	70
11	GS/2887	7	142	22	23	6	4	56.7	31	70
12	GS/2893	6	177	24	24	7	5	64.5	31	70
13	GS/2894	4	120	20	20	5	4	59.4	31	68
14	GS/2895	5	131	22	22	6	4	60.3	32	68
15	GS/2896	7	162	23	25	6	5	63.1	32	69
16	GS/2897	7	181	24	27	6	6	65.2	31	69
17	GS/2914	5	124	21	18	4	4	70.1	32	60
18	GS/2915	6	143	23	25	4	5	72.2	33	56
19	GS/2916	7	148	25	27	6	6	73.6	32	62
20	GS/2917	4	114	21	20	4	4	79.6	32	60
21	GS/2918	6	124	23	22	5	5	73.6	31	65
22	GS/2919	6	141	24	25	5	5	64.3	32	65
23	GS/2920	5	111	22	21	5	4	70.3	32	63
24	GS/2921	7	120	23	22	6	5	73.2	32	61
25	GS/2922	7	126	24	23	6	5	75.4	32	63
26	GS/2923	5	98	21	22	4	5	76.1	32	67
27	GS/2924	6	115	23	24	5	5	70.1	32	59
28	GS/2925	6	119	24	24	5	5	72.7	33	55
29	GS/2926	5	105	22	23	4	4	76.4	32	57
30	GS/2927	6	125	23	25	5	5	73.6	32	59
31	GS/2928	6	129	24	26	6	5	69.8	32	63
32	GS/2929	4	98	20	21	4	4	69.8	32	60
33	GS/2930	5	116	21	23	5	5	71.3	32	59
34	GS/2931	5	119	22	24	5	5	73.1	33	59
35	GS/2932	4	86	21	23	5	4	76.1	32	60
36	GS/2933	5	115	22	25	5	5	74.1	32	59
37	GS/2934	6	123	22	26	6	6	73.4	32	66
QCVN 05:2013/BTNMT		-	**30.000**	**350**	**200**	-	-	-		
QCVN 26:2010/BTNMT		-	-	-	-	-	-	70		

Sample	**Locations, weather conditions when sampling**
Gs/1873	House of Mr. Chau Minh Dat, near the WWTP in Tan Dong Hiep Ward. Sunny
Gs/1874	House of Mr. Vu Quang Thuan, near the WWTP in Tan Dong Hiep Ward. Sunny
Gs/1959	House of Mr. Nguyen Van Tam, near stone quarry 3/2 Sunny
Gs/1960	At the junction entering the WWTP in Tan Dong Hiep Ward. Sunny,
GS/2888	wastewater treatment plant Tan Dong Hiep. Sunny,
GS/2889	roads front gate Tan Dong Hiep B. Sunny
GS/2890	wastewater treatment plant Binh An Sunny
GS/2891	wastewater treatment plant adjacent Tan Dong Hiep **B** Industrial Zone; Sunny
GS/2892	wastewater treatment plant adjacent to the Tan Van **Andesit Stone Quarry**
GS/2886	Top online Lo O stream
GS/2887	Ending online Lo O stream
GS/2893	Tan Van Phuoc road adjacent wastewater treatment plant of Binh An Sunny
GS/2894	Upwind wastewater treatment plant of Binh An; Sunny

No	Sample	PM 10 µg/m^3	CO µg/m^3	SO_2 µg/m^3	NO_X µg/m^3	NH_3 µg/m^3	H_2S µg/m^3	Noise dB	Air Temperature	Humidity
	GS/2895	Downwind wastewater treatment plant of Binh An; Sunny								
	GS/2896	Crossroads 743 and Binh Thung road in the Binh AnWTP ; Sunny								
	GS/2897	Crossroads Binh Thung and My Phuoc Tan Van in the WWTP. Sunny								
	GS/2914	site of pump station 1; Sunny								
	GS/2915	Upwind from pump station No. 1 is about 30m Sunny								
	GS/2916	Down wind from pump station No. 1 is about 30m Sunny								
	GS/2917	site of pump station 2; Sunny								
	GS/2918	Upwind from pump station No. 2 is about 30m Sunny								
	GS/2919	Down wind from pump station No. 2 is about 30m Sunny								
	GS/2920	site of pump station 3;								
	GS/2921	Upwind from pump station No. 3 is about 30m Sunny								
	GS/2922	Down wind from pump station No. 3 is about 30m Sunny								
	GS/2923	site of pump station 4; Sunny								
	GS/2924	Upwind from pump station No. 3 is about 30m								
	GS/2925	Down wind from pump station No. 4 is about 30m								
	GS/2926	site of pump station 5;								
	GS/2927	Upwind from pump station No. 5 is about 30m Sunny								
	GS/2928	Down wind from pump station No. 5 is about 30m Sunny								
	GS/2929	site of pump station 6; Sunny								
	GS/2930	Upwind from pump station No. 6 is about 30m								
	GS/2931	Down wind from pump station No. 6 is about 30m Sunny								
	GS/2932	site of pump station 7; Sunny								
	GS/2933	Upwind from pump station No. 7 is about 30m Sunny								
	GS/2934	Down wind from pump station No. 7 is about 30m Sunny								

Dust and smoke at many places in Di An area has been problem. Dust and smokes are generated by trucks carry large quantities of soil and rock running on the roads, especially Ha Noi, 1A and 1K National Highways, Provincial Road DT743. Some industrial establishments, brick production businesses and the coal yards in Binh Thang ward and some other areas are also releasing dusts and smokes. At present, Binh Thang ward has 5 coal enterprises are under operation, most concentrated in the Ngai Thang commune with 3 establishments. These establishments are licensed with the Provincial Department of Planning and Investment for coal storage but in fact most of the coal yard in the commune are doing coal grinding on the site. These activities are causing noise, environmental pollution and negatively affect the lives of local people.

4.2.2 Surface Water Quality

Surface water in Di An Town has been contaminated with SS, COD, BOD5 and Coliforms, other indicators are relatively good. Test results shown that water in T4 Canal at the receiving point of waste water from Dong An residence area has SS, COD, BOD5 and Coliforms exceed allowable levels specified in QCVN 08:2008/BTNMT (column A2) by 1.5 times, 8.2 times, 11.7 times and 2.4 times, respectively. Water in T4 Canal at the receiving point of waste water from WWTP in Tan Dong Hiep Ward has COD, BOD5 and Coliforms exceed allowable levels specified in in QCVN 08:2008/BTNMT (column A2) by 5.5 times, 7 times and 2 times respectively. Water in Siep Stream at the confluence with T4 Canal has concentrations of SS, COD, BOD5, coliform

exceed allowable levels specified in QCVN 08:2008/BTNMT (A2) by 2.4 times, 3.9 times, 4.8 times and 1.6 times respectively. Water at the beginning section of T4 channel which receives wastewater from T5A channels has been contaminated seriously with COD and BOD5 exceeded standard 11.7 times, coliform exceeded 1,400 units. Site observation during social survey also found that part of channel T4- Siep spring has also been polluted, the water has brown color and has bad order.

Water in Tan Van Canal at the proposed discharge point of Binh An WWTP has SS, BOD_5 exceed allowable values in QCVN 08:2008/BTNMT (A2) 2 times and 1.2 times respectively. Water in Dong Nai river at the confluence with Tan Van Canal is relatively good, all the indicators qualify QCVN 08:2008/BTNMT (A2).

Lo O stream has been polluted lightly with COD , BOD5 values at 1.2 to 2.1 times higher than standard, water quality at the beginning section is better than the end, water quality parameters exceed standards less (1.2 times) .

The Nhum Stream has been seriously contaminated with SS exceeds standard 2.6 times ; COD and BOD 5 exceed standard 17.3 times and 18.2 times, respectively.

Table 4-3Surface water Quality in the Project Area

Parameter	Sampling Location										QCVN 08:2008/ BTNMT (A2)
	NM1	NM2	NM3	NM4	NM5	NM6	NM7	NM8	NM9	NM10	
pH	6.0	6.8	6.9	6.3	6.7	6.5	6.2	6.7	6.3	6.3	6-.,5
DO (mg/l)	3.4	3.2	3.4	3.1	3.2	3.3	3.7	4.1	4.1	3.9	≥5
SS(mg/l)	44	24	71	10	30	60	10	18	79	27	30
COD(mgO_2/l)	123	83	58	8	11	13	18	31	260	176	15
BOD_5(mg O_2/l)	62	42	29	4	6	7	7	12	109	70	6
Total N(mg/l)	11.2	8.4	7	<0.1	0.28	0.56	2.8	2.8	16.8	15.4	-
Total P (mg/l)	2.0	1.6	1.4	0.1	0.12	0.24	0.12	0.18	2.6	1.7	-
Coliform (MPN/100mL)	6,000	5,000	4,000	110	310	400	330	500	-	3,900	2,500
Sample	**Positions , weather conditions when sampling**										
NM1	Existing T4 canal at the discharge point of waste water of Dong An residence area. Sunny										
NM2	Existing T4 canal at the discharge point of WWTP in Tan Dong Hiep Ward. Sunny										
NM3	Siep Stream at the confluence with T4 canal. Sunny										
NM4	Dong Nai River, 100m upstream of the confluence of Tan Van canal. Sunny										
NM5	Dong Nai River, 100m downstream of the confluence of Tan Van canal. Sunny										
NM6	Canal receiving waste water from WWTP in Binh An Ward. Sunny										
NM7	Top online Lo O stream. Sunny										
NM8	Ending online Lo O stream.. Sunny										
NM9	Nhum stream. Sunny										
NM10	Existing T4 canal at the receiving point of T5A sewer. Sunny										

4.2.3.Underground Water Quality

Underground water quality is relatively good with most parameters meet QCVN 09:2008/BTNM, except for pH is low, which shown groundwater is acidic.

Table 4-4Underground Water Quality in the Project Area

No	Parameter	Value	QCVN 09:2008/BTNMT
1	pH	4.5	5.5-8.5
2	Malt ($CaCO_3$ mg/L)	8	500
3	SO_4^{2-} (mg/L)	<10(**)	400
4	NH_3 – N (mg/L)	<0.1(**)	0.1
5	NO_3^- (mg/L)	3.0	15
6	NO_2^- (mg/L)	0.002	1.0
7	Cl^- (mg/L)	17.7	250
8	Total Fe (mg/L)	0.03	5
9	COD ($KMnO_4$) (mgO_2/L)	0.8	4
10	F^- (mg/L)	<0.02(**)	1.0
11	Coliform (MPN/100mL)	0	3
12	SS (mg/L)	<2(**)	-
	Sampling position: House of Mr., Chau Minh Dat – Cluster 27 – Dong An Quarter – Tan Dong Hiep Ward, near the Tan Dong Hiep's WWTP		

Note: (**)below detectable value of the test

However, some households interviewed during the social survey considered that the source of underground water that they are using is not clean yet, not safe yet because the water is clear, has fishy smell, or the water source has been polluted due to domestic wastes, insecticide, wastewater from toilets, mixed with soil, saline or contaminated with iron and other metals, etc.[2]

4.2.4. Soil and Sediment Quality

Quality of soil at the proposed WWTP Tan Dong Hiep Ward is relatively good with all parameters meet QCVN 03:2008/BTNMT.

Table 4-5Soil Quality at the WWTP sites

No	Parameter	Unit	Đ1	Đ2	QCVN03:2008/BTNMT
1	As	mg/kg	ND	0,2	12
2	Pb	mg/kg	9,1	36,8	70
3	Cd	mg/kg	0,7	1,4	2
4	Cu	mg/kg	10	55	50
5	Zn	mg/kg	15	147,5	200
	Đ1	At the proposed WWTP in Tan Dong Hiep Ward			
	Đ2	At the construction site of the WWTP in Binh An Ward			

Note: ND – not detected

[2]Social-Economic Survey Report, section 3.3.3 page 24

Quality of sediment in the project area is relatively good as meet QCVN 43:2012/BTNMT.

Table 4-6Sediment Quality in the Project Area

Parameter	Sampling Location								QCVN 43:2012/ BTNMT
	TT1	TT2	TT3	TT4	TT5	TT6	TT7	TT8	
As (mg/kgTLK)	0.2	0.2	0.2	0.2	ND	ND	ND	0.2	17.0
Cu(mg/ kg TLK)	43.1	45.6	35.9	41.5	19.1	17.3	40.5	178.3	197
Zn(mg/ kg TLK)	189	133	157.5	121.0	56.5	51.8	254	268	315
Pb(mg/ kg TLK)	10.1	23.2	8.4	21.1	9.2	< 8	10.4	8.6	91.3
Cd(mg/ kg TLK)	0.7	1.0	0.6	0.9	0.5	0.5	< 0.5	0.6	3.5
Cr(mg/ kg TLK)	26.0	21.8	21.7	19.8	4.9	4.5	15.1	20.6	90
Hg(mg/ kg TLK)	ND	ND	ND	ND	ND	ND	ND	ND	0.5
Ni(mg/ kg TLK)	61.9	21.5	51.6	19.5	19.9	18.2	67.9	47.7	-
Oil and Grease (mg/ kg TLK)	0.4	0.5	0.6	0.4	0.5	0.5	0.6	0.6	-
pH-KCl	6.6	6.1	5.2	5.1	-	-	-	-	-
pH-H_2O	6.7	6.5	6.1	5.9	6.7	6.4	7.4	7.2	-

Sample	**Location, weather conditions when sampling**
TT1	Existing T4 canal at the discharge point of waste water of Dong An residence area. sunny
TT2	Existing T4 canal at the discharge point of WWTP in Tan Dong Hiep Ward. Sunny
TT3	Dong Nai River at the confluence with Tan Van canal. Sunny
TT4	Canal receiving waste water from WWTP in Binh An Ward. Sunny
TT5	Top online Lo O stream. Sunny
TT6	Ending online Lo O stream.. Sunny
TT7	Nhum stream. Sunny
TT8	Existing T4 canal at the receiving point of T5A sewer. Sunny

Note: ND: not detected; DW: dry weight

4.2.5 Biological Resources

4.2.5.1 Terrestrial Biology

Existing land use at the proposed WWTP site is on mostly residential and agricultural land, with 57 households are living. The existing vegetation in the area is mostly bushes and shrubs, 1,170 rubber and timber trees. There are only domestic or farmed animals and poultries such as chicken, ducks, dogs and cats.

Figure 4-3.Existing Vegetation Cover at the proposed Tan Dong Hiep WWTP

4.2.5.2 Aquatic Lives

During the preparation of this ESIA, survey on aquatic species were conducted at four locations in the project are : the proposed discharge point of the proposed WWTP into T4 canal (TS01), T4 to Siep stream (TS02), Siep stream to Tan Van canal (TS03), and Tan Van canal to Dong Nai river. Survey results are discussed below.

a. Plant plankton

Species composition of plant plankton is relatively diverse and rich. Popular species are mostly fresh water species such as Bacillariophyta and Chlorophyta, in addition, there are also some marine original species penetrated into the mainland and distributed widely.

Table 4-7 Species composition of Plant Plankton in the Project area

No	Algae phylum	Number of species	Percentage(%)
1	Cyanophyta	21	25.9
2	Bacillariophyta	8	9.9
3	Chlorophyta	42	51.9
4	Euglenophyta	9	11.1
5	Dinophyta	1	1.2
Total		81	**100**

Plant plankton survey at the sampling area found 81 algae species belonged to 5 phylums, in which Chlorophyta has highest species proportion with 42 dominant species; following that is Cyanophyta with 21 species making up 25.9% and lowest is Dinophyta has only one species, making up only 1.2%.Cellular density of plant plankton in the area is relatively high, varied from 15,088 to 150,027 cells per litre. Sampling at locations TS-03 and TS-04 found high cellular density with average value of more than 10^5 cells per litre while TS-01 and TS-02 has lower density, but still higher than 10^4 cells/litre.

Dominant plant plankton species found at sampling locations were *Cyanophytaof Planktothrix* and *Microcystis* line of descent. They are beded texture and sheaf like texture, easy to cause eutrophication in nourishment environment and generate toxic substances to harm aquatic creatures.

Table 4-8 Cellular Density and Dominant Species of Plant Plankton

Sample	Dominant species	Number of species	Total no. of species	No of dominant species	Percentage %
TS-01	Planktothrix zahidii	9	15,088	9,720	64.4
TS-02	Planktothrix sp.	25	32,151	14,000	43.5
TS-03	Microcystis aeruginosa	35	140,663	107,520	76.4
TS-04	Microcystis aeruginosa	50	150,027	122,880	81.9

Shannon – Wiener (H') Diversity Index of plant plankton

H' index varies from 1.01 to 2.30, highest at TS-02 and lowest at TS-04.

Table 4-9 Diversity index H' of plant plankton in the project area

Sample	Diversity Index H'	Water Quality
TS-01	1.10	Polluted
TS-02	2.30	Slightly polluted
TS-03	1.23	Polluted
TS-04	1.01	Polluted

In short, the monitoring results show that plant plankton system of the project area consist of 81 algae species belonged to 5 phylums including mostly fresh water original species and some marine original species penetrated into the mainland. Chlorophyta has highest species proportion.

Dominant species of the area are toxic Chlorophyta so that the water quality will possibly affected greatly. Diversity of Chlorophyta and Bacillariophyta in plant plankton system indicates that quality of surfacce water in the area has been affected dramatically by outside factors.

b. Zooplankton

Zooplankton system at the sampling position consist of 49 species of 7 groups, in which Rotifera is the most diverse group makes up more half of total number of species (29 species; makes up 59.2%), other groups have from 1 to 5 species each. Zooplankton system at the sampling locations are fresh water origin species.

Table 4-10 Species Composition of Zooplankton at Sampling Locations

No	Species	No of species	Percentage %
1	Protozoa	4	8.2
2	Nematoda	1	2.0
3	Rotifera	29	59.2
4	Cladocera	4	8.2
5	Copepoda	4	8.2
6	Ostracoda	2	4.1
7	Larva	5	10.2
Total		49	100.0

There are four different dominant species at four sampling locations in which dominant species at TS-01 is Nematoda of Nematoda group, at TS-02 is Moina macrocopa of Cladocera group, at TS-03 is Rotaria rotatoria of Rotifera group and at TS-04 is Bivalvia larva of Larva group. All of these species are popular and distributed widely in fresh water environment. However, different

dominant species at different sampling locations show that water environment characters at these locations are varied remarkably.

Domination index ranges from 15.4% to 77.0%. Highest domination index is at TS-04, which is 77.0%. This partially indicates that quality of water environment at this position has loosen ecological balance due to the over development of Bivalvia larva leading to decrease of other species density.

Table 4-11 Dominant Species of Zooplankton at Sampling Locations

Sample	Dominant species	No of species	Density (cell/m^3)	Density (cell/m^3)	Percentage (%)
TS1	Nematoda sp.	10	3,383	1,400	41.4
TS2	Moina macrocopa	14	4,367	1,200	27.5
TS3	Rotaria rotatoria	33	25,350	3,900	15.4
TS4	Bivalvia larva	22	16,950	13,050	77.0

Diversity Index H' of Zooplankton at sampling position varies from 1.62 to 4.06; highest at TS-03 and lowest at TS-04. Other positions have relatively high diversity index varying from 2.67 to 3.18.

Table 4-12 Diversity Index H' of Zooplankton at sampling location

Sampling Location	Diversity Index H'	Quality of water environment
TS1	2.67	Slightly polluted
TS2	3.18	Clean
TS3	4.06	Clean
TS4	1.62	Polluted

The monitoring results show that zooplankton system at the sampling locations consist of 49 species of 7 groups, in which Rotifera is the most diverse group, other groups have a few species. These are all popular species and distributed widely in fresh water environment. Cellular density is highest at TS-03 and lowest at TS-01. Domination index ranges from 15.4% to 77.0%. Different dominant species at different sampling positions show that quality of water environment at these positions is different remarkably. Diversity Index H' of Zooplankton at sampling position is relatively high, ranges from 1.62 to 4.06; H' at 2/4 positions are over 3.

c. Zoo benthic

Zoo benthic system at 4 sampling locations consists of 14 species of 5 classes, 3 phylums. In which, the bivalvia, Polychaeta, Oligochaeta and Insecta are also recognized 3 species occupying 21.4%. There is the lowest species as Gastropoda, only recorded onespecies. The form of larva is also recorded for one species.

Table 4-13 Species Composition of Zoo benthic

No	Phylum	No of species	Percentage %
I	Mollusca		
1	Gastropoda	1	7.1
2	Bivalvia	3	21.4
II	Annelida		
3	Polychaeta	3	21.4
4	Oligochaeta	3	21.4
III	Arthropoda		
5	Insecta	3	21.4
IV	Larva	1	7.1
Total		**14**	**100**

Cellular density of zoo benthic at four sampling locations is differed greatly, varied from 110 to 1,370 cells per m3. Highest density is at TS-03 due to rapid development of Limnodrilus grandisetosus and Corbicula baudoni. Limnodrilus grandisetosus also develop rapidly so that cellular density of zoo benthic at TS-01 and TS-02 are relatively high.

Dominant species is Annelida, in which Limnodrilus hoffmeisteri, Limnodrilus grandisetosus are highly dominated at TS-02 and TS-03. This indicates that sediment environment at these locations are polluted by organic matters.

Table 4-14Zoo benthic Dominant Species

Sampling location	Dominant species	Density	Density of dominant species	Percentage (%)
TS-01	Oligochaeta larva	700	600	85,7
TS-02	Limnodrilus hoffmeisteri	670	650	97,0
TS-03	Limnodrilus grandisetosus	1.370	740	54,0
TS-04	Dendronereides heteropoda	110	100	90,9

Diversity index, H'of zoo benthic system at sampling locations is very low, varied from 0.2 to 2.0. There are 3 of 4 locations with H' < 1, which means that diversity index of zoo benthic system at these locations are very low.

Table 4-15 Diversity Index Shannon – Wiener (H') of Zoo benthic

Sampling location	Diversity Index H'	Quality of water environment
TS-01	0.8	Heavily polluted
TS-02	0.2	Heavily polluted
TS-03	2.0	Polluted
TS-04	0.4	Heavily polluted

Sampling results show that Zoo benthic system at 4 sampling locations consists of 14 species of 5 classes, 3 phylums. In which, the Annelida was recorded with highest number of species (6 species); next is the mollusca with 4 species recorded; Arthropoda species was recorded with lowest number species, three species. The form of larva was recorded with one specie. Cellular density at 4 sampling locations is relatively high due to rapid development of Annelida, especially species indicating organic pollutants such as Limnodrilus hoffmeisteri, Limnodrilus grandisetosus. Diversity index, H'of zoo benthic system at sampling positions is very low.

4.3 Socioeconomic Conditions

4.3.1 Economic Structure and Growth Rate

Di An is one of the place that has many export processing zones with seven operating industrial parks. These are Song Than 1, Song Than 2, Binh Duong, Tan Dong Hiep A, B Tan Dong Hiep, Tan Binh Industrial park, and Binh An Garment industrial cluster.

The service sector has grown quite well with transport, ports and services subsectors. The town has one container port in Dong Nai river, some timber terminals, and construction material terminals, Song Than railway station is the combined terminal of the southern region.

Di An town is one of the few localities with fast economic growth in the province, about 15 - 20%/per year. In which the annual growth rate of industrial subsector is at 26 to 27% annually, services at 14 to 15%, and agriculture at 3 - 5%. Due to rapid urbanization, agriculture land in the Town has been decreased from time to time.

4.3.2 Land Use

Currently, residential land including housing land, public roads, alleys, public buildings such as kindergartens, residential development projects and so on with total of 1,271 ha accounting for 35.73% of Di An's total land area. There is also 5 ha of administration land;

The town's public buildings include the CPC office, schools, hospitals, health centers, sport/ cultural facilities etc. with total land of about 31,6 ha. Land for landscaping (provisionally) in Chau Thoi Mountain and Ho Lang historic area are about 53.86 hectares, accounted for 2.65% of Di An's land area. The average land area of landscaping is 2,5 m^2 per capita;

Land for public buildings such as markets, supermarkets, hotels, restaurants, land for none-manufacture companies, etc. are about 21 ha. Land for training facilities including industrial schools, railway school, vocational training centers, etc. covers about 9 ha. Land for urban roads cover about 81.5ha. Land for industrial facilities and other production located outside the industrial parks is 679 ha, accounting for 31.62% of the area including areas of construction materials factories.

Other land includes farmland, livestock, irrigation, canals, quarrying areas, cemeteries, graveyards, unused land, etc… with approximately 1,959 ha, accounting for 32.59% of the

town's land area. Of which, farmland area is about of 1,555ha accounting for 79.39%, land for cemeteries and graveyards about of 129 ha, land for ranches about of 23.6 ha.

4.3.3 Population, Occupation, Income and Housing Conditions

Total population of Di An Town in December 2014 is 387,552 persons (with 51,605 households). Among these, 206,810 people are female and 100% people are urban population. 90% of the total population are mostly living in five wards including Di An, Tan Dong Hiep, Dong Hoa, An Binh and Tan Binh. Whereas 10% of population is from Binh An and Binh Thang wards[3]. Population distribution by wards are presented in Table 4-16 below.

Table 4-16 General population ward in Di An Town

Ward	Households (HH)	Population in 2014	Permanent Resident		Temporary resident	
			HH	People	HH	People
Di an	10,342	91,197	9,712	37,956	630	53,241
An Binh	3,870	70,239	3,567	14,638	303	55,601
Tan Dong Hiep	14,442	89,490	6,045	23,708	8,397	65,782
Dong Hoa	8,083	55,779	6,074	22,567	2,009	33,212
Tan Binh	8,819	40,090	4,389	16,228	4,430	23,862
Binh An	3,998	26,502	3,582	15,812	416	10,690
Binh Thang	2,051	14,255	1,941	8,866	110	5,389
Total	**51,605**	**387,552**	**35,310**	**139,775**	**16,295**	**247,777**

The data in the Table 4-16 shows that nearly two third of the town's population are temporary residents, these are the laborers coming from the other provinces for work and live in Di An. Forecasted population of Di An Town in 2020 will be 476,400 people and in 2030 will be 595,100 people[4].

According to the Socio-economic Survey Report, among the 1,100 surveyed households (HH), 1.55% of those HH who replied to the question about occupation shown that they have been living on agricultural, 46.27 % are living on trade and services, 45.55% are workers and other occupations[5]. The main incomes of urban households are mainly from trading/service, casual work salary or retirement pensions. Households in rural areas usually have stable income from agriculture combined with casual ormasonry jobs. Living conditions of these household depend a lot on the occupation and the stability of incomes from the main labors the family, especially the head of the household. Most of household living on salary from Government employment or retirement pension are having stable income and life. Poor household are usually the ones that are unemployed or have unstable jobs with variable income.

[3]page 9, Social – Economic Survey Report
[4]page 9, SocioEconomic Survey Report
[5]Section 3.2.1, Socio-Economic Survey Report

Average income per capita[6] of people in poor household is 310,800 VND per person per month, equivalent to one fourth of the average income of middle income household group, which is at 2,138,367 VND per person per month, and is much lower than the average income of rich household group, at 8,389,787VND per person per month. Poor household usually have to spend 100% of their income for their daily lives expenses, sometimes they even have to borrow money to pay for some essential costs such as foods, school fees of their children. Meanwhile, middle income and rich household groups can save their money.

According to Resettlement Action Plan Report, average each household has 2.5 people (nuclear family). 60 % of the displaced people are in the working age, 20 % of people over 60, and 20 % of people under working age. The main income of 80 % of households to be relocated are salary as a worker in the industrial zone with an average of 5 million / month / household , 20 % households have income between 2 to 4 millions VND per month per household from domestic livestock and small households businesses[7].

74.9% of household in Di An are living in houses with permanent structures, 24.9% households are living in houses with semi-permanent structures and 0.2% are living in houses with temporary structure. 73.9% of rich household having permanent-structured houses and no household is living in temporary-structured house. 4.9% of the poor households are living in temporary-structured houses. Middle income and poor households are usually living in simple single storey houses with flat roof, and with not much valuable assets. Therefore, it can be seen that poor households are disadvantaged and vulnerable group. With low economic conditions, poor households usually they have less chances to enjoy good living conditions or access to some public services such as clean water, health care, education, cultural activities etc.… at their localities[8].

4.3.4. Public Security

Communication about traffic safety contributes to increasing the awareness of local people. Measures to enhance road safety have been implemented, signboards have been installed for safety. Wards authorities frequently remind the households to follow the traffic law, not doing business in ways that occupy the footpaths and sidewalk. The average numbers of road accidents are National Highway 1A (13 cases), Provincial Road DT 743 (69 cases), National Highway1K (24 cases), Industrial Park (30 cases),road in Di An town (139 cases)railway (2 cases). The areas has high accident frequency are Di An Ward with 64 cases, Tan Hiep Dong with 85 cases, remaining wards has less. The causes for accidents are due to travelling on incorrect lane, changing lanes or overtaking without proper observations, out of speed control, not to maintain safe distance with trains etc.

[6]Section 3.2.4, Socio-Economic Survey Report
[7]Section 5.3, Resettlement Action Plan Report
[8]Section 3.2.3, Social-Economic Survey Report

4.4 Existing Infrastructures and Services

4.4.1 Education and Health

The town has 38 public schools with 46,501 students. In addition to public schools, the town also has a private school named Phan Chu Trinh and 67 registered pre-school educational institutions to accommodate 11,849 students.

The town has one general hospital with 80 beds, 11 clinics, 50 specialised clinics, 7 traditional clinics, 6 maternal clinics and 16 locations for medical service. Six out of seven wards have medical station, (Binh Thang is the exception), all medical station of the wards also have doctors. The quality of medical cares has been improved gradually, the effectiveness of treatment has been enhanced. Besides that, Di An Town also has 90 private medical entities mostly being operated effectively contributing to public health care.

According to the Socioeconomic Survey Report, common water-related or environmental conditions-related diseases seen by local communities includes gynecological diseases, intestinal diseases, respiratory diseases, dengue fever, cholera, dysentery etc. Other diseases had low rate of occurrence. Among common diseases, colds, itchy /allergy /redness, skin diseases and other diseases were seen as may also be due to unsafe sanitation conditions but not sure. The main causes stated by the interviewed households were polluted water sources, noise, dust and waste of business entities, flies from garbage/fresh manure, particularly pollution from stagnant sewerage. Currently, in Di An Town in general and project area has no sign of environmental pollution due to industrial production.

4.4.2 Transportation

Traffic system in the Project area has been being develop relatively fast, internal routes connected with the provincial routes to make good traffic network and is convenient for travel and goods transportation demands.

At present, there are 3 national highways with total length of about 12.97 km passing through Di An Town. These are National Way 1A, 1K and Asian trans-highway. The section of National Way 1K in Di An Town is 5.7 km long having 4 lanes. This is an important route for transportation of materials during construction phase of the project.

National Highway 1A (Hanoi - Bien Hoa Highway). This is the most important route of the Southern region, connecting the Southern region with others in the country. This route runs through the South-eastern corner of Di An town with the length of 3,8 km from the Dong Nai bridge to the National University. There are currently 4 road lanes with very high density.

Provincial Road DT 743A starts from Tan Van intersection, passes through Tan Dong Hiep Ward, Thuan An Town and ends up at Thu Dau Mot City. This asphalt road is 13 km long, 9 to 11m wide. There is existing sewerage running along this road. This is the crossing road, connecting Binh Duong port with national road 1A then the center of the town. The road is very important to socio-economic development of Di An Town as well as Binh Duong province. The

section passing Di An is divided with several bends. Since there are many roads under the construction, some sections are tolled and the others are not.

Most of internal roads in residential areas are narrow, from 3 to 5m wide, and in poor condition, and without drainage or water supply. New residential areas has wider roads, from 8 to 12m and in good condition. Many roads has surface elevation higher than existing roadside houses challenges drainage. There are many T junctions opposing each other making it difficult or unsafe to travel.

Among the above roads, the provincial road DT743 and National Highway 1K were invested under BOT mode. This is a good solution to provide with a good road for transportation services. However, there are some shortcomings:

- There are no footpath.

- Most of the roads are not built with urban infrastructure such as stormwater drains, water supply pipelines and wastewater collection sewers. Some infrastructure such as power lines, communication cables were installed improperly, currently roadside land being managed by local people so management of these facilities are difficult.

- Footpaths are usually higher than existing ground levels at both sides of the roads so people have to elevate the ground level of their houses to prevent rain water from being drained into their houses or yards. Meanwhile, some roads have stormwater drains but only working for the roads, not the roadside houses as the bottom level of these drains are higher than the roadside house floors.

- Provincial Road DT743 is not straight but has many bends. The curves caused many problems for transportation, construction and architecture and houses. Land along the curves are being used inefficiently.

The North-South Railway passing Di An town to enter Ho Chi Minh city. The section passing through the town if about 9 km long. On this section also has the Song Than station and Di An passenger terminal. In addition, there is also 1.5 km internal railway of Di An locomotives factory that runs from Di An station to the factory. The existing railway is currently causing difficulties for roadway transportations in Di An because the railways crosses so many roads with high density of people and vehicles.

Di An has 7.5 km of rivers and canals. The section of Dong Nai river passing Di An town is 200m wide and 1 km long. There are ports and ferries stages along this section, particularly the Binh Duong port and timber terminal, construction materials. These are located on the both sides of the Dong Nai bridge, which is favorable for waterways. However, traffic at both ends are usually very busy and traffic jam usually happened. Binh Duong port is a specialized container port. The Port has been overloaded in terms of storage capacity.

4.4.3 Water Supply

Di An Water Treatment plant use raw water from the Dong Nai river. The intake is located at Thai Hoa commune of Tan Uyen town. Treatment capacity in phase 1 is of 135,000 m^3/day. The Thu Duc Water Treatment Plant is now supplying water for the National University and part of the residential areas in Dong Hoa and Binh Thang wards which are located along the Ha Noi highway. At present, water supply meets about 90% clean water demand, mostly for urban people. Most of household use tap water for cooking, drinking and other domestic activities while use less for other purposes. Some households use combined tap water with other supplemented sources in their daily activities in order to save money. Water from drilled well or rainwater are supplemented sources. These are not very commonly used in urban wards but highly quite popular in suburban areas where piped clear water supply network is not yet available[9].

About 80% of households are without piped water. In addition, according to the survey, some households are still using other water sources such as underground water from deep well, rainwater, pond/lake water. The households usually use the rain water directly or quickly filtrate water from drilled or dug well by letting the water to run through the tank filled with sand and gravel before using. 100% surveyed households assess the tap-water is pure and clean. Some businesses has been extracting groundwater themselves from drilled wells with a maximum capacityof 1,000m^3/daybut water quality is poor, pH ranges from 4.4 to 5, lower than standards.

4.4.4 Drainage

Di An has limited existing combined drainage and sewers system for both rainwater and wastewater. The existing channels are mainly concentrate at the administrative center and along the main road. The existing channels is only capable of draining small volume of storm water and wastewater. When it rains heavily, rainwater overflows on the surface of follows the natural pattern to existing channels and canals including Ong Tiep canal, Cai Cau, Ba Hen, Ba Lo, Nhum spring, Lo O spring, Cau Dan spring and other small canals in the town, then to Dong Nai river.

Although recently some new sections of ditch and drainage channels were constructed in the town such as T6 and T5A channel, streams and sluices in some streets have been improved or rehabilitated, the existing drainage in Di An town is incomplete as described below:

- Di An ward has detail drainage and sewer plans but the infrastructure build are incomplete, drains have been built in a number of roads in the central area. The combined drain and sewer have inadequate cross-sections thus led to localized flooding from rain water. Apart from the amount filtrated into the soil or evaporated, the rest of rain water are concentrated into the drain in the north to the Rach Cai bridge and in the south to the Nhum stream. Currently a number drainages are being built such as in Nguyen An Ninh street to address local flooding problem.

[9]Section 3.3.1, Social-Economic Survey Report

- Tan Binh ward has no existing drainage, currently rainwater has been following natural Terrance to the existing canals then flows to the main streams as Cay Thong, So and Ong Thom streams.
- Tan Dong Hiep ward. There is no drainage for rainwater from residential areas, industrial parks. Most of rainwater flows to the existing canals then to the main channels including Ong Tiep and Cai Cau ditches then to Dong Nai river.
- Binh An ward has many existing ditches and streams, rainwater from the planned and existing residential areas in the commune are discharge directly to these water bodies and then flows to Ba Hen and Ba Lo stream then to Dong Nai river.
- Binh Thang ward is located in relative low land, there are many ponds, cannals and ditches. Rainwater from the building area in the commune and unplanned areas is discharged directly to the ponds, channels and Lo O stream.
- Dong Hoa ward: the quarry create large number of ponds, rainwater of some basins flows to these ponds, some is drained into the south to the Nhum and Lo O streams.
- An Binh ward: rainwater is drained following natural topography, concentrated to the east of the Cau Da stream.

Status of rainwater drainage at industrial parks as follows :

- Song Than 1 and 2 industrial parks: rainwater drainage of two industrial parks are focused on the big drains, then flows to the Ba Bo canal (HCM city) and drains to the Saigon River where section of Vinh Phu commune.
- VINATAFON industrial park: drainage system is focused on the main sewer and drains in the north to the Cai Cau ditch.
- Tan Dong Hiep A industrial park: rainwater drainage is concentrated on the B2000 box sewer through the 743 provincial highway to Da stream.
- Tan Dong Hiep B industrial park: rainwater from industrial park is divided into to two basins, the northern part flows to existing ditches. Remaining basins drains up to detention reservoirs in the industrial park then to Da stream.
- DAPARK industrial park: drainage system is released up to the Ba hen ditch in the south.
- Northern Binh An industrial park: rainwater was planned to drain up to Ba Hen ditch and Ba Lo ditch.

Tan Binh industrial zone: rainwater drainage system is planned to concentrate on the main sewer which flows in the northeast up to the existing canals and ditches then flows up to So stream and Ong Thom stream.

As the existing drainage and sewers in the town are still limited, the route of transportation is long and some main routes haven't been constructed, every time when it rains in Di An Town there are number of locations are flooded. According to data of Di An Town PC, the locations in the project areas subjected to frequent flooding as below:

Table 4-17 Heavily flooded areas in Di An Town

No	Location/Section	Beginning point- End point	Length (m)	Depth and duration of flooding
I	**Binh Thang ward**			
1	30/4 street	Boundary of National University- highway No.1A	800	1.3m, high flow velocity, lasts in 2 to 3hours
2	Drain at group 12	9-group road, Ngai Thang quarter- Boundary of district 9	200	About 0.6-1m, lasts in 1 to 2 h
3	The zone, section 11, Hiep Thang	Boundary of national historical cultural monument area- Long Binh ward, district 9	100	Partial flooded depth about from 1 to 1.5m, lasts in 2 to 3h
4	DT.743A	Binh Thang toll station- Trung Thang intersection	100	0.2 to 0.4m deep, high flow velocity
II	**Binh An ward**			
5	National highway No. 1K	Lo O stream intersection- Noi Hoa market	400	about 0.5m, e lasts in 1 to 2 h
6	National highway No. 1K	Ngoc Hue petrol station- Boundary between Di An and Bien Hoa	500	about 0.5m, lasts in 1 to 2 h
7	6-group road, Binh Thung 1 quarter	The middle section of pipeline	100	Flooded depth of about 0.5m, overflowing in houses,
8	DT.743a (Lo O stream)	23-27 inter-group road, Noi Hoa quarter - Lo O stream crossing DT.743A	100	Flooded depth from 0.2 to 0.4m, high flow velocity
9	DT.743a (Hung Thinh petrol station)	Binh An martyr gravestone house- End of downhill of Hung Thinh petrol station	150	0.2 to 0.4m, high flow velocity
10	Binh Thung street	European Foreign Language Center- Teen barber's shop	120	0.2 to 0.4m
III	**Dong Hoa ward**			
11	Tran Hung Dao street	Dong Hoa petrol station - Tran Hung Dao - Tran Quang Khai intersection	400	0.3 to 0.5m, last in 2 to 3 hours
12	Tran Hung Dao street	Cay da xe street - Mr. Tran Ngoc Giao's house	100	0.3 to 0.5m, last in 2 to 3 hours
13	6-group area, Tan Hoa quarter	National University - National highway No. 1A	Gr 6	0.8 to 1.2m, last in 6 to 8 h
IV	**Di An ward**			
14	Some locations administrative center	Pho Xanh Coffee	50	0.3 to 0.5m, last in about 1
15	Xom Ga street	Gate at back of Kim Thien Pagoda - Truong Hoc Street	140	0.3 to 0.5m, last in about 2h
16	Xom Duong street	Adjacent to Xom Duong street - Contiguous to the Northsouth railway	40	0.3 to 0.5m, last in about 2h
17	Song Than Commercial and Residential area	Road No. 2, Song Than IP, Groups 31, 32, 33, Nhi Dong quarter and Roads No. 2, 4, 6, Linh Chieu ward, Thu Duc district		0.5 to 0.8m, elongation of about 3h
IV	**Tan Dong Hiep ward**			

No	Location/Section	Beginning point- End point	Length (m)	Depth and duration of flooding
18	DT.743b	Entrance of America Home Company - End of boundary of America Home Company	100	0.3 to 0.5m, last from 3 to 10 days
19	DT.743a	Hoa Hong 4 Nursery School - Do Tan Phong street	200	0.3 to 0.5m, last in about 1h
20	DT.743a	Tan Dong Hiep wardPolice office -	150	0.3 to 0.5m, last in about 1h
21	Nguyen Thi Minh Khai street	Chieu Lieu intersection	50	0.3 to 0.5m, last in 3 to 5 days
22		Tan Long intersection	50	
23		Phuoc Thanh black beer	50	0.3 to 0.6m, last in 3 to 5 days
24	Doan Thi Kia street	DT.743a (Ong Xa intersection)- Unprompted market	400	from 0.2 to 0.4m last in 3 to 10 days
25	Chieu Lieu street	Nam Hai Company - In front of Mr. Chin Bich's house	150	from 0.2 to 0.4m last in 2 to 4 days
VI	**An Binh ward**			
26	Di An street - Binh Duong	Di An 2 market - Binh Duong intersection to Ba Giang bridge	800	from 0.3 to 0.5m, last in 2 to 3 days
27	Dinh Binh Duong street	Adjacent to Gom Chan street - Song Than flyover - Gio Bay bridge	980	from 0.3 to 0.5m, last in 2 to 3 days
28	An Binh street	Adjacent to Gom Chan street - Song Than flyover - Tran Thi Vung street	800	from 0.1 to 0.5m, last in 2 to 3 days

Figure 4-4Flooding on Tran Hung Dao road

37.8 % of 1,100 surveyed households said that local flood happened in their surrounding area, waterlogging mainly happened in outside their houses meanwhile flooding happened inside the house.

…"…

...Reported by Mr. Nguyen Van My – resident living along ĐT 743 street, Tan Dong Hiep ward: this road section is often flooded, heavy rains in 30 minutes will make the street flooded severely. Most rainwater can not be drained and wastewater come up from manholes. Water has dark color and bad smell spread on the street then flowing into house;, many motorbike stop running suddenly when passing flooded street, some people were due to not able to see the flooded manholes. Many houses along the street built walls in front of their houses to prevent water from entering into the house but they still get wet whenever any container truck or heavy truck passed through.

15.5% of interviewed households responded that flood happens is due to excessive rainfall and low ground level while there is no drainage. 53.6% of households believed that flooding is due to shortage of drainage, or the drain are broken or blocked with soils and solid wastes thus reducing drainage capacity. 36% stated that flood is caused by lack of a proper drainage system.

Flooding has caused a lot of negative impact on the lives of people and environmental pollution, water pollution, affect daily activities of the people, reduce the life expectancy of roads, interrupt travel and cause dangers to human life.

Because investment of sewerage system was not synchronous that families had to find their ways to deal with wastewater. The household in the region had the system of sewer, ditch for exhaustion of rain water usually let the waste water from the septic rest-room to run into the common system of sewer. In some areas without general sewer systems, waste water with no place to drain, some households have to contribute money together to build sewer ditches, or buy simple plastic tube to transport wastewater from toilet to the general sewerage system or lead to nearby river. However, these are rare cases and unusual. In some area, residents have to dig a trench around the house, basin in the garden or small ditches to drain wastewater into roads or ditches along the road in residential areas. Some households still accept living with stagnant waste water and environmental pollution caused by wastewater.

For the matter that the people uses the self-absorbed rest-room causes the danger for environmental pollution seriously for the surface water and the underwater with hollow water circuit. When the waste water is discharged to the ditches outdoor usually being stagnant, causing insanitation, environmental pollution, to affect to the landscape and health of the people. Particularly as T4 canal - Cai Cau canal are being polluted, to see clearly the waste water with the brown and odor, Mu U spring in Tan Binh Ward is being polluted seriously.

Table 4-18 Discharge sources from household's toilet based on standard of living

Discharge sources of household's toilet	Standard of living			Total
	Poor	Medium	Rich	
General drainage system	1.3%	5.9%	1,1%	4,6%
Household septic tank	2.5%	49.4%	31,6%	73,5%
Directly into streets or surrounding areas	0.0%	8.4%	0%	0,1%

Directly into river/canal/pond	0%	0.4%	0,6%	1%
Garden/ infiltration pond	0.0%	7%	7,6%	14.6%
Storage for tree watering	0.0%	0.3%	0,6%	0,9%
Regional rain sewerage system	0.0%	8.8%	2,5%	3,5%
Others	1.3%	0.4%	0,1%	1,8%

(Source: Social-Economic Survey Report, section 3.6.2)

All the Industrial Parks in the Town have waste water treatment plant but there are still some factories outside industrial parks are still discharging untreated waste water into drainage system of the area. This wastewater is drained to excavated hole for self-absorbing or exhausts to the sewer for exhaustion of rain water to outside. Some industrial firms haven't been treated well therefore it causes much pollution to channel and canal and the residential area surrounding.

4.4.5 Collection and treatment of solid waste

A typical household daily emitted about 3kg of waste, the lowest emission is 1 Kg, the highest is up to 15kg. Households with different living standards produced different amount of waste. Usually, those with hard living conditions produced less waste compared to those with better living condition. Household involved in catering services are those recorded with highest waste disposal.

Currently, waste management and waste collection in Di An town was undertaken by Urban Work Company. Solid waste was not separated at source and was buried in landfills & burnt in the town and then transported to South Binh Duong waste treatment complex.

In district have formed a landfill transfer in Tan Hiep village, Tan Binh commune. Landfill has an area of 1,5 hectares but is not planning and investment in green plant quarantine stations, don't have the collection and disposal system, not to transfer to other places caused unsanitary, polluting environment.
The other smaller landfills are formed spontaneously at Dong Hoa, Tan Dong Hiep, Binh An, etc…also caused unsanitary.

Waste collection efficiency of the town only reached 40% of actual incurred waste. Due to lack of manpower and equipment, there are 4 to 6 dumpers collecting waste every day, for peak days (holidays, festivals) there are 7 dumpers which are equivalent to about 2 - 2.5 tons/day and waste are concentrated at dumping ground. The services are mainly deployed in town center, while the remaining areas waste treatment mostly by household themselves. Some households who had waste collection every day, the remaining households treated waste by the following ways: Burn / bury in the garden, sent to public dump ground, thrown onto a nearby bare field.

Figure 4-5. The quo status for discharge of garbage in the compass of Di An town

Most of industrial facilities inside and outside the industrial parks have the environmental company for solid waste collection then taken to the complex of solid waste treatment.

4.4.6 Power supply, Telecommunications

Power source supplying to Di An town of Binh Duong Province is mainly from the National Grid via the high voltage line and the110 KV transformer sub station. Di An town is provided with high voltage lines from the National Grid passing including: 220 KV line from Long Binh 220/110 KV transformer substation passing through the Chau Thoi area of Dong Hoa commune to Thu Duc 220/110 KV Transformer sub station, 110 KV line of Binh Hoa - Tan Dong Hiep, 110 KV line of Thu Duc - Song Than, 110 KV line of Long Binh - Binh An - North Thu Duc, 66 KV line from Thu Duc sub station along the National Highway 1 to Bien Hoa Industrial Park, These high voltage lines are the overhead lines.

100% of households are using electricity supplied by national electricity network. It implemented the task for arrangement of cable, ducted tens of kilometers of electric line at the residential area, urban area and the main roads of the town. Post, telecommunication developed strongly and diverse, the quality for serving continues being enhanced. The internet subscription with wide band (ADSL), digital television service and internet service increase many times in comparison with 2010. To ensure the demand for communication thoroughly for the people.

4.5. Cultural, Historical and Religious

At the present, Di An Town has 7 cultural - historical monuments recognized including 1 national monument and 6 provincial monuments. These natural - historical monuments have many important values of spirit, cultural social living and tourism attraction to local people.

Figure 4-6.Historic - cultural monuments in Di An Town

No	Name of monument/ Vestige/relic	Description	Cultural issue associated
	National monument/ vestige/relic		
1	Cultural relic and landscape of Chau Thoi Mountain	Location: Binh An Ward, comprises of Chau Thoi mountain and Chau Thoi pagoda, within an area of 25 ha, with beautiful landscape and antiques having historic, cultural values.	Chau Thoi posada, constructed long time ago (from 17th century), is place for meditation practice and quiet seeking.
	Provincial monument/ vestige/relic		
2	Revolution base Ho Lang	Location: Tan Phuoc Quarter, Tan Binh Ward, Total area of 31 ha, constructed to exhibit items in the combat of army and people of Di An for the education of tradition for the next generations.	No
3	Ong Ngai Thang Temple	Location: Ngai Thang Quarter, Binh Thang Ward, The monument comprises of the tomb and temple of Mr. Truong Cong Dat. At the present, the monument is in bad condition and often flooded because the monument is lower than surrounding area.	Praying and seeking quiet in holidays
4	Binh An Temple	Location: Binh Trung Quarter, Binh An Ward, the monument comprises of the tomb and temple of Mr. Truong Cong Can. At the present, the monument is in bad condition, land use conflict and transportation planning.	Praying and seeking quiet in holidays
5	Di An Temple	Location: Nhi Dong 1 Quarter, Di An Ward, The monument is in good condition	Praying and seeking quiet in holidays
6	Di An train factory	Location: Thong Nhat Quarter, Di An Ward, Constructed in 1902, the monument is still in original architecture and being used for operation of railway company.	No
7	Mach Mang Stream (So Stream) Monument	Location: Tan Phuoc Quarter, Tan Binh Ward, Total area of 550 m^2, memorize 165 solders died in 1968.	No

Generally, cultural - historical monuments of Di An Town are almost temples and pagodas, in which Chau Thoi pagoda has the most important value in spirit living of local people. Beside

that, some of the monuments are separating from way of living of local people such as temples. These monuments are not situated in construction routes of drainage system, sewerage system and WWTP so that they will not be affected by construction of the project.

The cemeteries in Di An district cover an areas about of 129 ha. In addition to two large cemeteries, namely Chaozhou in Tan Dong Hiep ward, and Public cemetery in Binh Thang ward, there are many other graveyards scattered in the residential areas. Some cemeteries are still continuing to bury. The cemeteries in the residential areas are affecting the environment, aesthetics and attractiveness of the residential areas.

4.6. Site-Specific Characteristics

4.6.1 Wastewater Treatment Plant (WWTP)

At the present, the site consists of 62,906 m^2 agriculture land, makes up 92.20%; 4,214.5 m^2 of traffic land and water sheds, makes up 6.18% and 1,105.8 m^2 housing land, makes up 1.62%. To connect with the plot is the North-South rail road running thru the Di An Town following the North East – South West.

Existing structures on the land include 7 houses, in which 5 firm houses and 2 bunk houses, 2 workshops, 5 tombs and other architectural objects. Plants of the site are mostly bushes, cajuputs, eucalyptus and bamboo. Animals of the site are mostly pets and poultries such as chickens, cats, dogs and ducks. There is no religious construction in the area.

At the present, people living in the construction's site of WWTP are mostly working in industrial parks and stone quarries in Tan Dong Hiep Ward. Infrastructure of the WWTP has not been constructed except for access roads in Dong An residential area. Dong An residential area, next to WWTP, has been constructed completely with an occupied percentage of about 80%. Drainage system of the area is in good condition. There are about 10 households living on the road closed to WWTP, having solid houses.

The construction's site is not flat. The West and North corners of the site are low with the altitude of 17.9 while the South corner has a higher altitude of 19.7-20.

Especially, the available portion of T4 channel at the region where the people is living in the plot of the project with the low elevation about 1m, the width is about 2m, thus in the days of heavy rain this region with water overflowing the channel and cause the phenomenon for internal flood.

Figure 4-7. Some images at WWTP area

Some existing constructions closed to the WWTP

North-South railway

Tan Dong Hiep stone quarry

Dong An residence area

Some constructions on the construction's site of WWTP

Some existing constructions on Dong An residence area closed to the WWTP

Treated waste water satisfying QCVN 14:2008/BTNMT, type A (K=1) will be discharged into T4 canal, after that poured into Siep stream and Tan Van canal , finally ended up at Dong Nai river. The available location of T4 channel where estimates for exhaustion of waste water after treatment 3m wide, 2,5m high. This portion of channel will be improved with the size 3x3.5x3.5. Specification of existing T4 canal, Siep stream, Tan Van canal and Dong Nai river are described in below table:

Table 4-19Specification and current status of receiving source of treated waste water

	Role	Plants on riverside, aquatic resource	Water quality
Existing T4 canal, 1300m long and 2.5-4m wide.	-Receive treated waste water from WWTP of Tan Dong Hiep B IP, domestic waste water of Dong An residence area -Drainage canal for Tan Dong Hiep Ward At the discharging point of WWTP  T4 canal at the WWTP area 	Plants are mostly bush and eucalyptus. Plant plankton comprises of 9 species including mostly *Cyanophyta and Bacillariophyta. Cellular density is lower than in other position at* 10^4 cells per litre. *Cyanophyta is dominant species belong to* planktothrix zahidii. Index H'=1.1, water is polluted. Zooplankton has 10 species. Lowest cellular density is more than 3,000 cells per m^3, Nematoda is dominant species. Index H'=2.67, water is slightly polluted. Zoo benthic has 4 species. Lowest cellular density is 700 cells per m^3, Oligochaeta larva is dominant species. Index H'=0.8, water is polluted.	Concentrations of COD, BOD_5, coliform in surface water are higher than permitted value in QCVN 08:2008/BTNMT (A2). In which: COD exceeds 5.5 times; BOD_5 exceeds 7 times; coliform exceeds 2 times.
Cai Cau Stream (Siep stream), 3115m long and 2.5-6m wide	-Receive water from T4 canal -Receive rain water and waste water from households and manufacturers outside of industrial parks in Di An Town and Dong Nai province T4 canal pouring into Siep Stream 	- Plants are mostly bush and eucalyptus. Plant plankton has 25 species. Lowest cellular density is more than 10^4 cells per litre, Nematoda is dominant species. Index H'=2.3, water is slightly polluted. Zooplankton has 14 species. Lowest cellular density is more than 4,000 cells per m^3, Moina macrocopa is dominant species. Index H'=3.18, water is clean.Zoo benthic has 2 species. Lowest cellular density is 670 cells per m^3, Limnodrilus	Concentrations of SS, COD, BOD_5, coliform in surface water are higher than permitted value in QCVN 08:2008/BTNMT (A2). In which: SS exceeds 2.4 times, COD exceeds 3.9 times; BOD_5 exceeds 4.8 times; coliform exceeds 1.6 times.

		hoffmeisteri is dominant species. Index H'=0.2, water is polluted.	
Tan Van canal, 2059 m long and 14.95 – 44.96m wide	- Receive rain water and discharge water from Siep Stream and Ba Kham canal Siep Stream entering Tan Van canal 	Plants are mostly bush and eucalyptus. Plant plankton has 35 species. Lowest cellular density is more than 140,000cells per litre, Nematoda is dominant species belong to Microcystis aeruginosa line. Index H'=1.23, water is polluted. Zooplankton has 33 species. Lowest cellular density is more than 25,000 cells per m^3, Rotaria rotatoria is dominant species. Index H'=4.06, water is clean. Zoo benthic has 8 species. Lowest cellular density is 1,300 cells per m^3, Limnodrilus grandisetosus is dominant species. Index H'=2, water is slightly polluted.	Concentrations of SS and $BOD_5$are higher than permitted value in QCVN 08:2008/BTNMT (A2). In which: SS exceeds 2 times; BOD_5 exceeds 1.2 times.
Dong Nai River	- Receive rain water and discharge water from Tan Van Canal Dong Nai River at the confluence with Tan Van canal 	- Plant plankton has 50 species. Lowest cellular density is more than 150,000 cells per litre, Nematoda is dominant species belong to Microcystis aeruginosa line. Index H'=1.01, water is polluted. Zooplankton has 22 species. Lowest cellular density is more than 16,000 cells per m^3, Rotaria rotatoria is dominant species. Index H'=1.62, water is polluted. Zoo benthic has 2 species. Lowest cellular density is 110 cells per m^3, Dendronereides heteropoda is dominant species. Index H'=0.4, water is slightly polluted.	Quality of water is relatively good, all the indicators satisfy QCVN 08:2008/BTNMT (A2).

4.6.2 Access roads

Access roads of the WWTP include DT 743B street, My Phuoc - Tan Van street and internal roads in Dong An residential area. Internal roads in Dong An residential area coming to the WWTP have a width of about 4m. These roads are in good condition and low traffic density.

Figure 4-8. Some images the access roads of the WWTP

Internal roads of Dong An residence area

Access road of Dong An residence area

My Phuoc – Tan Van Street

DT 743B Street is 12m wide, paved with asphalt and having high traffic density. Besides households, there are a lot of business establishments and especially Di An hospital at the junction with the access road of Dong An residential area. My Phuoc - Tan Van street is under construction with a width of about 16m for 3 lanes. Traffic density is low at the moment. However when the street is complete, traffic density on the street will be high.

Table 4-20 Sensitive constructions on access roads of WWTP

Road	Position	Sensitive construction	Current Images

DT 743B Street	At the junction with access road of Dong An residence area (toward Tan Dong Hiep B Industrial Park)	Di An Hospital	
Internal roads of Dong An residence area	500m from the junction with DT 743B Street	Market in Dong An residence area	

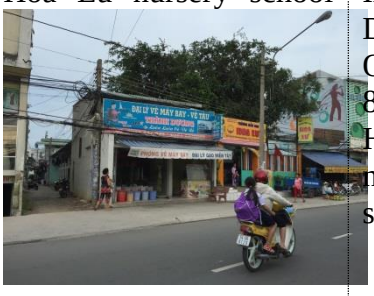
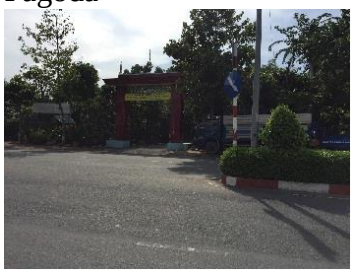
4.6.3 Main Sewers Pipelines Network

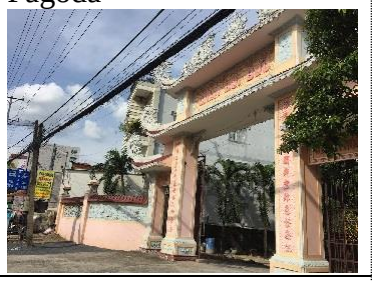
Main drains and pipelines will be constructed on main roads such as DT 743B street, Hai Ba Trung Street, Street No 21 in Song Than Industrial Park and Dong Tay B Street. The main drains have diameter of D500-D1000. Besides that, drains route on Nguyen Tri Phuong Street, Le Hong Phong Street and Tran Hung Dao Street will be constructed by D300-D500 pipes and ditches. Specification of sensitive constructions on main drains and pipelines network are described as in below table:

Table 4-21 Sensitive Features along proposed Main Drains and Sewers

Road	Location	Feature	Location	Feature
Provincial Road DT 743B, 12m wide, High density of traffic	1.5km from the junction between DT 743B and Dong Tan Street toward An Phu	Quynh Hoa Kindergarten 	20m from the junction between DT 743B Street and Hai Ba Trung Street	Di An Hospital 

	200m from Di An Hospital	Anh Sao nursery school 	200m from Binh Thung intersection	Toll station 
		Di An's martyr cemetery		
Dong Tay 1 Street, 8m wide, Medium density of traffic	At the junction with Nguyen Tri Phuong Street	Nhi Dong primary school 	100m from Nhi Dong primary school	Bup Sen Hong nursery school 
Street No 21, 10m wide, Medium density of traffic				Hoa Trang Nguyen nursery school 
Le Hong Phong Street - Asphalt road, 10m wide, High density of traffic	10m from the junction with DT 743B Street	Hoa Hong nursery school 	At the junction with Do Tan Phong Street	Market 
	500m from the market	Tan Dong Hiep primary school 	200m from Tan Dong Hiep primary school	Dong Thanh nursery school 

Nguyen Tri Phuong Street, 8m wide, Medium density of traffic medium			Binh Duong 4 Quarter	Hoang Yen nursery school 
	100m from Hoang Yen nursery school	Hoa Lu nursery school 	In Binh Duong 4 Quarter, 800m from Hoang Yen nursery school	Van An Tinh Xa pagoda 
	In Binh Duong 4 Quarter, 100m from Van An Tinh Xa pagoda	Railway 		
Roads in Dong Tan Quarter, Di An Ward, 10m wide, Medium density of traffic	500m from the junction with Street No 21, toward Ly Thuong Kiet Street	Di An Market 	300m from the junction with DT 743B Street	Ngoc Hong Medical Clinic 
Truong Tre Street, Asphalt road, 12m wide, Medium density of traffic	Nhi Dong 2 Quarter	Vo Truong Toan Secondary School 	Nhi Dong 2 Quarter	An Linh Pagoda 

	Binh Minh 2 Quarter	Phap An Pagoda 	Junction between Truong Tre Street, Di An Street and Binh Duong Street	Bui Buu Pagoda 
Tran Hung Dao Street, Asphalt road, 10m wide, Medium density of traffic	The junction between Street No 6 and Tran Hung Dao Street – Di An Ward	Di An Medical Aid Station 	20m from the junction between Dong Minh Street and Tran Hung Dao Street – Di An Ward	Di An Church 
	25m from the junction between Hai Ba Trung Street and Tran Hung Dao Street	Choi Non Nursery School 	At the junction between Hai Ba Trung Street and Tran Hung Dao Street	Hanh Phuc Nursery School 
	20m from the junction between Cay Xa De Street and Tran Hung Dao Street	Hoa Ban Do Nursery School 	100m from Hoa Ban Do Nursery School	Anh Dao Nursery School 

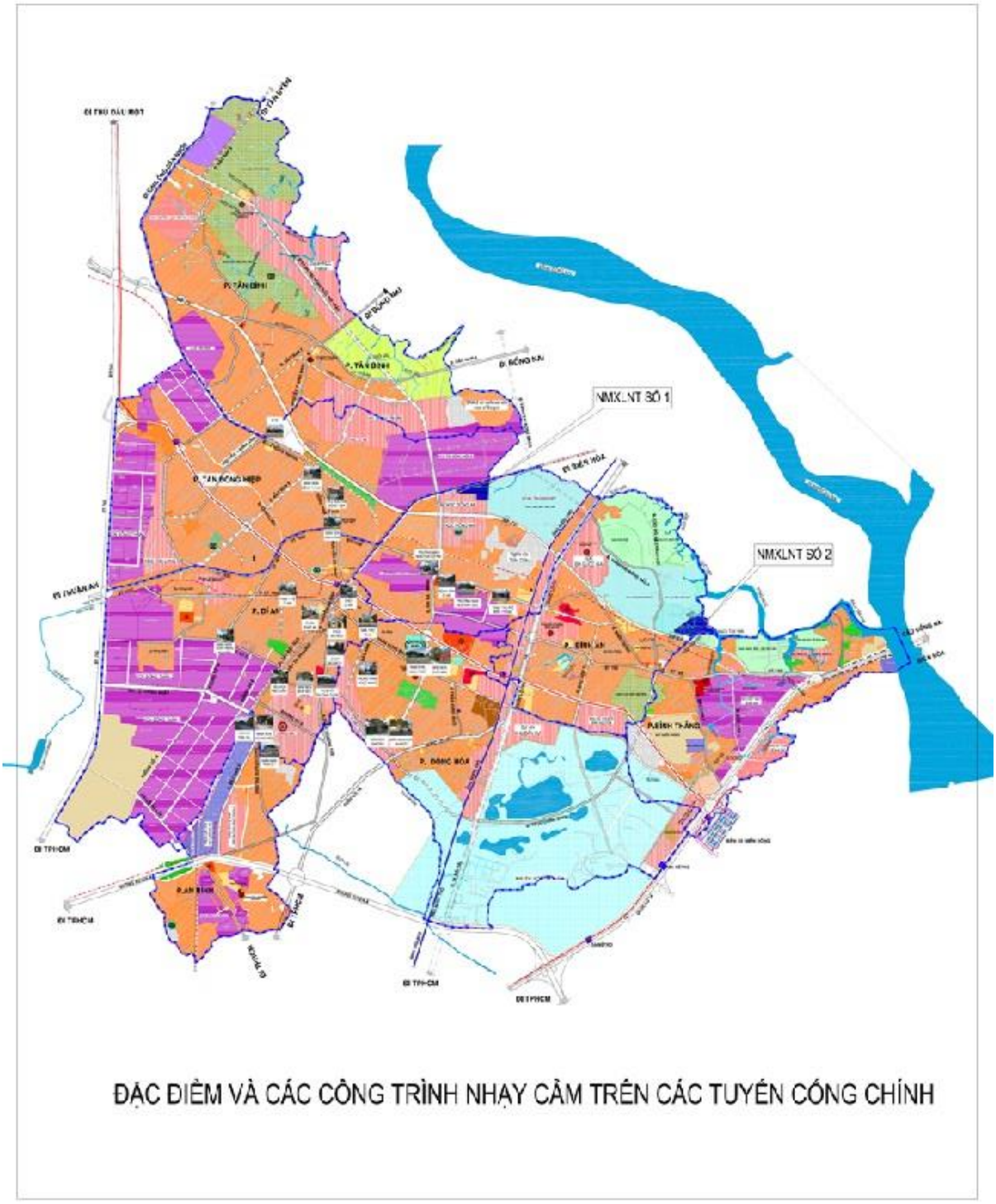


Figure 4-9 – Locations of Sensitive Sites along the Main Sewers

4.6.4 Pumping Stations

In order to help delivery of waste water from low altitude area to WWTP in Tan Dong Hiep Ward more convenient, in phase I of the project, 7 pumping stations will be constructed in Tan Dong Hiep Ward, Di An Ward, Dong Hoa Ward and An Binh Ward. Total area of land acquired 1,506 m^2 including state own land managed by People Committee of Wards and private own land managed by enterprises. Actual status of land for construction of pumping stations is demonstrated in below table:

Table 4-22 Actual status of construction's site of pump stations

No	Pump station	Location	Area (m^2)	Actual status	Current images
1	P1-1	Tan Dong Hiep Ward	115	- Vacant land - State own under management of People's Committee of Tan Dong Hiep Ward	
2	G1-1	Nguyen Thi Minh Khai Street	338	- Vacant land - State own under management of People's Committee of Tan Dong Hiep Ward	
3	G1-3	DT 743 Street, Tan Dong Hiep Ward	332	- Vacant land in the office of Quarter management board. - State own under management of People's Committee of Tan Dong Hiep Ward.	

4	P1-2	Opposite to Big C Di An, Tan Dong Hoa Ward	195	-Vacant land -Owned by Areco	
5	G1-4	Junction between Di An Street and Truong Tre Street, DI An Ward	236	-In the park, planned to be waste water pump station by Dai Nam Company	
6	P1-3	Nguyen Tri Phuong Street, An Binh Ward	213	- Vacant land - State own under management of People's Committee of An Binh Ward	
7	G1-2	Thang Nhat 2 Hamlet, Di An Ward	77	- There is a temporary house 50 m^2 on land (01 story, brick pillar, brick wall, tile and corrugated steel roof)	

4.6.5 Main Drainage Channels

The project will construct new drainage on T4 canal, T5 canal and Tran Hung Dao Street and dredge Cai Cau stream and Lo O stream.

Table 4-23Existing Conditions of Channels, canals, streams in Project Area

T4 canal: Existing T4 canal starts from the gate of Tan Dong Hiep B Industrial Park pours into Cai Cau stream at Tan Dong Hiep stone quarry. The canal is 1,300m long and 2.5 to 4m wide. At present, the canal receives waste water from Dong An residential area and Tan Dong Hiep B Industrial Park. Plants on the sides of canal are mostly bushes and cajuputs. There are some households living at the start section of the canal near the gate of Tan Dong Hiep B industrial park	 T5A section pouring into Existing T4 canal  Canal section in front of Tan Dong Hiep B Industrial Park
T5B canal This is a new constructed canal, starting from the intersection between Hai Ba Trung street and Tran Hung Dao street toward Tay A quarter of Dong Hoa Ward. The end point of the canal is near the street No 9 of Dong Hoa residential area. The road on the canal is unpaved with a width of about 6m. On the sides of the canal are mostly houses and some companies.	 Road at the begin of T5B Canal  Road at the center of the Canal
Tran Hung Dao Streeth as drainage with diameter of B600 on both sides. However, the drainage is not capable enough so that Tran Hung Dao Street of Dong Hoa Ward is often flooded on a length of 400m from Dong Hoa petroleum station to Tran Quang Khai	(location and images of sensitive constructions had been described in table 4.26)

Street, with a high of 0.3-0.5m. New drainage on Tran Hung Dao Street will be constructed in the middle of the road. The existing road is 12m wide, asphalted with medium traffic density. There are some sensitive constructions on the road such as schools and Di An Church	
Cai Cau (Siep) Stream starts from Tan Dong Hiep stone quarry (where T4 canal ends) and passes through National Way 1K, runs along Chau Thoi quarry before ends up at Tan Van canal. The stream is 3,115m long. The construction the drainage on Cai Cau stream will be started from the WWTP to the end point 200m apart from National Way 1K. Plants on the sides of the stream are mostly bushes, malalluca. On the section before reaching the National Way 1K, one side is close to houses. One the section after National Way 1 K, both sides of the stream is mostly bushes and cajuputs.  Section of T4 Canal pouring into Cai Cau Stream	 The section before going through the National Way 1K  The section through National Way 1K, Binh An Ward

	 The section next to the field in Binh An Ward
Lo O stream Existing Lo O stream has a length of about 3,000m and width of 4 to 8m. The stream runs through Binh An and Binh Thang Ward and ends up at Dong Nai river. The stream basin is about 300 ha.	

The collection and transmission pipelines has been designed along the sidewalk, street and roadway corridors (of the technical infrastructure land) so that is not land acquisition. The drainage was designed along the existing roadway and along streams and ditches nature, of the corridor of road, river and stream corridor protection. So these items are not land acquisition.

4.6.7 Disposal Site

Southern Binh Duong's Waste Treatment Complex has an area of 75ha, situated at Quarter 1B, Chanh Phu Hoa Ward, Ben Cat Town, Binh Duong province. The Complex has been taken into operation since 2005.

The treatment complex was put into operations in 2005 at MONRE's approval decision no. 43/QĐ-BTNMT dated 08/01/2016 approving EIA of the treatment complex at treatment capacity 1,575 tones/d of municipal waste and 550 T/d of industrial non-hazardous waste and 600 T/d of T/d of hazardous wastes.). The items invested in the complex including: 3 lines of the plant for production of compost total capacity of 1,260 tons/day (420 tons/day/1 module); Kiln + system for drying industrial garbage 11,500 kg/hour; the system for treatment of distillation, revocation of solvent 200 liters/hour; system for cleaning package, drum 2HP; system for solidification (concrete mixer) 40 tons/day; The station for treatment of industrial waste water of 250 m^3/day; the plant for production of refined brick 120,000 units/day, unrefined brick 1,000 units/day; Production of PO oil from nylon 40 tons of raw materials/day. The Complex is planned to be operated till the end of 2030.

Figure 4-10Photos of Composting Plant at Binh Duong SW Treatment Complex

Separation unit

Fermentation unit

Compost

Packaging unit

4.6.6.1 Pollution Control Measures at the Complex

a. Gases

The incinerator has capacity of 4200 kg/h. The gases emitted has been treated by the process described below to meet Vietnamese National Standard QCVN 30:2012, column B.

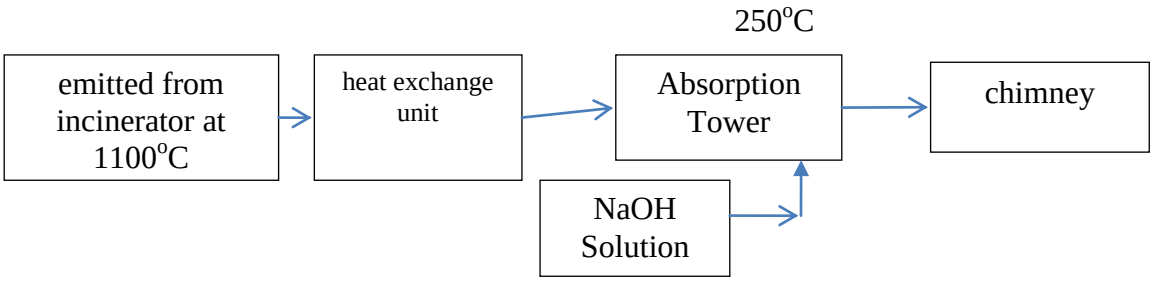


Figure 4-11. Gas treatment for Incinerator

Gas treatment for brick production unit: The gases emitted meet Vietnamese National Standard QCVN 19:2009/BTNMT, column A

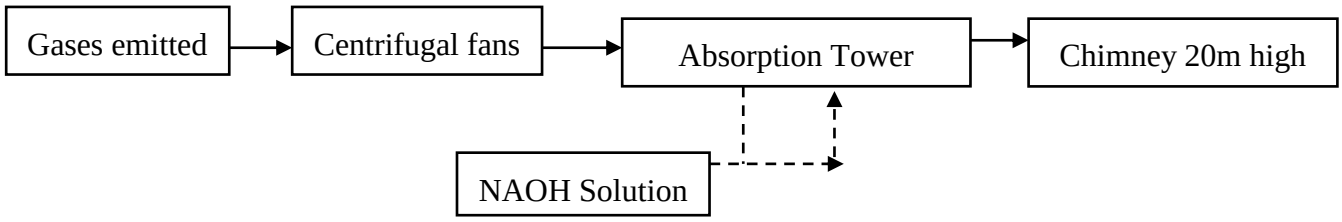


Figure 4-12: Gas treatment for Brick production

Gas treatment for Heat Reactor:

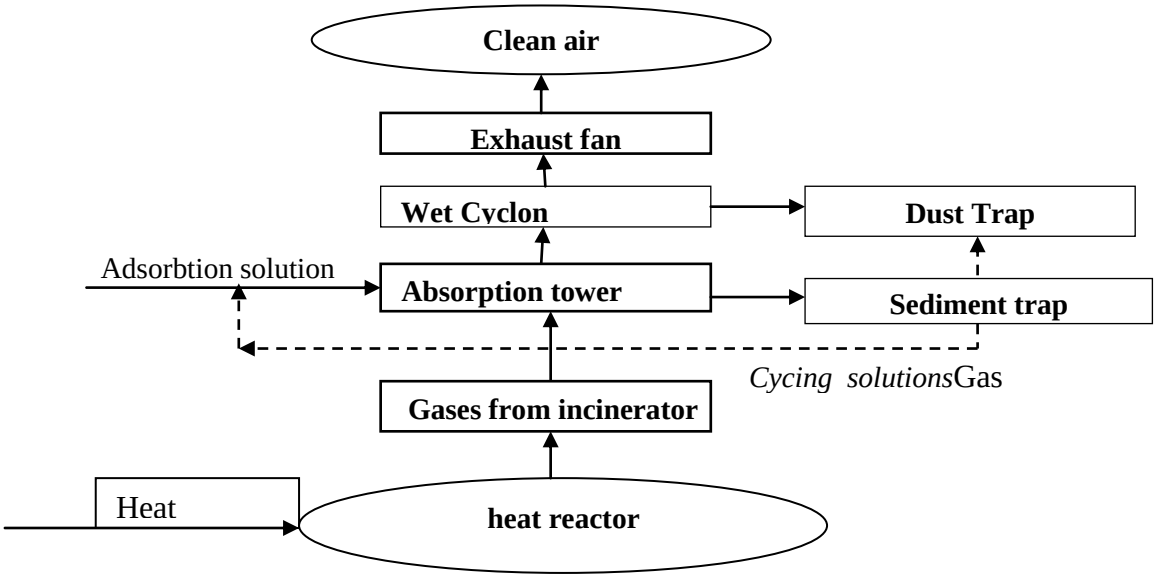


Figure 4-13. Gas treatment for Heat reactor

b. Wastewater Treatment

All wastewater including those from truck washing area has been collected to the leachate pond then treated together with leachate.

The composting unit is roofed to prevent rainwater. 60% leachate from fermentation unit is collected and reapplied to the wastes and the rest is led to the treatment unit to meet QCVN 25:2009/BTNMT (colum A) abd QCVN 40:2011/BTNMT (column A) before being discharged into the environment.

Leachate from solid waste in disposal cells are covered with 0.2 m of soil to prevent rain water from coming into the waste. The bottom of waste disposal cells are lined in impermeable materials, leachate is collected and pumped into the leachate treatment unit built within the Complex.Leachate will be treated to meet QCVN 25:2009/BTNMT (Colum A) and QCVN

40:2011/BTNMT (cột A). Rainwater from the hazardous waste cell will also be collected in accordance with TCXDVN 320:2004.

Oil in wastewater from cleaning equipment in PO production unit is separated and collected, wastewater is led to the industrial wastewater treatment unit capacity 250 m^3/d in the complex, treated wastewater meets QCVN 40:2011/BTNMT (column A).

35 m^3 of municiple wastewater generated daily at the complex is treated by septing tanks before being led to the centralised municiple wastewater treatment system. Slude is collected six monthly.

c. Solid Waste Management

Municiple wasteiscollected and stored in 2 tanks capacity 120L and put into waste separation unit at the complex. Inert and non-recyclable waste from composting unit is transported to the disposal cells or burnt in incinerator. Waste generated during brick production is smashed before being disposed of. Small quantity Ash from incinerator is tested to determine whether they are hazardous by comparing with QCVN 07:2009/BTNMT for disposal in hazardous cells otherwise being disposed off in solid waste disposal cells

Solid waste generated from heat diintegration unit within the complex.

Daily, 250 kg of sludgefrom industrial wastewater treatment and 960 m^3 of biosludge from municiple wastewater treatment are automatically collected into sludge storage tank. Sludge are pumped periodically into sludge drying unit. Dry sludge is tested for determining whethere they are hazardous waste according to QCVN 07:2009/BTNMT. Hazardous sludge will be disposed of in hazardous disposal cells otherwise in solid waste disposal site. Slude is not used for composting due to low organic matter contents. Wastewater from sludge dewatering unit is led to leachage storage cell.

4.6.6.2 Air Quality

a. Air quality at incinerator Outlets

Table 4-2423 Air quality at Incinerator Outlets

	Parameter	Test result					QCVN 30:2012/ BTNMT (B)
		GSKV/ 2443	GSKV/2444	GSKV/2445	GSKV/2446	GSKV/2447	
1	Temperature (^oC)	85	67	83	68	65	-
2	Incoming rate (m^3/h)	25.164	6.922	24.316	41.982	7.431	-
3	O_2 %	9,71	9,58	9,71	9,59	9,75	-
4	CO (mg/Nm^3)	236	225	256	208	188	250
5	SO_2 (mg/Nm^3)	<26(*)	<26(*)	<26(*)	<26(*)	<26(*)	250
6	NO_x (mg/Nm^3)	79	60	74	76	92	500
7	Dust (mg/Nm^3)	8	6	8	9	5	100
8	Hg (mg/Nm^3)	KPH	KPH	KPH	KPH	KPH	0,2
9	Pb (mg/Nm^3)	KPH	KPH	KPH	KPH	KPH	1,2

	Parameter	Test result					QCVN
10	HCl (mg/Nm^3)	0,8	0,5	0,7	1,1	0,4	50
11	Cd (mg/Nm^3)	KPH	KPH	KPH	KPH	KPH	0,16
GSKV/2443: At the chimeney of of industrial waste incinerator 2, capacity 1700 kg/h					**GSKV/2444:** At the chimeney of industrial waste incinerator, capacity 100 kg/h		
GSKV/2445: At the chimeney of of industrial waste incinerator 2, capacity 1700 kg/h					**GSKV/2446:** At the chimeney of industrial waste incinerator, capacity 4200 kg/h		
GSKV/2447: At the chimeney of industrial waste incinerator, capacity 200 kg/h							

The figures in the table above shown that air quality from chimneys of incinerators meet QCVN 30:2012/ BTNMT, column B, however, some parameters at the industrial waste incinerator exceed standard 1.024 times.

b. Treated wastewater quality at the Complex

Table 4-2526. Treated wastewater quality

Stt	Parameter	Result	QCVN 40:2011/ BTNMT (A)	QCVN 25:2010/ BTNMT (A)
		GS/260		
1	pH	6,7	6-9	-
2	COD (mgO_2/L)	7	74	50
3	BOD_5 (mgO_2/L)	3	30	30
4	SS (mg/L)	7	50	-
5	Total N (mg/L)	8,4	20	15
6	Total P (mg/L)	0,03	4	-
7	NH_4^+ (mg/L)	0,17	5	5
8	Total Fe (mg/L)	0,05	1	-
9	Colour (Pt_Co)	22	50	-
10	F^- (mg/L)	<0,02 (**)	5	-
11	Cl^- (mg/L)	10,6	495	-
12	Sunfua (mg/L)	0,007	0,2	-
13	Coliform (MPN/100mL)	60	3.000	-
14	CN^- (mg/L)	0,004	0,07	-
15	Phenol (mg/L)	<0,002 (**)	0,1	-
16	Oil and grease (mg/L)	KPH	5	-
17	Cu (mg/L)	<0,03 (**)	2	-
18	Pb (mg/L)	KPH	0,1	-
19	Cd (mg/L)	KPH	0,05	-
20	Hg (mg/L)	KPH	0,005	-
21	Zn (mg/L)	0,052	3	-
22	Mn (mg/L)	0,048	0,5	-
23	Cr^{6+} (mg/L)	KPH	0,05	-
24	Cr^{3+} (mg/L)	KPH	0,2	-
25	Ni (mg/L)	<0,08 (**)	0,2	-
26	As (mg/L)	KPH	0,05	-

Treated wastewater quality of the complex meets QCVN 40:2011/BTNMT and QCVN 25:2010/BTNMT, column A.

d. Soil Quality

Table 4-2627. Soil Quality at the treatment complex

Stt	Parameter	Test result			QCVN 03:2008/ BTNMT
		GS/2448	GS/2449	GS/2450	
1	Cu (mg/kg TLK)	4,5	2,0	2,2	100
2	Zn (mg/kg TLK)	8,7	2,6	4,1	300
3	Cr (mg/kg TLK)	20,4	5,1	6,2	-
4	Total N (%)	0,061	0,058	0,067	-
5	Total P (%)	0,029	0,021	0,025	-
6	Humidity (%)	8,5	9,3	8,9	-
7	pH-H_2O	4,7	4,6	4,7	-
8	pH-KCl	3,6	3,7	3,6	-
9	As (mg/kgTLK)	KPH	KPH	KPH	12
10	Pb (mg/kg TLK)	<8(**)	<8(**)	<8(**)	300
11	Cd (mg/kg TLK)	<0,5 (**)	<0,5 (**)	<0,5 (**)	10
GS/2448: At the hazardous waste treatment unit				**GS/2449:** At the wastewater treatment u	
GS/2450: At the sanitary landfill cell					

The data in the above table shows that all soil samples at the complex meet Vietnamese standard QCVN 03:2008/BTNMT.

d. Groundwater quality

Table 4-2728. Groundwater quality at the South Binh Duong Treatment Complex

Stt	Parameter	Sample					QCVN 09:2008/ BTNMT
		GS/2421	GS/2422	GS/2423	GS/2424	GS/2425	
1	pH	6,1	4,7	4,7	4,2	4,2	5,5-8,5
2	$CaCO_3$ (mg/L)	10	8	10	14	16	500
3	Colour (pH=7) (Pt_Co)	<2(**)	<2(**)	<2(**)	<2(**)	<2(**)	-
4	COD (mgO_2/L)	0,8	0,8	0,8	1,2	1,2	4
5	NO_3 – N (mg/L)	0,6	0,4	0,5	0,7	0,6	15
6	NO_2 – N (mg/L)	0,005	0,005	0,005	0,007	0,005	1,0
7	Cl^- (mg/L)	2,5	1,8	2,5	25,5	25,5	250
8	F^- (mg/L)	<0,02(**)	<0,02(**)	<0,02(**)	<0,02(**)	<0,02(**)	1,0
9	Toral Fe (mg/L)	0,04	<0,01(**)	0,02	0,08	0,11	5
10	SS (mg/L)	<2(**)	<2(**)	<2(**)	<2(**)	<2(**)	-
11	Mn (mg/L)	0,015	0,014	0,015	0,058	0,019	0,5
12	Hg (mg/L)	KPH	KPH	KPH	KPH	KPH	0,001
13	Pb (mg/L)	KPH	KPH	KPH	KPH	KPH	0,01
14	Coliform (MPN/100mL)	KPH	KPH	KPH	KPH	KPH	3
GS/2421: Drill well near canteen				GS/2422: drill well near the complex Tại			

GS/2423: Drill well near the treatment units	GS/2424: at residential house 50 from from complex
GS/2425: drill well near mechanical unit	

Data in the table above shows that groundwater quality at the complex is good, pH is relative low and ranges from 4.2-4.7.

4.6.8 Resettlement Site

23 households affected by resettlement at the WWTP will be relocated to the Tan Binh resettlement area in Tan Binh ward of Di An town. This resettlement site has a total land area of 79 ha and being under the investments of Binh Duong Construction and Consultancy Company (Biconsi). Currently, basic infrastructures has been built, including including access and internal asphalt roads, schoolds, parks, recreational areas etc. Biconsi prepared Environmental Registration for this resettlement area in October 2005 and submitted for certification by Binh Duong DONRE.

5. POTENTIAL IMPACTS AND RISKS

Overall, the project will bring positive socio-environmental and health impacts and economical benefits when the project put the storm water drainage and wastewater systems into operation. The new storm water drainage built in Tran Hung Dao street, the two boxed drains along T5B and T4 routes, the rehabilitated Cai Cau channel and Lo O stream will bring about better storm water drainage capacity for the project area. Flooding problems, particularly at 25 locations in the catchments of Cai Cau and Lo O streams where flooding occur frequently will be addressed. Flooding risk in the areas along the Provincial Road 743A, particularly at the intersection with the north-south railway will be reduced when surface runoff together with the treated wastewater from the WWTP can follow the T4 channel to the Cai Cau stream. Inundation problem in the Tran Hung Dao street will also be addressed by the new sluices built along the Tran Hung Dao street and the T5B channel which is connected with the Nhum stream. When flooding issues and risks are addressed, obstructions to traffic and daily life activities, environmental pollution problems as well as traffic safety risks associated with flooding will be eliminated. Construction of T4 and T5B boxed drains and the rehabilitation of the Cai Cau and Lo O streams will also contributes to improve sanitation conditions in the area.

When the new sewer pipeline system and the Tan Dong Hiep Wastewater Treatment Plant are put into operation, wastewater from residential areas will be collected and treated before being discharged into waterbodies. Surface and groundwater pollution related to uncontrolled/untreated wastewater in the serviced areas will be reduced. Particularly, water quality in the Dong Nai and Sai Gon rivers as important drinking water sources will be better protected as untreated domestic wastewater from large part of Di An town no longer being discharged into water bodies that area connected to these two rivers.

However, during the construction and operation the works to be provided under the Project, there are also some negative potential socio-environmental impacts and risks. Pre-Construction impacts and risks includes land acquisition and resettlement, loss of vegetation cover and trees due to site clearance, particularly at the wastewater treatment plant, safety risks associated with site clearance activities and exploded materials may be left at the site from the war, interruptions to existing services such as power supply.

The potential construction-related impacts and risks are predictable based on similar past projects. These includes: i) increased level of dust, noise and vibration, emission of pollutants from vehicular exhausts; ii) generation of solid waste and wastewater including some hazardous wastes from construction sites and workers accommodation, these may cause environmental (air, water and soil) pollution and affect human health; iii) increased traffic safety risks and traffic disturbance; iv) Damages to the existing infrastructure that may interrupt existing public services such as power or water supply; v) Health, safety and environmental issues related to the workers and the public with regards to construction activities; vii) social disturbance to the local people related to the mobilization of approximately 300 workers to the project area; viii) exposure of artifacts during construction phase.

The potential impacts and risks during operation phase are mostly related to the operation of the proposed wastewater treatment plant. These includes the permanent changes of the landscape at the WWTP site, odor problem, generation of sludge and packaging materials, pollution and damages risks associated with system failure, impacts on the water quality and carrying capacity

of the receiving water bodies, generation of waste, and workers' occupational health and safety issues.

There potential impacts and risks as assessed in Table 5-1 below and examined in more details in the following subsections.

Table 5-1Potential Negative Environmental and Social Impacts and Risks

Activities	Potential Impact/ risk	Objects most affected	Duration	Spatial	Magnitude
I. PRE-CONSTRUCTION					
Land acquisition for the WWTP and pumping stations	Loss of land, resettlement needed, income may be affected	57 households, 3 companies, 4 organizations affected. 23 HH relocated	permanent	At WWTP	Medium
Site Clearance at the WWTP, pumping stations and along drainage channels T4, T5B, Cai Cau canal	Loss of vegetation cover and trees	Vegetation covers are removed, 1107 trees will be cut down	permanent	At WWTP, along channels	Medium
	Dust and noise	Medium	Short	At WWTP	Medium
	Solid waste generation	From existing structures	Short	Large	Medium
	Interrupt existing services such as power/water supply	Local residents Businesses	Short	Medium	Medium
	Safety risk related to unexploded materials from the war, demolition of existing structures	Workers and local residents	Avoidable	WWTP Excavated areas	High
II. CONSTRUCTION					
Excavation of ditch, filling the pipeline, execution of box culvert, pump station, execution of foundation, the works in the plant; gathering building materials and gathering temporarily waste, transportation of raw materials,	Dust and smoke	WWTP, drainage and sewer	Medium	large	High
	Noise	Construction Sites	Short, temporary	medium	Medium
	Vibrations	Access roads traffic	Short, temporary	small	medium
	Construction waste generation	Local Residents	medium	Large	high
	Hazardous waste	Soil and water, human health	Long	small	high
	Wastewater generation	Local residents and workers	Short	medium	medium
	Traffic Disturbance and Safety risk	People on road	Medium	large	Medium to high
	Damage or interrupt existing infrastructure/ services	Local residents	Medium	low	Medium

Activities	Potential Impact/ risk	Objects most affected	Duration	Spatial	Magnitude
	Health and Safety risks for workers	Workers	long	Medium	Medium
	Health and Safety risks for local residents	local residents	Long	Large	Medium
	Social Disturbance	Workers and local residents	Short	Limited	Medium
	Erosion/ Sedimentation	Slopes, waterbodies	Short	Medium	Medium
	Landslide/ soil subsidence	Excavated holes, pipe trenches etc.	Short	Small	high
	Artifacts exposed	Excavated areas	-	Low	Low
Mobilisation of workers to the project area	Generating solid waste, sewage	Community where locates the camp for workers	medium	medium	medium
	Social Disturbance due to differences in tradition, income etc.		Temporary	Medium	Low
	STD transmitted diseases	Workers and local residents	Long	medium	high
	Risks of electric safety, gas		medium	Small	Medium
III. OPERATION					
1. Operation of the plant for treatment of sewage	Odor from treatment units of the WWTP	Residential areas near the WWTP Local residents	Long term	Medium	Low
	Sludge generation		Long term	medium	Low
	Hazardous waste wasted oil; chemical, packaging materials		Long term	Medium	High
	Impacts on the quality and flow at the receptor.	Receiving channels: T4, Siep and Tan Van streams, Dong Nai river	Long term	medium	medium
	Damages and pollution due to system failure	The areas surrounding the plant	Long term	Large	High
2. Daily life of the employees.	Occupational health and safety	- water, land Human health	long term	Narrow	high

5.1 Pre-Construction Phase

5.1.1.Land Acquisition, Resettlement

The Project will acquire 6.8 ha of land at the proposed wastewater treatment plant in Tan Dong Hiep Ward and 1506 m2 of land in Tan Dong Hiep Ward, Di An Town, Dong Hoa and An Binh wards for the construction of booster pumping stations and interceptors. Table 5-2 below shows existing land used in the area to be acquired.

Table 5-2 The scope and effective level for revocation of land serving for the project

No.	Item	Location	Land area (m^2)	Land status	Existing structure
1	WWTP	Tan Dong Hiep Ward	68,226	Vacant land, agricultural land, residential houses	workshop
2	**Pumping stations**				-
2.1	G1-1	Tan Dong Hiep Wd	115	Empty land	-
2.2	P1-1	Tan Dong Hiep Wd	338	Empty land	-
2.3	G1-2	Di An Ward	77	Empty land	-
2.4	P1-2	Dong Hoa Ward	332	Empty land	-
2.5	P1-3	An Binh Ward	236	Empty land	-
2.6	G1-3	Tan Dong Hiep Wd	213	Empty land	-
2.7	G1-4	Di An Ward	95	Empty land	-
	Standby	An Binh Ward	100	Empty land	
	Total		69,732.3		

57 households will be affected due to land acquisition for the construction of the WWTP, among these 23 households will be relocated. Social survey indicated that the affected households as Kinh people who have been living there for long time. Each household,on average, has 2.5 persons (the nuclear family). 60% of the affected peopleare in the working age, 20% persons over 60 years old, and 20% are under working age. The main income of 80% affected households are salary from their works in existing industrials parks, averaged at 5 million VND per month per household. 20% of affected households have income from 2 to 4 millions VND per household per month, sourced from animal husbandry and home businesses. Thus, resettlement mainly impact to 20% households with the main income from husbandry and household business.

In addition, three companies and five organizations will also be affected partially by land acquisition. The acquired land is mostly located outside and next to the wall of their offices.

Table 5-3Land Area Acquired from Organizations and Companies

No.	**Management Entity**	**Total (m^2)**
1	PC of Tan Dong Hiep Ward	328
2	Management Board of Tan Hiep Dong B industrial park	338
3	Management Board of project of Di An Town.	77
4	Dai Nam J.S Company	95
5	Thai Binh Investment J.S Company.	332
6	PC of Binh An Ward	236
7	Huong Sen Investment – Construction Co., Ltd	100

Total	**1506**

Resettlement Action Plan has been prepared for the Project Affected households will be compensation and support to minimize the negative impacts of land acquisition. In addition, the a there are also two graves at the pumping station P1-3 that the Project will need to pay compensation and support for relocation.

5.1.2 ReducedGreen Space

It is estimated that 1,107 trees at the WWTP site will be cut off. Among these are 225 rubber trees, 210 perennial trees, 672 timber trees. These trees havegreening and economic values rather than the ecological values. The green landscape at the WWTP will be changed permanently, replaced with the WWTP structures. In addition, rehabilitation of Cai Cau drainage channel will also disturb the existing vegetation covers and trees along the banks of the channel. These potential impacts is not avoidable, long term, small to medium but and localised, can be mitigated and compensable. The mitigation measures are presented in Section 7.

5.1.3 Dust and Noise

Site clearance will lead to the disassembling and demolition of 1,950 m^2 of existing houses and structures (mainly temporary houses, tiled roofed houses, one to two storey houses, and workshop). The area is quite small compared to the total land area of the WWTP site which is 68,000 m^2. Site leveling at the WWTP and pumping stations will generate dust and noise.

Dust generated from disassemblingand demolition of the existing structures including fine and suspended dust, it is very hard to determine the quantitative as it depends method of demolitions and weather conditions … Based on previous experience of the project owner, the areas that demolition of existing structures usually has dust level exceed the allowable permitted limit specified in QCVN 05:2013/BTNMT from two to three times. However the dust will be deposited fast and only occur in a short time. At distance 30-40 m from the demolition site, dust level already meet standard. The area to be affected the most is the existing Dong An residential area and the households nearby the pumpingstations where dust can disperse. However, the impacts will happen in a relative short term, up to one week at the WWTP site and two days at each pumping station site.

Dust generated from the ground leveling at the WWTP and pumping stations will be significant in sunny and windy days. Dust level is anticipated to exceed 1.5 to 2 times the allowable limit specified in QCVN 05:2013/BTNMT. The WWTP areas and pumping stations will be affected but localised at dust concentration would meet standard at 25-35 meters from the levelling location depending on the weather. Levelling will take place in about one week.

Noise generated mainly from disassembling and demolition activities, and from the operation of equipment and vehicles. The equipment used will be bulldozer, truck, roller and excavator with the noise exceeding the permitted limit QCVN 26:2010/BTNMT (level 70dBA) within 80m distance. The households in the Dong An residential area near the WWTP and pumping stations will be affected.

The potential impacts of dust and noise at pre-construction phase are mitigable as presented in Section 7.

5.1.4 Waste Generation

The waste generated at pre-construction phase will be mainly 182 tons of biomass and the unreusable materials from demolition such as concrete, brick, timber etc. … The wastes generated have negative visual impacts and may attract harmful insects and animals such as rats, black beetle. The potential negative impacts of waste will be managed in accordance with GOV Decree No. 59/2007/ND-CP dated 09 April 2007 on management of solid waste and the measures presented in Section 7.

5.1.5 Interrupt Existing services

During site clearance, power should be cut off electricity to ensure the safety during the disassembling and demolition of existing structures. Power cut off may disturb daily actives of households and local businesses such as restaurant. In order to reduce this impact, electricity cut off schedule will be informed to the local people at least 2 days in advance.

5.1.6. Safety Risks

There may be some unexploded materials such as bomb and mine left from the war at the WWTP site. Together with that risk, demolition and disassembling activities, the operations of the machines may also have safety risk to the workers and local people. This risk will be eliminated as the project have budgeted 560,000,000 VND (25,600 USD equivalent) and will hire specialised army force do mine clearance before site clearance. Work place safety rules presented in Section 7 will be applied to minimise safety risk during site clearance.

5.2. Construction Phase

5.2.1 Dust, Noise and Vibration

a. Dust

Dusts will be generated from ground leveling at the WWTP and pumping stations, from excavation for drainage construction and sewer pipeline installations. Dust will be dispersed from ground leveling, excavation or filling, loading and unloading of granular construction materials and wastes, and from trucks during transportation of materials. On average, excavation or filling of 1 m^3 of soil will generate about 75 grams or 0.075 kg of dust, in which 10% are suspended dust. With coefficient for pollution of E= 0,075 kg/m^3 and based on the construction schedule of the project, forecast on the quantity of dust dispersed from excavation, filling and leveling were calculated and presented in Table 5-4 below.

Table 5-4 Forecasted DustGeneration from Ground Levelling, Excavation and Filling

Item	Volume (m^3)	Volume (ton)	Construction duration (quarter)	Quantity of dust (kg/day)
WWTP	201,800	282,520	2	97.0
Primary Sewer pipelines	32,000	44,800	6	5.1
Secondary Sewer pipelines	41,000	57,400	6	6.6
Tertiary Sewer pipelines	160,000	224,000	6	25.6
Pumping station	1,000	1,400	2	0.5
T4 Boxed drains	80,000	112,000	4	19.2
T5B Boxed drains	160,000	224,000	4	38.5
Cai Cau Channel	180,000	252,000	6	28.8
Boxed drain Tran Hung Dao St.	70,000	98,000	4	16.8
Lo O stream	70,000	98,000	4	16.8
Total	**995,800**	**1,394,120**		255

Note: specific weight is 1.4 ton/m^3

Data in the above table indicates that 0.5 (at pumping station) to 97 (at the WWTP site) kilograms of dust will be generated and dispersed from various construction sites of the project. Accumulatively, if all construction contracts are executed at the same time, 255 kilograms of dust will be introduced into Di An town each day or 7.6 tonnes of dusts each month. However, the actual dust generation will be less as construction will take place at the same time in all bid packages and each contract will be implemented in stages. This potential impacts will be further mitigated by the measures presented in Section 7.

Dust Generated from Transportation

Excavation and filling will also require transportation. According to WHO rapid assessment guidelines, materials dropped during the transportation of sand, soil will generate dust at coefficient of 10 gram/km/vehicle.

The project will use the dump-trucks capacity 18 tons for transportation of excavated and filling materials. The number of trips and the volume of dust generated during the transportation were calculated and presented in Table 5-5.

Table 5-5 ForecastedVolume of Dust from Transportation

Item	Volume of Materials (m^3)			Volume (ton)
	Filling	Disposal	Total	
WWTP	201,800	45,000	246,800	345,520
Primary Sewer pipelines	32,000	70,000	102,000	142,800
Secondary Sewer pipelines	41,000	54,000	95,000	133,000
Tertiary Sewer pipelines	160,000	170,000	330,000	462,000
Pumping station	1,000	840	1,840	2,576
T4 Boxed drains	80,000	110,000	190,000	266,000
T5B Boxed drains	160,000	190,000	350,000	490,000
Cai Cau Channel	180,000	220,000	400,000	560,000
Boxed drain Tran Hung Dao St.	70,000	70,000	140,000	196,000
Lo O stream		70,000	70,000	98,000

Item	Volume of Materials (m^3)			Volume (ton)
	Filling	Disposal	Total	
Total (m^3)	**925,800**	**999,840**	**1,925,640**	**2,695,896**

Table 5-6 Forecast of volume of dust generating during transportation

Item	Construction Duration (quarter)	Nos. of trips (vehicle/day)	Volume of generating dust (g/km)
WWTP	2	123	1230
Primary Sewer pipelines	6	17	170
Secondary Sewer pipelines	6	16	158
Tertiary Sewer pipelines	6	55	548
Pumping station	2	1	9
T4 Boxed drains	4	47	474
T5B Boxed drains	4	87	873
Cai Cau Channel	6	66	665
Boxed drain Tran Hung Dao St.	4	35	349
Lo O stream	4	17	175
Total (m^3)	-	-	-

Generally, the forecasted volume of dust generated during the transportation of the excavated soil is not very high and it is distributed along the routes of transportation. Among these, dust generated along the routes for transportation to the WWTP is highest, followed by routes T5B and T4, Cai Cau stream, Lo O streams and the sewers.

Based on the volume of dust calculated for construction phase, Sutton model has been used order to determine to average concentration of dust at any point of time. The calculation following the Suttton model are presented in annex 2. The result shows that dust concentrations are highest at the edge/border of construction sites and along the following routes:

- Provincial road DT 743B, national highway 1K, these are the main routes for transportation of raw materials, at the same time it is the main road in the town;
- Le Hong Phong street is the route used for transportation of filling materials to construction sites;
- Toad No. 21as the route where main sewers will be installed;
- Tran Hung Dao, Hai Ba Trung Street are the routes where T5B boxed drains will be built;
- My Phuoc – Tan Van street, Hai Ba Trung and internal road of Dong An residential area are as the routes for directly transportation of raw materials into the region of plant.

The residents living along the transportation route and the streets where the pipes are installed will be affected by dust the most. Dust pollution will obstruct their services and business because the psychologically, regular customers will choose to visit cleaner locations for meal instead of the places with dust. Therefore, the affected businesses will have less customers. Dust pollution will be ended when excavation and filling is completed. The impacts of dusts will last during the entire construction phase and mitigable by the measures presented in Section 7.

b. Exhaust Fume

The means of transportation such as machine serving work execution will generate exhaust fumes. According to WHO, the pollution coefficient of transportation means using diesel oil are as follows:

Table 5-7 Pollution Coefficient

Item	Dust	SO_2	NO_2	CO	VOC
	(g/xe.km)				
Non-load operation	$611x10^{-3}$	$582x10^{-3}$	$1.620x10^{-3}$	$913x10^{-3}$	$511x10^{-3}$
Load operation	$1.190x10^{-3}$	$786x10^{-3}$	$2.960x10^{-3}$	$1.780x10^{-3}$	$1.270x10^{-3}$

Source: WHO. Environmental technology series. Assessment of sources of air, water, and land pollution. A Guide to rapid source inventory techniques and their use in formulating environmental control strategies - Part I and II

Based on the scope of work and construction schedule, the forecasted number of trips at different times are as follows:

Table 5-8 Forecasted number of Trips for Materials Transportation

Year	**Quarter**	**Trips per day**	**Year**	**Quarter**	**Trips per day**	**Year**	**Quarter**	**Trips per day**
Stormwater Drainage			**Sewers**			**PumpingStations**		
2016	4	75 ÷150	2016	4	75 ÷150	2016	4	50 ÷ 100
2017	1	75 ÷150	2017	1	75 ÷150	2017	1	50 ÷ 100
	2	100 ÷ 200		2	75 ÷150		2	75 ÷150
	3	75 ÷150		3	100 ÷ 200		3	100 ÷ 200
	4	100 ÷ 200		4	100 ÷ 200		4	100 ÷ 200
2018	1	75 ÷150	2018	1	100 ÷ 200	2018	1	75 ÷150
	2	100 ÷ 200		2	100 ÷ 200		2	50 ÷ 100
	3	75 ÷150		3	100 ÷ 200		3	

The result of forecasted exhaust fume from project transportation means is presented in the Table 5-9 below.

Table 5-9 Forecast of the pollution volume of exhausted fumes from the means of transportation

Quarter	**Operation regulation**	**Dusts**	**SO_2**	**NO_2**	**CO**	**VOC**
	System for gathering rainwater					
1/2017	Non-load	0,046÷0,092	0,044÷0,087	0,122÷0,243	0,068÷0,137	0,038÷0,077
	Load	0,089÷0,179	0,059÷0,118	0,222÷0,444	0,134÷0,267	0,095÷0,191
2/2017	Non-load	0,061÷0,122	0,058÷0,116	0,162÷0,324	0,091÷0,183	0,051÷0,102
	Load	0,119÷0,238	0,079÷0,157	0,296÷0,592	0,178÷0,356	0,127÷0,254
3/2017	Non-load	0,046÷0,092	0,044÷0,087	0,122÷0,243	0,068÷0,137	0,038÷0,077
	Load	0,089÷0,179	0,059÷0,118	0,222÷0,444	0,134÷0,267	0,095÷0,191
4/2017	Non-load	0,061÷0,122	0,058÷0,116	0,162÷0,324	0,091÷0,183	0,051÷0,102
	Load	0,119÷0,238	0,079÷0,157	0,296÷0,592	0,178÷0,356	0,127÷0,254
1/2018	Non-load	0,046÷0,092	0,044÷0,087	0,122÷0,243	0,068÷0,137	0,038÷0,077

Quarter	Operation regulation	Dusts	SO_2	NO_2	CO	VOC
	Load	0,089÷0,179	0,059÷0,118	0,222÷0,444	0,134÷0,267	0,095÷0,191
2/2018	Non-load	0,061÷0,122	0,058÷0,116	0,162÷0,324	0,091÷0,183	0,051÷0,102
	Load	0,119÷0,238	0,079÷0,157	0,296÷0,592	0,178÷0,356	0,127÷0,254
	System for gathering sewage					
2/2017	Non-load	0,046÷0,092	0,044÷0,087	0,122÷0,243	0,068÷0,137	0,038÷0,077
	Load	0,089÷0,179	0,059÷0,118	0,222÷0,444	0,134÷0,267	0,095÷0,191
3/2017	Non-load	0,046÷0,092	0,044÷0,087	0,122÷0,243	0,068÷0,137	0,038÷0,077
	Load	0,089÷0,179	0,059÷0,118	0,222÷0,444	0,134÷0,267	0,095÷0,191
4/2017	Non-load	0,061÷0,122	0,058÷0,116	0,162÷0,324	0,091÷0,183	0,051÷0,102
	Load	0,119÷0,238	0,079÷0,157	0,296÷0,592	0,178÷0,356	0,127÷0,254
1/2018	Non-load	0,061÷0,122	0,058÷0,116	0,162÷0,324	0,091÷0,183	0,051÷0,102
	Load	0,119÷0,238	0,079÷0,157	0,296÷0,592	0,178÷0,356	0,127÷0,254
2/2018	Non-load	0,061÷0,122	0,058÷0,116	0,162÷0,324	0,091÷0,183	0,051÷0,102
	Load	0,119÷0,238	0,079÷0,157	0,296÷0,592	0,178÷0,356	0,127÷0,254
3/2018	Non-load	0,061÷0,122	0,058÷0,116	0,162÷0,324	0,091÷0,183	0,051÷0,102
	Load	0,119÷0,238	0,079÷0,157	0,296÷0,592	0,178÷0,356	0,127÷0,254
	Execution of pump stations					
2/2018	Non-load	0,006÷0,012	0,006÷0,012	0,016÷0,032	0,009÷0,018	0,005÷0,010
	Load	0,012÷0,024	0,008÷0,016	0,029÷0,059	0,018÷0,036	0,013÷0,025
	Execution for construction of the wastewater treatment plant					
1/2017	Non-load	0,031÷0,061	0,029÷0,058	0,081÷0,162	0,046÷0,091	0,026÷0,051
	Load	0,060÷0,119	0,039÷0,079	0,148÷0,296	0,089÷0,178	0,064÷0,127
2/2017	Non-load	0,046÷0,092	0,044÷0,087	0,122÷0,243	0,068÷0,137	0,038÷0,077
	Load	0,089÷0,179	0,059÷0,118	0,222÷0,444	0,134÷0,267	0,095÷0,191
3/2017	Non-load	0,061÷0,122	0,058÷0,116	0,162÷0,324	0,091÷0,183	0,051÷0,102
	Load	0,119÷0,238	0,079÷0,157	0,296÷0,592	0,178÷0,356	0,127÷0,254
4/2017	Non-load	0,061÷0,122	0,058÷0,116	0,162÷0,324	0,091÷0,183	0,051÷0,102
	Load	0,119÷0,238	0,079÷0,157	0,296÷0,592	0,178÷0,356	0,127÷0,254
1/2018	Non-load	0,046÷0,092	0,044÷0,087	0,122÷0,243	0,068÷0,137	0,038÷0,077
	Load	0,089÷0,179	0,059÷0,118	0,222÷0,444	0,134÷0,267	0,095÷0,191
2/2018	Non-load	0,031÷0,061	0,029÷0,058	0,081÷0,162	0,046÷0,091	0,026÷0,051
	Load	0,060÷0,119	0,039÷0,079	0,148÷0,296	0,089÷0,178	0,064÷0,127

The result indicates that the concentration of the exhaust fume generated by fuel burning is lower than allowable limits specified in QCVN 06:2009/BTNMT many times, therefore not to cause for atmosphere pollution.

c.Noise

During the execution for construction of the project, noise mainly generates from the operation of the equipment, machines as means for construction execution. The types of equipment, machinery, means for execution includes vibrating compactor, bulldozer, trailer, paver, concrete spreader, concrete mixer, roller, truck with the quantity presented in Chapter 2. The level of noise generation at the source as follows:

Table 5-10 Noise Level Generated from Construction Plants at Source

No.	Machinery, equipment	The noise level at 1 m from source (dBA)	
		Fluctuation interval	**Average**
1	Vibrating compactor	87,0 ÷ 88,5	87,7
2	Bulldozer	82,2 ÷ 96,3	88,2
3	Trailer	72,0 ÷ 84,0	78,0
4	Paver	77,0 ÷ 96,0	86,5
5	Concrete spreader	74,0 ÷ 86,0	80,6
6	Concrete mixer	75,0 ÷ 88,0	81,5
7	Roller	72,0 ÷ 75,0	73,0
8	Truck 10T	65,3 ÷ 75,1	70,4
9	Truck 15T	82,0 ÷ 96,0	88,0
10	Irrigation machine	53,0 ÷ 63,5	57,7
11	Pump 2HP	67,7 ÷ 83,2	75,4
QCVN 26:2010/BTNMT		70,0 dBA	
Standard of Ministry of Health (the duration for contact is 8 hours)		85,0 dBA	

Source: Summarized from Bolt et al. (1971, 1987); Western Highway Institute (1971); WSDOT (1991); and LSA Associates (2002)

The noise level as well as the impacts level will decrease gradually with increasing distance from source and can be forecasted by the formula:

$L_p(x) = L_p(x_o) + 20 \log10(x_o/x)$ [*US Traffic Department, 2006*]
In which: $Lp(x_o)$: noise level at 1 m from the source (dBA); $x_o = 1$ m
$L_p(x)$: Noise level at the receptor (dBA) at distance of x (m)

Construction plants used for storm water drainage and sewersare similar. Forecasted noise levels generatedfrom equipment, machinery, means for execution in different distance from the source are presented in Table 5-11.

Table 5-11Forecasted Noise Level from Construction Plants

Machine, equipment	ForecastedNoise Levels at different distances from source (dBA)				
	3,0m	**5,0m**	**5,5m**	**8,0m**	**10,0m**
Stormwater drainage and sewers					
Trailer	68,5	64,0	63,2	59,9	58,0
Roller	63,5	59,0	58,2	54,9	53,0
Truck 15T	78,5	74,0	73,2	69,9	68,0
Vibrating compactor	78,2	73,7	72,9	69,6	67,7
Paver	77,0	72,5	71,7	68,4	66,5
Irrigating machine	63,5	59,0	58,2	54,9	53,0
Pump 2HP	83,2	78,7	77,9	69,6	67,7
PumpingStations					

Trailer	68,5	64,0	63,2	59,9	58,0
Truck 15T	78,5	74,0	73,2	69,9	68,0
Vibrating compactor	78,2	73,7	72,9	69,6	67,7
Pump 2HP	83,2	78,7	77,9	69,6	67,7
Concrete mixer	72,0	67,5	66,7	63,4	61,5
WWTP					
Trailer	68,5	64,0	63,2	59,9	58,0
Bulldozer	78,7	74,2	73,4	70,1	68,2
Roller	63,5	59,0	58,2	54,9	53,0
Truck 15T	78,5	74,0	73,2	69,9	68,0
Vibrating compactor	78,2	73,7	72,9	69,6	67,7
Concrete spreader	71,1	66,6	65,8	62,5	60,6
Concrete mixer	72,0	67,5	66,7	63,4	61,5
Paver	77,0	72,5	71,7	68,4	66,5
QCVN 26:2010/BTNMT	70,0 dBA				
Standard of Ministry of Health (the duration for contact is 8 hours)	85,0 dBA				

Thus at distance from 8m from source, noise levels will meet QCVN 26:2010/BTNMT. At distance less than 8m, noiselevel will exceed QCVN 26:2010/BTNMT. The most sensitive receptors to noise are presented in Table 5-12.

- The special region as:

Table 5-12Noise Sensitive Receptors

No.	Object	Source of Noise
1	Di An Medical Center, Anh Sao and Hoa Quynh Kindergartens	Construction of D400 sewers on road DT 743A and D 800 sewers in Hai Ba Trung street and T5B boxed drains
2	Dong Hoa Primary School Dong Hoa Secondary School	Construction of sewer D300 in internal road of residential area.
3	Tan Dong Hiep Secondary school Dong Thanh and, Hoa Hong Kindergartens	Construction of main sewer D500-D600 in Le Hong Phong St.
4	Nhi Dong Primary School, Bup Sen Hong Kindergarten	Construction of sewer D300 in West East road
5	Hoa Trang Nguyen Kindergarten	Construction of sewers and rainwater drains on Road No. 21 Song Than Industrial Park
6	Hoang Yen, Hoa Lu Kindergarten	Construction of sewers in Nguyen Tri Phuong St.
7	Hanh Phuc and Hoa Ban Do Kindergarten, Hoa Anh Dao Preschool	Construction of sewers in Tran Hung Dao street.
8	Vo Truong Toan Secondary School	Construction of sewers in Truong Tre street.

In day time, these sites will be affected by the noise at level 1.1-13.2dBA above allowable limits. In night time, except at the Medical Center of Di An Town which will be affected by the noise at level exceeding allowable limit from 12.1dBA (when using machinery and equipment with low noise), the schools will not be affected by noise as they do not operate at night. Noise impact occurs inconstantly, only happen when machines are operated.

The site that is already usually noisy and will also be affected by noise from construction activities are listed in Table 5-13:

Table 5-13Noisy Locations

No.	Impacted objects	Kind of impact
1	Agricultural product market Vinatex supermarket in Di An	Construction of sewer D300 in Nguyen An Ninh street.
2	Section 5 market in Di An	Construction of sewer D300 in internal road of residential area
3	Tan Long market	Construction of sewer D300 in Doan Thi Kia street.
4	Song Than Trade Center	Construction of sewer D300 in street No. 9
5	Big C Di An	Construction of sewers D400 in internal road of Dong Hoa residential area and D500 in National Road 1K
6	Dong Hoa residential area and supermarket	Construction of sewer D400 in internal road of Dong Hoa residential area and pumping station

In day time, the residential areas, markets, supermarkets will not be affected by noise pollution from machinery, equipment operations that generate low noise level. These sites will be sufferedby noise level exceeding allowable levels from 1.2-3.5dBA. At night, noise level will affect these objects at levels exceeding allowable limits from 9.7-18.5dBA. In which the noisy level causes the stronger impact to the households located in the first row on the street and less impacts of houses located at the back rows. Noise The impact does not occur constantly, only appears whenequipment are operated.

d. Vibration

The vibration will be generated due to the operation of the equipment, machinery, means for execution. For execution of the system for gathering rainwater and sewage will use the same kinds of equipment, machinery, means for execution therefore the vibration will generate equivalently.

Table 5-14 The vibration of the equipment, machine, means for execution

Machine/equipment	Lv at 1m (VdB)	PPV at 1m (mm/s)	Machine/equipment	Lv at 1m (VdB)	PPV at 1m (mm/s)
Vibrating compactor	87	0,027	Roller	58	0,001
Bulldozer	87	0,027	Truck 10T	58	0,001
Trailer	87	0,027	Truck 15T	86	0,023
Paver	87	0,027	Irrigating machine	58	0,001

Machine/equipment	Lv at 1m (VdB)	PPV at 1m (mm/s)	Machine/equipment	Lv at 1m (VdB)	PPV at 1m (mm/s)
Concrete spreader	75	0,005	Pump 2HP	87	0,027
Concrete mixer	75	0,005			
QCVN 27:2010/BTNMT				**75**	

Source: D.J. Martin. 1980, J.F. Wiss.1974, J.F. Wiss. 1967, David A. Towers. 1995.

The vibration following the impacted distance can forecast thru the formula of Swiss Construction Association as follows::

$$L_v(D) = L_v(1m) - 30*\log_{10}(D)$$

In which: $L_v(D)$: The vibration of the equipment calculated as per the unit VdB at the distance of D m;

- $L_v(1m)$: The vibration of equipment calculated as per the unit VdB at the distance of 1 m;
- D: the distance calculated in m from the source causing vibration;

The result for forecast of the vibration at the different distance from the source due to the operation for execution presented in the following table.

Table 5-15 Forecast of the vibration due to the operation in execution

Machine, equipment	Item for execution will be used the equipment	Forecast of the vibration in the different distance from the source (Lv - VdB)				
		3m	5m	5,5m	8,0m	10 m
Trailer	system for gathering rainwater, sewage, pump station, plant	72,7	66,0	64,8	59,9	57,0
Roller	system for gathering rainwater, sewage, plant	43,7	37,0	35,8	30,9	28,0
Truck 15T	system for gathering rainwater, sewage, pump station, plant	71,7	65,0	63,8	58,9	56,0
Vibrating compactor	system for gathering rainwater, sewage, pump station, plant	72,7	66,0	64,8	59,9	57,0
Paver	system for gathering rainwater, sewage, plant	72,7	66,0	64,8	59,9	57,0
Irrigating machine	system for gathering rainwater, sewage,	43,7	37,0	35,8	30,9	28,0
Pump 2HP	system for gathering rainwater, sewage, pump station	72,7	66,0	64,8	59,9	57,0
Concrete mixer	Pump station, plant	60,7	54,0	52,8	47,9	45,0
Bulldozer	Plant	72,7	66,0	64,8	59,9	57,0
Concrete spreader	Plant	60,7	54,0	52,8	47,9	45,0
QCVN 27:2010/BTNMT		75,0				

Thus the region out the radius 3m from the generating source, the vibration in the permitted scope following the specification QCVN 27:2010/BTNMT. The households living bedside the routes will construct the system for drainage of rainwater, gathering the sewage and pump station with the distance to the location for execution from 3-5m, according to each portion. Thus the impact of the vibration at the low level. The households living surrounding the wastewater treatment plant, the distance to the households is about 15m thus the impact of the vibration is also at the low level.

The solutions for management and reduction of the dust, noise, vibration, exhausted fume are presented concretely in Chapter 7.

5.2.2 Generation of Construction Waste and Wastewater

During construction phase, solid waste, wastewater and some hazardous waste will be generated from construction sites, workers'accommodation, storage areas etc. as discussed in details below:

Excavated Materials

In addition to 182 tones of biomass and 20,000 m^3 of top soil to be excavated from the proposed WWTP site during pre-construction phase, approximately 1.7 millions tonnes of soil will also be excavated at various construction sites of the Project including the WWTP, drainage and sewer pipelines and along the improved drainage channels. As common construction practice, as much as possible excavated materials will be reused for pipe trench and holes refill. Table 5-16 below shows the calculated volume of excavation, refill and residual soils.

Table 5-16 Earth Work Volumes

No	Item	Top soil removal (m^3)	Excavation (m^3)	Filling (m^3)	Residual soil to be disposed (m^3)
1	WWTP	20,000	92,730	201,800	45,000
2	Main pipelines		102,000	32,000	70,000
3	Secondary pipelines		95,000	41,000	54,000
4	Tertiary pipelines		330,000	160,000	170,000
5	Pumping stations		1,840	1,000	840
6	T4 boxed drain		190,000	80,000	110,000
7	T5B boxed drain		350,000	160,000	190,000
8	Cai Cau stream		400,000	180,000	220,000
9	Tran Hung Dao street		140,000	70,000	70,000
10	Lo O stream		70,000		70,000
	Total	**20,000**	**1,771,570**	**925,800**	**999,840**

Table 5-16 shows that the Project will need to deal with approximately one million cubic meters of excavated materials including soil and mud. If all of that one millions cubic meters of excavated materials are disposed of, it is estimated that about 20 ha of land will be needed if the height of the dump is 5m. However, as discussed in Section 2.3.9, the Project will coordinate with other authorities for using excavated materials for ground levelling instead of setting up new disposal sites. Tan Binh Resettlement Site needs up to 960,000 m^3 of filling materials, the Tan Dong Hiep quarry which planned to be closed in 2016 would also need large quantity of filling materials. Therefore, only materials not suitable for ground levelling will be disposed off at the

South Binh Duong Solid Waste Treatment Complex for covering garbage in landfill cells, all other excavated materials will be used for ground levelling in Binh Duong.

Sewage and Domestic Solid Waste

It is estimated that up to 140 workers will be mobilized for construction of storm waterdrainage and up to 140 workers for construction of sewers, 20 workers for each pumping station and from 75 to 200 workers for the WWTP. Following the construction standard TCXDVN 33:2006, each worker in the site will consume about 22 – 45 liters of water/day. The wastewateris equal to 90% of water use. If no mitigation measures are implemented, each person will release 40 gCOD each day. If the workers have meals at the construction sites, on average each person will generate 0.15 kg of solid waste each day[1]. Based on these assumptions, the volumes of wastewater and solid wastes generated were forecasted and presented in Table 5-17 below:

Table 5-17Solid Wastes and Wastewater Generated

Year	Quarter	Wastewater		Solid Waste (kg/day)	Wastewater		Solid Waste (kg/day)
		Volume (m^3/day)	Volume (kgCOD/day)		Current (m^3/day)	Volume (kgCOD/day)	
		Stormwater Drainage			**Sewers Construction**		
2017	1	5,67	5,6	21			
	2	5,67	5,6	21	5,67	5,6	21
	3	5,67	5,6	21	5,67	5,6	21
	4	5,67	5,6	21	5,67	5,6	21
2018	1	5,67	5,6	21	5,67	5,6	21
	2	5,67	5,6	21	5,67	5,6	21
	3				5,67	5,6	21
Total volume		**2.654 (m^3)**	**2.620 (kg)**	**9.828 (kg)**	**3.095 (m^3)**	**3.057 (kg)**	**11.466 (kg)**
		WWTP			**Pumping station**		
2017	1	3,04÷4,05	3÷4	11,25÷15			
	2	4,05÷6,08	4÷6	15÷22,5			
	3	6,08÷8,1	6÷8	22,5÷30			
	4	6,08÷8,1	6÷8	22,5÷30			
2018	2	4,05÷6,08	4÷6	15÷22,5	0,4 ÷ 0,81	0,8	3
	1	3,04÷4,05	3÷4	11,25÷15			
Total volume		**2.055÷2.844 m^3**	**2.028÷2.808 kg**	**7.605÷63.180 kg**	**187,2÷10.530 m^3**	**374,4 kg**	**1.404 kg**

Table 5-16 indicated that the total volume of wastewater and solid waste generated by the workers during construction phase will be 7,991÷8,972 m^3 and 30.3÷33.2 tons, respectively. If not being managed properly, that volume of wastewater and solid wastes will cause nuisance, negatively affect urban landscape, environmental pollution and affect the health of both workers and local residents. The impact is at the medium level and mostly happenedin about 18 months of construction phase. However, this potential impacts will be manageable as the Project planned to request the contractor to hire existing accommodation in Di An town where basic health and environmental sanitation are acceptable instead of setting up new temporary workers camps. Additional mitigation measures are presented in Section 7.

5.2.3 Potential Impacts on Aquatic Life

As presented in Section 4.2.5.2, aquatic species found in the T4 channel and Cai Cau canal are quite poor, water environment is not suitable for the creatures of high class or plant for development. Therefore the potential impacts of the project's proposed construction works onto aquatic lives in these water bodies are not significant and negligible

5.2.4 Potential Impacts on Water Quality

During dredging for the improvements or rehabilitation of the drainage channels and canals, construction plants will break soil structures and mix up the bottom sediments. Therefore, the contents of suspended materials will be increased, water will become muddy. According to some researches carried out in dredging projects such as the dredging the Nam Trieu – Hai Phong navigation channel, the SS content in average increased over 5 times compared to baseline condition. Besides that, the contents of suspended solids and the concentration of other pollutants also increase significantly when the bottom sediment is stirred.

On the other hand, the project will also have large amount of excavated and filling materials, particularly at the WWTP site, along the main sewers and drains, and along the Cai Cau stream. If not properly managed, these granular materials will follow surface runoff to nearby water body causing water pollution and sedimentation in these drainage channels. This risk is very high.

Solid wastes and wastewater generated from construction site, if not collected and treated, will lead to environmental pollution in general and water pollution in particular.

Surface Run off

Construction activities has the potential to negatively affect water quality in the area as surface runoff through construction sites would contains high level of foreign matters such as soil, sand, garbage, organic pollutants, oil etc. Such polluted surface runoff would lead to the pollution of the receiving water sources, negatively affect aquatic lives as well as other water users. The Cai Cau stream has highest risks of water pollution as it runs along the construction sites, and some rehabilitation works will also take place on this channel.

As the pipelines will executed for each route, therefore the area for execution is not very large at each time thus not discussed in more details in this report.

With reference to pollution coefficient in rainwater overflowing guided in*Assessment of Sources of Air, Water, and Land Pollution - WHO, 1993,* the for pollutants generation coefficient of the urban area as follows:

- Total Nitrogen: 875 kg/km^2/year, equivalent with 87.5 g/ha/year;
- Total Phosphor: 105 kg/km^2/year, equivalent with 10.5 g/ha/year;
- BOD_5: 4.725 kg/km^2/year, equivalent with 472,5 g/ha/year;
- COD: 31.150 kg/km^2/year, equivalent with 3,115 g/ha/year;
- SS: 64.050 kg/km^2/year, equivalent with 5,405 g/ha/year;

Average annual rainfall of Di An Town is 1,937 mm/year. Therefore, the total rainwater received at the WWTP will be 13,1716 m^3 per year. Estimated pollutants in rainwater at this site is presented in Table 5-18:

Table 5-18 Forecasted concentration of pollutants in rainwater at the WWTP

No.	Parameter	Volume (gram/year)	Concentration (mg/l)
1	Total nitrogen	595	4,5
2	Total phosphorus	71,4	0,5
3	BOD_5	3213	24
4	COD	21182	161
5	SS	43554	331

Rainwater runoff affects mainly the WWTP areas with total land area of 6.8 hectares. The volume of rainwater runoff from this site is calculated using experimental formula as below:

$$Q_{tt} = q \times F \times \psi$$ (source: TCXDVN 51:2008)

In which:

+ q: rainy intensity (l/s.ha), determined as $q= A(1+ClgP)/(t+b)^n$

t – The duration of the flow of rain (minute), option t=150 minutes

P- The cycle for repeat of the calculated rain (year), option P=25 years

A, C, b, n- The defined parameter follows the rainy condition of the locality, *(For Binh Duong area, A=11650; C=0,58; b=32; n=0,95 equivalent to coefficient used for Hochiminh city);*

we have: $q= 11650(1+0,58*lg25)/(150+32)^{0,95} = 150,36$ l/s.ha;

+ F: The area of the basin that the sewer serves (ha), F = 6,8 ha.
+ ψ : The coefficient of the flow, to each kind of covering surface ψ with the different value. With 75.5% the area of the project with the period for execution as the earth foundation with about 24.5% surface covering grass $\psi_2 = 0,15$;

Applying data in the mentioned formula, we have: $Q_{tt} = 150,36 \times 6,8 \times 0,15= 153$ (l/s), equivalent to 0,2 m^3/sec. With the estimated flow rate and concentration, by balancingmass volume, the effect of rainwater overflowing in the region for execution of the plant to the source for direct receipt as the Cai Cau canal estimated as follows:

$$C = (Q_n * C_n + Q_s * C_s) / (Q_n + Q_s)$$

In which:

- C is the forecasted content of the pollutant;
- C_n is the forecasted content of the pollutant of rainwater overflowing;
- C_s is the forecasted content of the pollutant of Cai Cau canal;
- Q_n is the current flow rate of rainwater ($Q_n \approx 0,2$ m^3/second);
- Q_s is the current of Cai Cau canal ($Q_s \approx 2$ m^3/second);

Table 5-19 Forecasted pollutant centration of Cai Cau canal after receiving rainwater from WWTP

No.	Parameter	Q_n	Cn × Qn (g/s)	Cs (g/m^3)	Qs (g/m^3)	Cs × Qs (g/s)	C (g/m^3)

1	Total nitrogen	0,2 m^3/s	0,9	7	2 m^3/s	14	6,8
2	Total phosphor		0,1	1,4		2,8	1,3
3	BOD_5		4,8	29		58	28,5
4	COD		32,2	58		116	67
5	SS		66,2	71		142	95

Table 5-22 shows that COD and SS concentration in Cai Cau canal may be increased after receiving rainwater flow from the WWTP site. On the other hand, oil and other hazardous materials that may be used or generated during construction phase will also have the potential to cause pollution in water bodies if not properly managed. Thus, the project will minimize the potential impacts on water quality by sediment traps and isolation of fuels together with other mitigation measures presented in Section 7.

5.2.5 Hazardous Materials

According to MONRE Circular No. 36/2015/TT-BTNMT dated 30 June 2015, oil, lubricant, fuel, wasted the oil is classified as hazardous materials. Limited amount of these materials will be stored or generated at the construction sites during construction phase. Wasted oil will be generated from repair and maintenance of construction plants, vehicular, equipment, etc. The volume of wasted oilgenerated depends on the following factors:

- The quantity of transportation means and mechanical equipment;
- The quantity of oil generated from transportation means and mechanical equipment;
- The cycle for replacement of lubricant, oil and maintenance of machine;

According to a research[10]carried out in 2002, on average 7 liters of wasted out and lubricants will be generated ant each time of replacement for a vehicular, and replacements should take place every three to six months depending on the frequency of operation. The volume of wasted oil generated are estimated in the Table 5-20.

Table 5-20 The volume of Wasted Oil

Year	**Quarter**	The volume of dismissed oil in generation (liter/month)		
		Execution of the system for gather of rainwater	Execution of the system for gather of sewage	Execution for construction of pump station
2017	2	41÷82	41÷82	
	3	41÷82	41÷82	
	4	58÷117	41÷82	
2018	1	41÷82	58÷117	
	2	41÷82	58÷117	5 ÷ 10
	3		58÷117	

If not being manage well, wasted oil as well as other materials cross-contaminated with wasted oil and lubricants such as containers, cloths, dusters etc. may be leaked into the soil and groundwater, or follow surface runoff to waterbodies.Storage of oil, wasted oil, fuel and lubricants wasted oil at

[10]by the Centre for MillitaryScience andTechnical Technology, Ministry of Defence carried out in 2002

the site may also has the high risk of fire and explosion. The smell of oil also causes the bad effect to the health of the workers. The oil and other hazardous substances can be manage disolations, restricted access, protection etc. as detailed in Section 7.

5.2.6 Traffic Disturbance, Increased Safety Risks

Excavation of ditches, holes and channels as part of storm water drainage and sewer pipeline constructions along the streets will obstruct traffic movements and increase the traffic safety risks. Excavated areas may also block access to roadside house and buildings. Open excavated holes, temporary loading of construction materials and wastes, particularly the bulky pre-casted pipes, would also cause increased safety risks for traffic means. The potential impact on traffic and traffic safety of pumping stations and wastewater treatment plants are more localised. These types of impacts only happen in quarter 2 of 2018.

The project will execute the sewer installation in such a way only half of road width will be occupied at each time if possible, the other half will be maintained for traffic movements. Thus the excavation, refill, pipe installation will occupy parts of the road surface causing disturbance to traffic and increased traffic safety risks. Excavation and refill activities may also cause spreading of soil and mud on the road, when it rains these materials will make road surface become sliding and cause danger to traffic means. On other hand, spreading of construction materials and wastes around the construction sites also may cause vision reduction and affect traffic safety.

Spreading of asphalt for road surfacere-establishment will also occupy half of the road, the remaining space for traffic movements is very narrow. Thus, traffic jam, even serious jams are predicted if no mitigation measures are put in place.

It is predicted that the routes that traffic and traffic safety would be affected the most includes the provincial road 743, Hai Ba Trung street and Dong An residential area as vehicles of all three subcomponents (WWTP, sewersand drainage) would be travelling on these roads and streets. The traffic in the route My Phuoc – Tan Van, national highway 1K will be affected by storm water drainage construction. Sewers construction will affect more to the traffic on Tran Hung Dao, Le Hong Phong, Nguyen Tri Phuong, Road No. 21, Song Than industrial park and the internal roads in this region with the sewer of the project.

The impacts to the traffic and increased traffic safety risk will be higher in the routes where large pipes or drains are built. The scale of impacts is even higher if these large size excavation takes place along the sections passing school, hospital, markets etc. Table 5-21 below lists the locations mostly affected.

Table 5-21 Locations with Highest Impacts on Traffic and Traffic Safety

No.	Locations	Construction Activity
Road		
1	Tran Hung Dao street	boxed culvert size 1.600÷2.000 and 2.500÷2.500
2	Hai Ba Trung street	T5B boxed drain size 2×2000÷2500, main sewer size D700-D800, pressure sewer D700-D800 - 2,070 m to pumping station P1-2
3	Road to Dong An residential area	main sewer D1000

No.	Locations	Construction Activity
4	Le Hong Phong street	main sewer size D500-D600
5	Internal road of residential area	main sewer size D300-D400
6	Street 21	main sewer size D400-D600
7	West East 1 street	main sewer size D800
8	DT 743A street	main sewer size D400-D800 pressure sewer D600, 644 meters to pump for transfer of grade from station P1-1
9	National road 1K	main sewer gathering waste water size D400
10	Nguyen Tri Phuong street	main sewer size D500-D600, pressure sewer D400 1,700 m to pumping station P1-3
Structures, Objects		
1	Di An Medical Center, Anh Sao and, Hoa Quynh Kindergartens	sewer size D400 in DT 743A street sewer size D800 in Hai Ba Trung street
2	Dong Hoa Primary School Dong Hoa Secondary School	sewer size D300 in internal road of residential area
3	Tan Dong Hiep Secondary school Dong Thanh Kindergarten, Hoa Hong Kindergarten	main sewer size D500-D600 in Le Hong Phong St.
4	Nhi Dong Primary School, Bup Sen Hong Kindergarten	sewer size D800 in Đông Tây Road
5	Hoa Trang Nguyen Kindergarten	sewer D400 in street Nol. 21 Song Than IP
6	Hoang Yen, Hoa Lu Kindergarten	sewer D500-D600 in Nguyen Tri Phuong street.
7	Hanh Phuc, Hoa Ban Do Kindergarten, Hoa Anh Dao Preschool	sewer, rainwater in Tran Hung Dao street.
8	Vo Truong Toan Secondary School	sewer in Truong Tre street
9	Section 5 market Di An	sewer D300 in internal road of residential area.
10	Tan Long market	sewer size D300 in Doan Thi Kia street
11	Big C Di An	D400 sewer in internal road of Dong Hoa residential area. D500 sewer in National road 1K
12	Dong Hoa residential area and supermarket	sewer size D400 in internal road of Dong Hoa residential area, pumping station

Table 5-22 forecast traffic density based on the assumption that all work items in the project are executed at the same time in all streets

Table 5-22 Forecasted Traffic Density

. Time	Stormwater drainage (turn/day)	Sewers (turn/day)	Pump stations (turn/day)	WWTP (turn/day)	Total (turn/day)
Q3/2017	75 ÷ 150	75 ÷ 150			150 ÷ 300
Q4	100 ÷ 200	75 ÷ 150			175 ÷ 350
Q1/2018	75 ÷ 150	100 ÷ 200	10 ÷ 20	50 ÷ 100	235 ÷ 470
Q2		100 ÷ 200		75 ÷ 150	175 ÷ 350
Q 3		100 ÷ 200		100 ÷ 200	200 ÷ 400
Q 4		100 ÷ 200		100 ÷ 200	200 ÷ 400

However, in practice, timing of construction bidding will be varied between various bid packages. On the other hand, the contractor will execute the works in stages. Therefore the forecasted traffic density presented in the table above will be much higher than practice. These negative impacts on traffic and increased traffic safety risks will be minimize by the measures presented in Section 7.

5.2.7 Social Impacts

It is estimated that 60-120 workers will be mobilized to work in each of the storm waterdrainage, sewers and the WWTP construction packages. Thus there will be up to 360 workers will be mobilized in same period to work for the different package. The number of the workers come from the other provinces accounts for up to 60% total numbers of workers. That means about 210 persons will come from other provinces. However, the number of labor will be varied from time to time depending on construction progress.

The mobilization of 360 workers to the construction are may lead to the social disturbance, or even social conflicts due to discrepancy of income, work, customs etc. Besides that there is the risk that the workers will participate into the social evils such as gambling or prostitution. However, the potential social impacts and risks will not be high in Binh Duong because in so may years, a lot of workers from other provincesalready have come for work in the industrial sector and live in the province. Local people has acquainted the movement of influx of workers, local authorities also have experience for management of the immigrant labor. Social effect will be further minimized by the measures specified in Section 7.

In addition to increased dust level and traffic disturbance, the income of households living along the sides of the roads where construction takes place may also be affected if they are also doing having business at home. Incomes of shops and the restaurant may be reduced or lost if entrance is blocked or too dusty. Generally, will be difficult for the affected businesses to attract the customer when construction take place in front of their shops. The number of households with temporarily affected in construction phase are presented in the table 5-23 below:

Table 5-23 Households with Temporarily Affected by Construction

Ward/Block	**Number of households**	**Total**
Tan Dong Hiep		
Dong An Block	2	2
Tan An Block	5	5
Dong Hoa		
Tay A Block	217	217
Di An		
Binh Minh 1	32	32
Binh Minh 2	2	2
Total		**258**

This impact is only temporary and relative short term as construction will be implemented in stages. This impact will be further reduced by the measures detailed RAP and Section 7.

5.2.9 Health and Safety Risks

Construction sites with the open excavated holes, material loads, construction plants and equipment, loading and unloading of construction materials and wastes may cause safety risk to the workers at the site, and the public. Similarly, storage, handling and usage of fuel and electricity may also contain health risk to the workers and the public as well as fire, explosion and environmental hazard risk.

Solid waste and wastewater generated by up to 360 workers, if not managed properly, may cause nuisance and pose health risks to the workers as well as the public. Common diseases in Di An town includes fever, flu, varicella, measles, limbs and mouth to be recognized frequently. The worker may get the risk of being affected by these diseases. Besides that, if worker gets infected, their illness may be spread to others including local people. In order to prevent that risk, the contractor will be requested to apply the measures in Section 7.

5.2.10 Damages or Interrupt Existing Infrastructure

a. Roads

A lot of routes will be excavated or affected by the operation for gathering, transportation of raw materials and wastes during construction phase. The routes affected much are national highway 1K, DT 743A, Hai Ba Trung, Tran Hung Dao, Le Hong Phong, Nguyen Tri Phuong, Road 21. After completing the installation of the pipes, road surface will be reinstated. The costs has been included in the total project cost.

b. Water Supply

The pipelines for water supply at present mainly follows along the technical channel placed along the road. For execution of drainage and sewers, the project will not affect these channel. On other hand, the investor of the project is the water supply management entity with a lot of experience for execution to avoid the impacts on water supply, and if any issues arisen, these would be addressed promptly by them.

c. Power Supply

At present, the national electric network has been improved with either proper wiring or put underground tens of kilometers of the lines at the residential areas, urban and along the main routes. Project owner will coordinate closely with the electric authority to ensure that the impacts to these lines underground cable will be avoided.

Pumping station P1-2 is located about 20 m from a existing medium voltage line therefore there is the risk that machines such as excavators or cranes may hit the electric wire or damage the supporting pole to cause damages or interrupt electrical supply and have safety risk. The electrical safety risk can be avoided by the application of proper construction methods.

Picture 5. 1. Electric line over the region of pump station G1-1

5.2.11Environmental Hazard Risks

During the execution, the project will mobilise machines and equipment, limited volumes of oil, solvent, paint, chemical for the building task at the construction sites of WWTP. Besides that the electricity and gas will also be used. The parking, operation and usage of these machinery, equipment, materials and fuels may lead to safety and health risks such as accident, fire and explosion, or pollution if oil and fuel are leaked. This risk will be managed by the measures presented in Section 7.

5.2.12Impacts on Cultural Heritages

Construction of sewers and drainage will not lead to land acquisition of any known existing physical cultural structures. When construction takes place along the streets where there are religious structures such as pagodas or temples, construction activities may disturb traffic or access to these works, or cause visual impacts or nuisance if construction materials and wastes are loaded improperly. Heavy noise may also affect religious procedures. There are 6 cultural works that may be affected by construction activities as listed in Table 5-.24.

Table 5-24 Cultural Structure in Di An Town

No.	Street	Name of relic/cultural work	Project Activity	Distance to construction site
1	DT 743 street	War Soldiers cemetery	Sewer construction	>20 m
2	Nguyen Tri Phuong Street	Van An Pagoda	Sewer construction	>10m
3	Truong Tre St.	Phap An, Bui Buu, An Linh Pagodas	Sewer construction	>10 m
4	Tran Hung Dao St.	Di An church	Sewer and Drainage construction	>20 m

During the execution of the works, as the volume for excavation are also high, thus there will be chances that some cultural objects or remains exposed during the execution. The process for treatment of these case are presented under the Chance Find Procedures presented in Section 7.

5.3. Operation Phase

5.3.1. Impacts on Receiving Water Body Receiving Treated Wastewater

a. Impacts on Flow Rate

The design capacity of the WWTP is 20,000 m3/d or equivalent to 0.23 m3/s in phase 1, and is 60,000 m3/d or equivalent to 0.69 m3/s in phase 2. The treated wastewater will be discharged to T4 channel then to the Siep stream (also named as Cai Cau stream). It is 10 m from the discharge point to the Siep stream, and from Siep stream to Dong Nai river is 7,400 meters as shown in Figure 2-4 in Section 2.3.2. As mentioned in Section 4.1.4, the average flow rate in the Dong Nai river in dry season is 242 m3/s, it shows that even at design capacity of 60,000 m3/d, the proposed WWTP would add less than 0.3% into the flow of the Dong Nai river in dry season, the potential impacts of the WWTP on the Dong Nai river would be very small thus will not be discussed further in this ESIA report.

At present, the T4 channel and Cai Cau stream drains storm water for a catchment of about 1250 ha, including entire areas along the Provincial Road 743A and Tan Dong Hiep A IP. After putting the proposed WWTP into operation, the T4 and Cai Cau channels will also carry additional volumes of treated wastewater from the proposed WWTP, at 20,000 cmd in Phase 1 and 60,000 in Phase 2.

According to the feasibility study of the project, hydraulic calculations for T channel and Cai Cau stream were carried out using SWMM 5.1 model for the cases:

- Without climate change taken into considerations: Calculations are made based on actual measured rainfall data and water level from the Bien Hoa hydrological station at frequency of 10 years (P = 10%) with H_1 = 1.84m when not taking climate change into considerations;
- With climate change taken into considerations: The data of rainfall is 6.8% higher than the measured data from the Bien Hoa hydrological station with 10 years frequency (P = 10%) , with H_2 = 2.74m (0.9m m higher than without considering change of climate);

The nodes for hydraulic calculations started from the discharge point of the WWTP to T4 channel, then to Cai Cau stream and then to the Dong Nai river, including the nodes CX1, RC1, RC2, RC3, RC4, RC5, RC6, RC7; Detail results of calculation are presented in the Feasibility Study Report. Table 5-24 below only consider the cases whether flooding would happen along the receiving channels under various scenarios:

Table 5-25 The flooded points onT4 channel and Cai Cau Stream in Operation Phase

No.	Node for calculation	Flooding Duration (h)	Flooding Depth (m)
Q = 60,000 cmd, Climate change not considered			
P = 5 years: No flooding at any point along T4 Channel and Cai Cau stream			
P = 10 years: No flooding along T4 Channel, very minor flooding along Cai Cau stream: at RC4,			

No.	Node for calculation	Flooding Duration (h)	Flooding Depth (m)
Q = 60,000 cmd, Climate change not considered			
RC5, RC6 as indicated below			
RC4		0.01	0.0000
RC5		0.02	0.0020
RC6		0.03	0.0020
Q = 60,000 cmd, Climate Change considered			
P = 5 years: No flooding along Channel T4, Cai Cau stream: RC4, RC5, RC6, RC7 will be flooded in which RC6 and RC7 will be flooded heavily, at 0.39 to 0.43m in 1to 1.5 hours, concretely:			
RC4		0.01	0.00
RC5		0.01	0.00
RC6		**1.01**	**0.43**
RC7		**1.44**	**0.39**
P = 10 years: Channel T4 will not be flooded. Along Cai Cau canal, flooded at RC4, RC5, RC6, RC7 with RC5, RC6, RC7 flooded heavily from 0.13 to 0.43 m in 1 to 1.5 hours:			
RC4		0.71	0.0430
RC5		0.8	0.1240
RC6		**1.32**	**0.5330**
RC7		**1.74**	**0.4470**

The data in Table 5-24 shows that flooding will not happen at any point along T4 channel in any scenario, with or without climate change considerations, and at P =5% and P = 10%. If climate change is not taken into account, flooding along Cai Cau stream would be negligible for the case P = 10 years.

With climate change scenario, flooding may happen at RC4, RC5, RC7 and RC7 along the Cai Cau stream with flooding level up to 0.5 m in nearly two hours if rainfall at P= 5 years and P = 10 years frequency occurs. This is the results of calculation with most disadvantaged conditions where water level in the Dong Nai river is assumed to be high, at 2.74 m and with climate change impacts.

b. Impacts on Water Quality of Receiving Water Body

The project would brings about the positive effect on the quality of the receiving water body when untreated wastewater are collected and treated to meet standard before being discharged into the T4 channel and Cai Cau canal. The volume of pollutants in sewage treated at the first phase with capacity of 20,000 m^3/day is indicated in Table 5-26 below:

Table 5-26Pollutants Treated by the project

Parameter	Unit	Input	Output	Treatment	Treatment percentage
BOD_5	Ton/day	4,00	0,60	3,40	85,0
SS	Ton/day	4,50	1,00	3,50	77,8

Parameter	Unit	Input	Output	Treatment	Treatment percentage
Total N	Ton/day	0,80	0,60	0,20	25,0

Treated wastewater will meet QCVN 14:2008/BTNMT-Colum A (K=1,0) before discharged into T4 channel then to the Cai Cau stream and finally to the Dong Nai river.

To assess the impact of the wastewater onto the quality of water in Cai Cau stream and Dong Nai river in project area, IPC model introduced by the WB and WHO is applied. The WWTP discharge rate 20,000 m^3/day, the flow rate at the Siep stream after improvement is 2 m^3/s, Dong Nai river is 773 m^3/s (in flood season).

In practice, there are some water quality models that can be used such as: IPC, QUAL, QUAL2EU, QUAL2K, SWAT, BASIN … However, the application of QUAL, QUAL2EU, QUAL2K, SWAT, BASIN is complicated and requires a lot of input data, resources and time. Therefore, in the scope of this ESIA report, IPC model was used for rapid assessment based on dilution model.

$C = (Q_n * C_n + Q_s * C_s) / (Q_n + Q_s)$

In which:

- C is the content of pollutant forecasted.
- C_n is the content of pollutant of the exhausted source.
- C_s is the content of pollutant of the receiving source.
- Q_n is the current of the exhausted source.
- Q_s is the current of the receiving source.

Table 5-27ForecastedPollutantConcentration in Cai Cau Stream and Dong Nai river in Operation Phase

No.	Pollution parameter	Cs	Qs	Q_n	C
Cai Cau canal					
1	Total nitrogen	7	2	0,2	5,3
3	BOD_5	29			8
5	SS	71			46
Dong Nai river					
1	Total nitrogen	0,28	242	0,2	0,27
3	BOD_5	6			5,83
5	SS	30			29,81

The assessment result indicates the water quality of Cai Cau canal will improved significantly after the project enters operation phase. For Dong Nai river, the water quality is not expected to be improved much. This is understandable because this is a big river and its water quality is influenced by a lot of other discharge sources. However, the project will contribute to the protection of the water quality of Dong Nai river.

5.3.2 Gas Emissions from WWTP

WWTP is source of biological gases that can disperse with the wind about some tens, hundreds meters. Sol gas may contain bacteria and fungers that could be the cause of diseases or allergy through respiration. Such biological gases would affect air quality of surrounding the WWTP. For the Project's WWTP, the gases would be mostly generated from the balancing pond and the ASBR tanks.

Table 5-28 below provide indications of bacteria density near WWTP presented at the 7th International Conference on Environmental Science and Technology – Ermoupolis. Bioaerosol formation near sewage treatment facilities

Table 5-28Density of Bacteria in the air at the WWTP

Group of bacterium	Value (CFU/m^3)	Average (CFU/m^3)
Total bacterium	0 – 1290	168
E.coli	0 – 240	24
Intestine bacterium and other species	0 – 1160	145
Fungus	0 - 60	16

CFU/m3 = Colony Forming Units/m3

The quantity of bacteria generating from the WWTP would be varied significantly in each location, highest at the WWTP and lowest in the far distance.

Table 5-29 The quantity of bacterium dispersing from the wastewater treatment plant

	Quantity of bacterium/1 m^3 air			
Distance	0 m	50 m	100 m	>500m
End of windy direction	100 - 650	50 - 200	5 - 10	-
Head of windy direction	100 - 650	10 - 20	-	-

Source: 7th International Conference on Environmental Science and Technology – Ermoupolis. Bioaerosol formation near sewage treatment facilities, 2001

As indicated in the Project description, the project design will include odor treatment unit to collect and treat the gases. Thus this potential impacts would be addressed completely in the proposed Project.

5.3.3.Odor from WWTP and Pumping Station

Odor from WWTP and pumping stations generates mainly from the units where anaerobic disintegration takes place. Aerobic disintegration also generates odor but at low level. The gas generated mainly from anaerobic disintegration including H_2S, Mercaptane, CO_2, CH_4… In which, H_2S and Mercaptane as the main substances causing the odor, whereas CH4 is the substance causing fire and explosion if accumulated at a fixed concentration.

Table 5-30Odour-causing Compounds Containing sulphur from Anaerobic Disintegration

Compounds	Formula	Specific smell	Finding threshold (ppm)
Allyl mercaptan	CH_2=CH-CH_2-SH	Garlic, strong coffee smell	0,00005
Amyl mercaptan	CH_3-$(CH_2)_3$-CH_2-SH	unwell, odor	0,0003
Benzyl mercaptan	$C_6H_5CH_2$-SH	Unwell, strong	0,00019
Crotyl mercaptan	CH_3-CH=CH-CH_2-SH	Fox smell	0,000029
Dimethyl sulfide	CH_3-S-CH_3	Decomposed plant	0,0001
Ethyl mercaptan	CH_3CH_2-SH	Decomposed cabbage	0,00019
Hydrogen sulfide	H_2S	Decomposae egg	0,00047
Methyl mercaptan	CH_3SH	Decomposed cabbage	0,0011
Propyl mercaptan	CH_3-CH_2-CH_2-SH	Unwell	0,000075
Sulfur dioxide	SO_2	Pumgent, allergy	0,009
Tert-butyl Mercaptan	$(CH_3)_3C$-SH	Fox smell, unwell	0,00008
Thiophenol	C_6H_5SH	Odor, garlic smell	0,000062

Source: 7th International Conference on Environmental Science and Technology – Ermoupolis. Odor emission in a small wastewater treatment plant , 2001

There are basic difference between the compounds containing sulphur in WWTP various treatment units. H_2S increases from two sources reduction of Sulfide (resistance [1] and [2]) and the desulphur of the organics containing sulphur (resistance [3]).

$$SO_4^{2-} + \text{organic} \xrightarrow{\text{Bacteriumk}} S^{2-} + H_2O + CO_2 \quad [1]$$

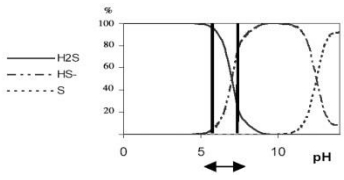
$$\longrightarrow S^{2-} + 2H^+ \longrightarrow H_2S \quad [2]$$

$$SHCH_2CH_2NH_2COOH + H_2O \longrightarrow CH_3COCOOH + NH_3 + H_2S \quad [3]$$

H_2S is easy to separate:

$$H_2S \xleftarrow{pH = 7,04} H^+ + HS^- \xleftarrow{pH \quad =} H^+ + S^{2-} \quad [4]$$

The separation of H_2S:



Anaerobic disintegration generates the odor but at low level and negligible.

Table 5-31 H_2S generated from WWTP

Units	Level (g/s)	The rate for generating into the air (%)
Interceptors	0,019	0,1380
Garbage screen	0,005	0,0427
Intake	0,113	1,0000
Aerobic pool	$6,08*10^{-27}$	0,1427
Sedimentation tank	$7,44*10^{-32}$	0,1928

Source: 7th International Conference on Environmental Science and Technology – Ermoupolis. Odor emission in a small wastewater treatment plant , 2001

The technology for treatment of sewage applied at the wastewater treatment plant is the aerobic technology therefore odor is minimised. Odor mainly generated from pumping champer and the balancing pond but at low level. Besides that, the pump stations are contained thus odor would be minimal. As presented in Project Description, the WWTP design includesod or treatment unit to eliminate odor problem.

5.3.4. Exhaust Fume from Standby Generator

In order to supply electricity constantly to the devices at the WWTP, one generator 480 kVA will be installed at the WWTP provisional usage. The characteristics of the standby generator and pollution coefficient when igniting DO oil is presented in the Table 5-32 below.

Table 5-32 Characteristics of the generator and Pollution Coefficient

Characteristics of the generator			**pollution coefficient when igniting DO oil**		
Parameter	**Unit**	**Value**	**Parameter**	**Unit**	**Value**
Quantity	Piece	01	Dust	kg/1000 liters	1,79
Capacity	kVA	480	SO_2	kg/1000 liters	10,81*S
Used fuel		DO	NO_x	kg/1000 liters	8,63
Standard Fuel consumption	Liter/hour	200	CO	kg/1000 liters	0,24
Chimney height	m	8,0			

Source: IPC model version 2.0 – 1998 By World Bank and WHO. In which: S is the sulphur component in DO oil, in Vietnam S = 0,25%; When igniting 1 kg DO oil, the quantity of exhausted fume creating 28.3 m3; The density of DO oil is 0.87 kg/liter

Calculation result of volume and concentration of the pollutants in exhaust of generator indicated in the table below shows that the gases emitted from the standby generator meets QCVN 19:2009/BTNMT Colum B (Kp = 1; Kv = 0,8). Further more, the generator only operated when the national electricity is cut off, therefore the time for operation in each month is not much (about 24 hours/month). Thus, the level of impact of the standby generator to the air is low.

Table 5-33Volume and Concentration of the pollutants from exhaust of generator

Parameter	**Volume (kg/hour)**	**Concentration (mg/Nm^3)**	**QCVN 19:2009/BTNMT Column B (Kp = 1; Kv = 0,8)**
Dust	0.36	73	160
SO_2	0.54	110	400
NO_x	1.73	351	680
CO	0.05	10	800

5.3.5. Noise from WWTP and Pumping Stations

At the WWTP and the pumping station, noise is generated from the operation of equipment such as: pumps, air blower and standby generator. Among these, most for attention is the stand by generator. The generator when operating will create the noisy

level at distance of 1m from source is about 90 – 1000 dBA in case no control measures are applied while the standard issued by the Ministry of Health is 85 dBA (contact duration is 8 hours) and the QCVN 26:2010/BTNMT is 70 dBA in the residential area. However, as described in chapter 2, the pumps are located deeply underground and the pumps are operated automatically therefore the possibility to have presented at the pump station with noise exceeding the standard is very low, if they are there it would be in a very short time.

5.3.6. Sludge Generation

Five important parameters of the sludge generated from WWTP that determine the level of impacts are weight, the content of bacterium causing the disease, the content of the harmful organics, the absorption capacity of the soil and heavy metal. According to Frank R. Sellman (Handbook of Water and Wastewater treatment plant Operations, CRC Press, 2003), on average, for 1 kg BOD to be excluded , 2.24 kg of sludge will be generated. Total BOD volume of the project is estimated about 3,400 kg BOD/day, this means 7,616 kg of sludge will be generated each day, moisture is about 75 – 85%. Thus, the solid content is about 15 – 25% with the volume, estimated at 1,142 – 1,904 kg/day. After dewatering, the remaining moisture of the sludge is about 15%, the volume of the dried sludge generated is estimated at 1,142 kg/day.

The sludge generated from the proposed WWTP is classified as the biological mud (biosolids). When the WWTP is operated at capacity 20,000 m^3/day, the forecast quantity of mud generated is 1,142 kg/day. When the plant reaches capacity 60,000 m^3/day, the forecast volume of sludge generated is about 3,462 kg/day. Sludge will be transported to the South Binh Duong Solid Waste Treatment Complex for composting or brick production.

5.3.7. Waste Generation

Some municipal waste will be generated by the operators if they live there, at about 18 kg/day and about 2.4 m^3/day of wastewater will be generated based on the assumption that each person generates 1.5 kg of solid waste and 200 liter of wastewater each day, and 12 workers will be working and living there. In practice, the workers will not be living there and work in shifts, therefore the amount of solid waste generated would be much less and would be collected by the urban company regularly.

The predicted character and volume of hazardous waste generated at the WWTP is presented in Table 5-34 based on the experience from the operating Thu Dau Mot WWTP.

Table 5-34 The component and volume of harmful substance

No.	Name of waste	Existent status *(solid/liquid/sludge)*	Waste Volume *(kg/year)*
1	Metal barrel for containing oil	Solid	50
2	Package for containing chemical treating waste (PAC, NaOH, H_2SO_4)		200
3	Clout with dismissed oil	Solid	600
4	Dismissed oil	Liquid	200

No.	Name of waste	Existent status *(solid/liquid/sludge)*	Waste Volume *(kg/year)*
5	Dismissed battery lead	Solid	12
6	Cartridge for printer, photocopy	Solid	12
7	Dismissed fluorescent lamp	Solid	12
	Total		**1086**

The hazardous waste, if not controlled and disposed of properly, would cause serious environmental pollution. Hazardous waste management procedures will be set up as part of the WWTP Operation manual which requires hazardous waste to be monitored regularly and disposed on in accordance with applicable laws and regulations. The Operating entity will register with relevant authority about the type and quantity of hazardous waste generated at the WWTP as required by Law. The WWTP operating unit will also contract with the Binh Duong Urban Environment Company or licensed dealer for collection and treatment of hazardous wastes generated from the WWTP during operation phase. Other mitigation measure related to hazardous waste management as well as associated occupational health for the workers are presented in Section 7.

5.3.9. Environmental Hazard and System Failure Risk

a. Chemical leakage:

Some chemicals including NaOH, H_2SO_4 , PAC, Polymer will be used for wastewater treatment. Thus there is a risk of chemical leakage from containers or accidents from chemical handling. If serious chemical leakage or accidents happen, it would cause the serious air, soil, and water pollution and health hazard to the operators and the public. The risk of the chemical leakage and accidents will be controlled by the measures presented in Section 7.

b. Treatment System Failure

The factors that may affect treatment efficiency includes power cut off or system operation fails, or the uncontrolled discharge of effluent from small industries into the sewers. IPC model of WB & WHO was used to forecast the quality of surface water in the Cai Cau stream and Dong Nai river in order to asses the risk of treatment system failure onto these water bodies in two scenarios, WWTP is operated at 20,000 cmd and 60,000 cmd.

Table 5-35 Forecast Water Quality of Cai Cau Stream and Dong Nai River at Various Treatment Efficiency

Scenario	Availability	Forecast of the water quality of Siep spring							
		No treatment (ceasing operation)		Treatment Efficiency at 50%		Treatment Efficiency at passes 70%		Treatment Efficiency at 100%	
BOD_5(mg/l)		**CC**	**DN**	**CC**	**DN**	**CC**	**DN**	**CC**	**DN**
S1	29.00	47	7.06	17	6.97	14	6.96	8	6.95
S2	29.00	200	7.17	115	6.92	81	6.89	30	6.84
SS (mg/l)									
S1	71.00	87	60.05	55	59.96	51	59.95	45	59.93

Scenario	Availability	Forecast of the water quality of Siep spring							
		No treatment (ceasing operation)		**Treatment Efficiency at 50%**		**Treatment Efficiency at passes 70%**		**Treatment Efficiency at 100%**	
S2	71.00	225	60.15	138	59.87	103	59.84	50	59.79
Total N (mg/l)									
S1	7.00	10.42	0.5718	5.24	0.5568	4.82	0.5556	4.20	0.5538
S2	7.00	40.00	0.5718	30.00	0.5568	26.00	0.5556	20.00	0.5538

CC= Cai Cau stream DN = Dong Nai river

S1 = Treatment plant operated at 20,000 m^3/day; S2 = Treatment plant operated at 60,000 m3/day

The figures shown in Table 5-35 indicates that when there are failures in the WWTP, the water quality of Cai Cau channel will be affected significantly by the untreated or improperly treated wastewater from the proposed WWTP::

- When the WWTP is operated at 20,000 m^3/day and treatment efficiency only reach 50%, the water quality of Cai Cau stream is still better than "before" project. The higher treatment efficiency, the more improvements for water quality in the Cai Cau stream.
- When the WWTP is operated at 60,000 m^3/day but system fails, the concentration of the pollutants in Cai Cau stream will be equal to the with the output effluent of the WWTP. However, in that case, water quality in the currently polluted drainage channels such as Lo O and Nhum spring would still be better than "before" the project as untreated wastewater no longer be discharged into these water bodies.

With the Dong Nai river, there is very small changes in BOD, SS and Total N between the cases where Di An WWTP fails and fully operated as the effluent from the WWTP is very small compared to the flow rate of Dong Nai river.

c. Other Risks and Issues

If sewers are broken or blocked, untreated wastewater would be leaked onto the ground and spread around causing soil and water pollution.

Fire and explosion may occur due to electric shock, thunder etc. and cause damage to human lives and property.

Occupational health of the operators would also be concerned as from time to time they would be in contact with chemical such as acid, soda which are corrosive and has harmful health effect if workers contact directly. Sludge, if in direct contact, may also cause some health risks to the workers

6. ALTERNATIVE ANALYSIS

6.1. Options for Selection of Treatment Technology

6.1.1Options for selection of treatment Technology

a. Option 1 - Conventional Activated Sludge treatment technique (CAS)

This treatment technology is bases on the development of suspended microbe called activated sludge maintained in rich oxygen environment (continuous aeration) so that the activated sludge develop rapidly and consume organic pollutants in wastewater. This consumption lead to increase of biomass and volume of activated sludge.

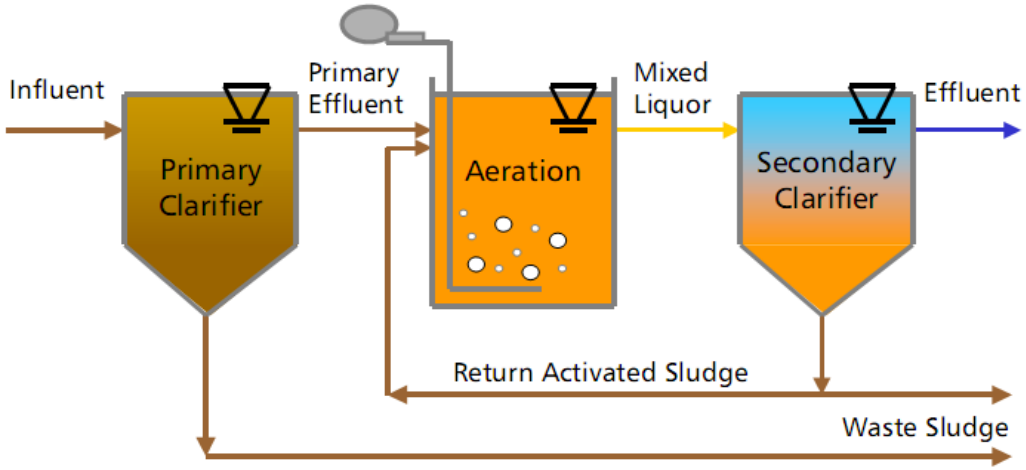


Figure 6-1 Conventional Activated Sludge Treatment Technique (CAS)

The components in this treatment plant using this technology include: intake, collection works, primary sedimentation tank, chemical store, secondary sedimentation tank, air blower, disinfection, sludge thickening, sludge drying and odor control system.

Table 6-1Advantages and Disadvantages of CAS technique

Advantages	Disadvantages
1. The technology has been approved and applied for over 100 years	1. Need primary sedimentation tank and secondary sedimentation tank, difficult to control odor
2. The technology doesn't register intellectual property	2. Insufficiently working when loading is varied suddenly
3. The technique has been applied for several WWTP in Hanoi, HCM City	3. Buffer zone is small, less land is acquired
	4. Need anoxic tank prior the aeration tank for nitrogen treatment for adding chemical
	5. Management organization having no experience in operation

b. Option 2 - Oxidation ditches (OD)

Oxidation ditches is another type of activated sludge technique. Hydraulic retention time of oxidation ditches is much longer than in aeration tanks so that this technique requires much larger area for construction. After oxidation ditches, mixture of waste water and activated sludge is delivered to secondary sedimentation tank to remove sludge from water. A part of sludge is returned to oxidation ditches, the remainder of the sludge is passed to dehydrator to remove water from sludge before being discharged.

Figure 6-2 Oxidation ditches technique

Differed from CAS process, OD process will not requires primary sedimentation tank because waste water can be delivered directly to oxidation ditches for treatment.

Table 6-2 Advantages and Disadvantages of OD technique

Advantages	Disadvantages
1. Aerobic and anoxic zones come between in oxidation ditches so that efficiency of biodegradation of pollutants and nitrogen treatment are relatively high	1. Electricity Consumption is high
2. Able to adapt with sudden variation of waste water volume	2. Require a lot of land. Need a secondary sedimentation tank (after oxidation pond)
3. No need for primary treatment	3. Possibility more odor generated
	4. Cost of construction is high
	5. Management organization having no experience in operation

c. Option 3- Sludge Batch Reactor technique (SBR) and Advanced Sludge Batch Reactor technique (ASBR)

Advance Sequencing Batch Reactor technique (ASBR) is an improvement of Sequencing Batch Reactor technique (SBR).

SBR (Sequencing Batch Reactor) is a treatment process using activated sludge operated by batches following 4 steps are air blowing - sludge settling - decanting - sludge discharging. These steps are operated in nearly optimal conditions so that efficiency of the treatment is high.

Concentration of BOD_5 in treated water is often less than 20 mg/l. SBR technique will not require secondary sedimentation tank and event primary sedimentation tank in some cases. This technique is suitable for low capacity treatment plant.

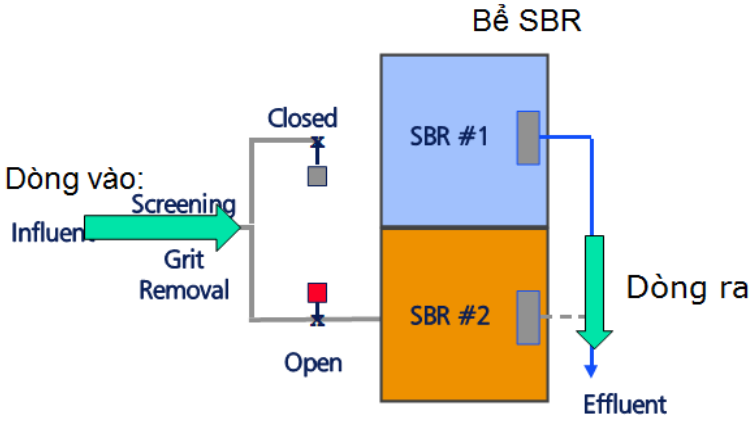


Figure 6-3 Sludge batch reactor technique

In order to overcome disadvantages of SBR technology, A-SBR has been developed and applied widely for treatment of waste water in low and high capacity treatment plant around the world.

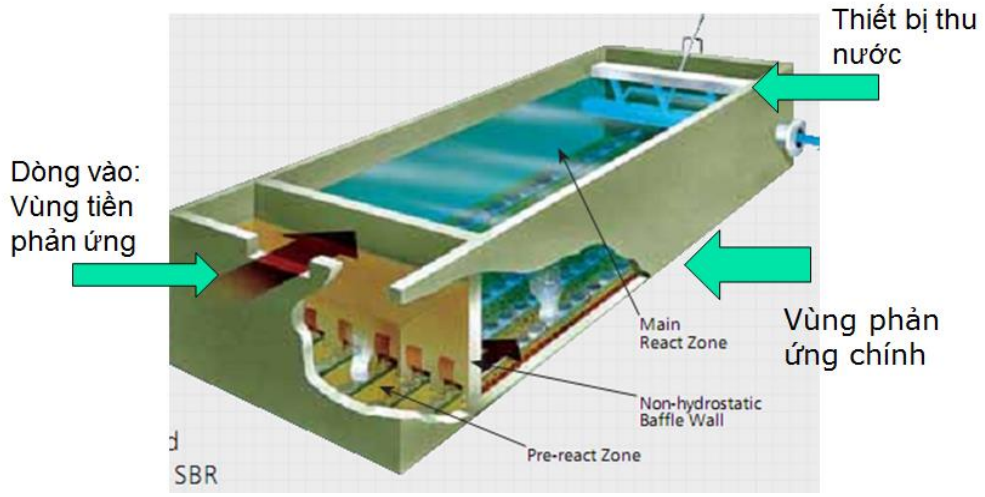


Figure 6-4 ASBR treatment process

ASBR technology is used in secondary treatment process based on the development of activated sludge in rich oxygen environment so that the activated sludge develop rapidly and consume organic pollutants in waste water. This consumption lead to increase of biomass and volume of activated sludge.

ASBR technique differs from CAS technique and OD technique because in this technique, secondary treatment process is occurring in only one tank without the need of primary sedimentation tank or secondary sedimentation tank. Air blowing process and decanting process are operated in the same tank (ASBR tank). The advantage of this technique in comparison with SBR technique is that waste water coming continuously. Treatment process of ASBR technique consists of 3 basic steps are: air blowing, settling and decanting.

Table 6-3 Advantages and Disadvantages of ASBR technique

Advantages	Disadvantages
1. No need for primary sedimentation tank	1. Operation of the WWTP is depended completely on online testers and controllers
2. No need for secondary sedimentation tank	2. Online tester is needed to be checkup and fixed regularly
3. No need for adding chemical	3. Decanter is the weakest part of the technique (install only 01 decanter for each tank). Several tanks are needed
4. Land needed 10% less than conventional activated sludge technology including area of primary sedimentation tank, activated sludge tank and secondary sedimentation tank	4. If the sludge can not settles down effectively on ASBR tank, treated water is difficult to qualify discharging standard. So that, secondary equalization tank should be constructed to ensure the quality of treated water
5. consumption electricity 50% less than activated sludge and oxidation pond technique	5. Operation worker need to be train carefully about the technique
6. Can remove nutrients: N-P	
7. good settling ability of sludge	
8. Emit less odor	
9. Highest buffer zone distance	
10. Good operational experience are in place	

6.1.2 Selection of the treatment technique

According to above evaluation of advantages and disadvantages of the 03 treatment technologies, we have the below table:

Table 6-4Comparison of advantages and disadvantages of the 03 treatment techniques

Operational criteria	Technique 1 – CAS	Technique 2 – OD	Technique 3 - ASBR
Qualify QCVN 14:2008/ BTNMT	High	High	High
Efficiency of nitrogen removal	Medium	High	High
Efficiency of phosphorous removal	Medium	Medium	High
Land occupation	Medium	High	Low
Complicability in operation	High	Medium	High
Requirement for primary treatment and adding chemical	Yes	No	No
Adaption ability to sudden variation of input loading	Bad	Good	Good
Possibility of causing odor	High	High	Medium
electricity Consumption	High	High	Low
Cost of construction	High	High	Medium
Operation experience of the project's owner	Not yet	Not yet	Strong

The table shows that the 3th technique has advantages in comparison with the 1st and 2nd techniques including smallest land acquisition, lowest total investment and operation cost (because no chemical is needed and some components can be reduced), high enduring capacity of load shocking and integrated with existing constructions help to make the operation much more convenient and obtain higher efficiency. For this reason, the 3rd option will be selected for the construction of WWTP.

6.2. Options for Location of WWTP

6.2.1 Options for location selection

Based on topographic condition, administrative boundary, traffic network, natural drainage network, we can use National Way 1K as a baseline to divide Di An Town into 2 zones for collection of domestic waste water includes:

- Zone I: Comprises of Tan Binh Ward, Di An Ward, Tan Dong Hiep Ward, An Binh Ward and a part of Dong Hoa Ward with total population of 346,795 people on an area of 4,357 ha.

- Zone II: Comprises of Binh An Ward, Binh Thang Ward and the remainder of Dong Hoa Ward has been planned to belong to National University of Ho Chi Minh City with total population of 40,757 people on an area of 1,653 ha.

With these 2 zones, the project proposes 3 options for construction of WWTP:

Option 1: Construct 2 WWTPs to collect and treat waste water in 2 zones separately. Domestic waste water in zone I is collected to WWTP in Tan Dong Hiep Ward, close to existing Tan Dong Hiep stone quarry. Domestic waste water in zone II is collected to WWTP situated near Tan Van canal, close to the intersection between DT 743C street and My Phuoc - Tan Van street.

Option 2: Collect all the domestic waste water in Di An Town to the WWTP in Tan Dong Hiep Ward, close to existing Tan Dong Hiep stone quarry. Waste water in zone II will be collected to a pump station with capacity in year 2030 is 6,000 m^3/day situated near intersection between DT 743C street and My Phuoc - Tan Van street and pumped to WWTP in Tan Dong Hiep Ward.

Option 3: Collect all the domestic waste water in Di An Town to the WWTP situated near Tan Van canal, close to the intersection between DT 743C street and My Phuoc - Tan Van street. Waste water in zone I will be collected to a pump station with capacity in year 2030 is 60.000 m^3/day on DT 743C street, close to martyr cemetery of Di An Town, 500m from intersection between DT 743C street and National Way 1K and pumped to the WWTP situated near Tan Van canal.

6.2.2 Advantages and disadvantages of the options

Advantages and disadvantages of the options are described in below table:

Table 6-5Advantages and disadvantages of 3 options of the project

Option	Advantages	Disadvantages
1	Length of collection pipelines is short. Pump for delivery of waste water through National way 1K is in crucial.	Need to construct 2 WWTP for 2 basins so that budget for ground clearance is high and cost of construction for 2 WWTP is higher than it's of 01 WWTP with the same capacity
2	Construct only 01 WWTP near the discharging point (1st basin) so that length of delivery pipelines is short, similar to the 1st option	Need to pump all the waste water from 2nd basin to 1st basin. However, flow rate of waste water in 2nd basin is low, at about 6,000 m^3/day in 2030. Therefore, operation of pump station is not complicated and consumption of electricity is not high
3	Construct only 01 WWTP	Need to construct 01 pump station with very high capacity (20,000 m^3/day for the period to 2020 and 60,000 m^3/day for the period to 2030) to deliver all of waste water from 2nd basin to 1st basin. This results in increase of electricity consumption and cost of construction for delivery pipeline system

Advantages and disadvantage of 2 location for construction of WWTP are demonstrated in below table:

Table 6-6 Advantages and disadvantages of 2 options of WWTP's location

No	Location	Advantages	Disadvantages
1	WWTP in Tan Dong Hiep Ward	- Far from the administrative center. - Convenient for discharge of treated waste water (near Cai Cau Stream) - A few people affected. - Out of sensitive areas. - Enough land for construction of treatment facilities and for expansion of the treatment plant in the future. - Approved by the People's Committee of the Province. - Adequate with general planning of the Town.	Close to Dong An residence area.
2	WWTP at Binh An Ward - near Tan Van canal	- Far from administrative center. - Far from residential areas. - Out of sensitive areas. - A few people affected. - Convenient for discharge treated water (next to Tan Van canal) - Adequate with general planning of the Town. - Enough land for construction of treatment facilities and for expansion of the treatment plant in the future.	

6.2.3 Select the best option

Table 6-7 Synthesizing criteria for selection of treatment techniques

Criteria	Option 1 – CAS	Option 2 – OD	Option 3 - ASBR
Number of pump stations	Smallest	Medium	Biggest
Consumption of electricity	Lowest	Medium	Highest
Length of pressure pipelines	Shortest	Medium	Longest
Number of WWTP	2	1	1
Cost of construction	Cheapest	Medium	Most expensive

Based on evaluation of advantages and disadvantages of the options, the project select the 1st option: construct 2 WWTPs to collect and treat waste water in 2 zones separately despite the fact that total investment toward 2030 is higher than that of 2nd option because of higher compensation budget for sites clearance. However the 1st option needs less pump station than other options so that the cost for electricity is lowest. Moreover, the arrangement of 2 WWTPs in 2 zones will be more suitable in a long term and with the development of traffic and social economy of the Town.

In phase I, the project will construct only one WWTP in Tan Dong Hiep Ward to collect and treat wastewater of zone 1. The WWTP in Binh An Ward will be constructed in 2030.

7. MITIGATION MEASURES

7.1. Mitigation Measures and Environmental Solutions Incorporated Into Project Proposals

To control and minimize the potential impacts of the operational phase of the wastewater treatment plant and promote environmental friendliness of the Project, the following measures have been incorporated into the proposed investment project and will be implemented in the detailed design stage:

- Along the channels for drainage of Lo O spring and Cai Cau canal, the channel slopes will be protected by engineering solution combined with greening by vegetation;
- Inclusion of an automatic monitoring system to monitor flow rate at intake and discharge point, flow, pH, COD, TSS and EC. Having an automatic monitoring system is critical as it allows timely detection of problems if encountered, to ensure the system is operated in a stable manner. At the same time, it also facilitate the monitoring of treated wastewater discharge by environmental management agency. Monitoring Data will be shared with the Binh Duong DONRE.
- Larsen sheet piles will be applied to reinforce and protect the slopes of pipe trenches to prevent landslide and erosion when excavation depth is 3m or deeper
- Structures that are potentially be built at depth in contact with groundwater which has corrosive potentials due to relative low pH (4-4.5) will be designed with non-corrosive materials
- The treatment units within the WWTP will be sited in compliance with the Vietnamese National Standard QCVN 01:2008. This standard requires the WWTP that has biological and odor treatment units and no sludge drying lagoon must have a buffer zone of at least 30 m wide. For project, the minimum distance from some treatment units to the nearest residential buildings:

Item	**Distance (m)**
Pumping station	50 m
Intake	75 m
Sludge thickening unit	110 m
Sludge drying bed	125 m

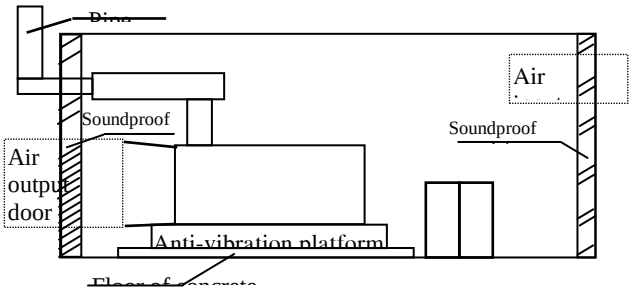
To meet QCVN 01:2008/BXD requirements, the WWTP will have a buffer zone of at least 30 m wide from the nearest residential area in which 10 m wide green corridor will be created.

- A 10 m wide green corridor and grass land will be established within the WWTP to create green landscape at the WWTP and separate the concrete buildings with the roads and residential areas near the front of the WWTP. The estimated costs for planting green tree is 2 billion VND.

- The units such as the wastewater intake, pumping station, sludge dewatering and compaction within the WWTPs that generates the most odors (VOC, H_2S,NH_3 etc.) will be sited in the northeast of the WWTP which is furthest from the residential area. These units will also be designed in contained buildings. The gases generating odors will be collected and treated using Chemical Scrubber (which includes two chemical treatment towers, the same as in the existing odor treatment unit in Thu Dau Mot WWTP of Binh Duong.

Picture 7.1. Odour Treatment Towel at Thu Dau Mot WWTP

- Toilet, washing, and showers areas will be included in the administration building for the operators to use after working shifts. The administrative building shall be designed in such a way that maximise lighting using natural lights, water and electrical equipment will be energy-saving types.
- Sludge will be transported to the existing composting plant at the South Binh Duong Solid Waste Treatment Complex for composting or brick making
- An Emergency Response plan has been proposed to address the causes where there are some failure in the wastewater treatment system.
- In order to control noise from standby generator at the wastewater treatment plant, backup generators are placed in the machine room. The stands, engine platform is reinforced of concrete with high quality. Installation of anti-vibration rubber cushion; installation of sound insulation. To check the balance and adjust if necessary. The machine will be checked, lubrication and routine maintenance



Picture 7.2. Anti-noise for the standby generator at the wastewater treatment plant

7.2 Mitigation Measures for Pre-Construction Phase

7.2.1 Mitigation Measures for Land Acquisition and Resettlement

To mitigate the potential impacts associated with land acquisition and resettlement, A Resettlement Action Plan (RAP) has been prepared for the subproject and will be implemented Accordingly. The key points of RAP are summarised below. For more details Please see Rap.

Compensation to impacts on land acquisition, structures, crops/trees

* Component of building wastewater treatment plant: The detail compensation plan for building wastewater treatment plant is expected to be approved by January 2016 and compensation payments are completed by March 2016.

* Component of building wastewater collection networks: The agricultural land compensation rates are specified in the table of land prices issued by Binh Duong province and verified by the competent agency; Subsidy shall be paid into the State budget and included in the annual budget estimates of communes, wards and towns; Subsidy is only used to invest in the construction of infrastructure projects, or used for public interest purposes of communes, wards and towns.

Allowance for livelihood restoration

* Component of building storm water drainage system: the policy applies to households temporarily affected by trading activity caused by construction is 5,000,000 / household (50% of average monthly income of 10,000,000 VND/household as indicated in the Socio-economic Survey Report in the project area). AHs will receive supports and allowances as part of the compensation plan, according to the standards and regulations of the Government of Vietnam, including support for stable life, job training allowances, and other special allowances for the poor and vulnerable people with total amount of VND 18,591,704,883. Specifically:

Table 7-1 Support plan for livelihood restoration

NO.	Type of support	Entitled person	Support level	Total
1	Transitional allowance	23	3,000,000 VND/household	69,000,000
2	House rent allowance (06 months)	21	3,000,000 VND/hh/month	378,000,000
3	Allowance for production and life stabilization	78	2,000,000 VND/person	156,000,000
4	Allowance for vocational training and job change	40	03-times of agricultural land price	14,998,704,883
5	Land purchase allowance	24		2,990,000,000

* Building of wastewater treatment plant: Allowance for livelihood restoration has been mentioned in the approved master compensation plan. Expected time for allowance is in January 2016 upon the detail compensation plan and decision on land acquisition is approved and issued respectively.

* Building of wastewater collection networks: Land acquisition does not impact on local people, thus support policy for livelihood restoration is not applied.

Resettlement

* **Building wastewater treatment plant:** there are 24 eligible households that shall be allocated in the resettlement area. Location of the resettlement area is in Tan Binh residential - service area located in Tan Binh Ward, Di An Town, Binh Duong Province. This is a commercial residential area invested by Binh Duong Construction - Consulting - Investment JSC. Resettlementrate of the project approved by Decision 2641/QD-UBND dated October 23, 2014 of Binh Duong province is 4,000,000/m2. Resettlement rate is consistent with the regulations of Binh Duong (Article 39 - QD 51). Tan Binh residential-service area was founded in 2013, which its plan of 1/500 approved by the People's Committee of Binh Duong province, completed public utilities, infrastructures like internal 12m roads, parks, schools etc., ensuring better living conditions for the displaced people. Resettlement location was publicly disseminated at the local area to affected people. Displacement is expected to be completed by March 2016.

*** Component of building wastewater collection networks:** acquired land area is vacant land, it does not affect to local people so resettlement allocation is not required

7.2.2 Measures to Reduce Safety risks of Site Clearance and Ground Leveling

To address safety risks associated with unexploded materials, the Project has allocated 560 millions VND (22,700 USD equivalent) to fund mine clearance at the wastewater treatment plant. The Project Owner will sign the contract with the specialised unit or the military headquarters of Binh Duong to carry out mine clearance at the WWTP site. This task will be implemented right after completing land acquisition and compensation and BEFORE any dismantling, demolition or ground levelling takes place.

Adequate measures will be applied during demolition of existing infrastructure to protect workers and public from falling debris and flying objects. Among these measures, the Contractor shall:

- Set aside a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels
- Conduct sawing, cutting, grinding, sanding, chipping or chiseling with proper guards and anchoring as applicable
- Maintain clear traffic ways to avoid driving of heavy equipment over loose scrap
- Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged
- Provide all workers with safety glasses with side shields, face shields, hard hats, and safety shoes

To minimise dust generated from dismantling and demolition activities, the surface of disassembling work will be watered in the dry and hot days, these works will be covered with canvas to prevent dust dispersion to the surrounding areas. Trucks, vehicles for transportation of the waste will also be covered. Stockpile and excavated soil, if not reused for tree planting within the WWTP, will be transported to disposal sites within 24 hours. Speed limit at 40 km/h or less will be applied to the area within 200 m from the WWTP site.

To control noise, the project only allow contractors to use the equipment with the low noise generation, and no disassembling or transportation will take place between 10 pm to 6 am. All machines and construction plants will be turned off when not in use.

PMU will coordinate with Power authority if power cut off is necessary for ensuring safety. The affected communities will be informed in advance to minimise nuisance, or disruptions to domestic and business activities.

7.2.3. Measures to Reduce the Impacts on Vegetation and Landscape

Site clearance will take place within designated land areas only. The area to be disturbed will be minimised. No tree cutting or disturbance to the vegetation cover outside the designated areas will be allowed.

In order to reduce the volume of waste generated during site clearance, the project conducted consultations with the households and will inform them at least 1 week before site clearance takes place. Reusable or recyclable materials such as wood, brick, metals that will collect and sold to local recycling business either by the affected households, or Project Owner sold as scrap.

For the wastes to be disposed off, the Project Owner will sign contract with the Di An Public Works Unit or the South Binh Duong Waste Treatment Unit, or the environmental licensed entities for collection, transportation and disposal at the South Binh Duong landfill.

7.3. Construction Phase

7.3.1. Dust, Noise and Vibration Control Measures

The following measures will be implemented for dust, noise and vibration control to reduce the impact to the air quality and human health:

- Only use machines with emission rates below allowable limits specified in TCVN 6438-2005
- Arrange washing areas for vehicles at the entrance/ exit of the WWTP construction site. Wastewater from there will be collected and sedimented before drainage to the environment;
- Water the access road at least 2 times per day when the weather is dry, hot and not to cause muddy condition. Watering at least 200 m of access road to and from the entrance/exit of the WWTP site, and along road sections with medical centres and schools;
- Cover tightly the vehicle transporting loose materials;
- Cover or bind temporary storage areas larger than 20 m3 to avoid dust dispersion;
- Not to be burnt the waste on site;
- Apply speed limit at 40 km/h or less within 200m from any construction sites;

- Where possible, maintain noise level at or below 90db.
- Avoid implementing the operations generating loud noise in sensitive time (early morning or late at night in the sensitive locations (residential area, medical station, etc...). If executing in the night is unavoidable, affected communities should be informed in advance at least 2 days in advance;
- Locate machines and tools generating loud noise at sites that allows the noise at residential area not more than 70dBA;
- Use static compactors instead of vibration compactors if feasible for vibration control.

7.3.2. Water Pollution and Sedimentation Control Measures

The Contractor will be required to be responsible to control the quality of surface runoff discharged from construction sites, to ensure that the effluent meets QCVN 08:2008/BTNMT – National Standard on Surface Water Quality. The Contractor shall ensure that:

- Excavation and filling activities will be controlled, especially in rainy season. The contractor shall ensure that excavated and filled areas are always stable, disturbance to the surrounding must be minimised. Materials and waste generated during excavation will be gathered, collected and transported out the site soonest possible but no later than two working days.
- Create and maintain the ditches for drainage within the construction site of the wastewater treatment plant. Sedimentation traps shall be created to allow sedimentation of soil and solids before surface runoff is discharged to any existing water body. The sedimentation traps must be maintained and cleaned up periodically.
- Temporary loading of construction materials and wastes must be at least 200 from any existing stream and rivers where construction activities does not take place.
- ground disturbance is minimised, the measures to stabilise the disturbed areas are implemented soonest possible.
- used oil and lubricants are not left on barren ground or disposed off into drains, channels or any water bodies.
- Construction materials and waste are not temporarily loaded at places where erosion or land slide, soil subsidence may occur, or at places that such loading may affect land or property of local people. Excavate drainage ditches within construction sites as instructed by the supervision Engineer to avoid localised flooding.
- An area for vehicle washing is established at the entrance and exit of the WWTP site. Sedimentation trap/manhole will be included to allow setting of solids before wastewater is discharged into the environment;
- At the excavated places which are at risks of soil subsidence or sliding, such as deep pipe trench or pumping station, support/piles or other acceptable materials shall be installed to protect the walls of the ditch. Where excavation is deeper than 3 m, Larsen piles should be used for slope/wall protection. All support materials will be disassembled when construction is completed. Excavated hole will be dried by pump (if underwater) to pump water in the holes to the area accepted by the Site Engineer.
- Contractor's site office and any disturbed areas disturbed during construction will be dismantled, packed up and reinstated before handing over the site. The soil contaminated with oil, if any, will be removed and transported to acceptable disposal site. Sanitation facilities including septic tank, drainage ditch etc. will be refilled and covered safely.

- The drains and water bodies disturbed by construction activities must be cleaned and be free of debris and garbage. Surplus soil, construction materials and wastes shall be collected and removed entirely from the construction sites then transported to approved disposal sites;
- The region for execution is limited within the acquired land area. top soil will be retained for tree planting within the WWTP in later stage. Construction materials loaded within the WWTP will be at least 50 m from any water source.
- Drainage ditches with sedimentation traps are created and maintained, surface runoff is led to the Cai Cau stream. Sedimentation traps should be installed at the northeast corner of the WWTP where later this site will be used as stabilisation pond of the.
- Collect and transport the excavated soil out of construction sites 24 hours;
- Gravels are applied on internal roads of the wastewater treatment plant;
- Ground levelling shall be implemented at the Southwestern part first, then, Northeastern area which is connected to the Cai Cau stream in order to create natural slope for rainwater drainage overflowing to the Cai Cau stream which is located at the eastern corner of the project;

For T4 channels and Cai Cau stream dredging the contractors shall:

- Diver flow to maintain drainage functions of these;
- Carry out dredging the bottom only when there is no flow, ensure that dredging is carried out to the designed depth and ensure that the dredged materials do not enter T4 and Cai Cau stream flows.

7.3.3. Waste Management and Treatment Measures

The contractor will manage and control the solid waste and hazardous waste by the following measures:

- Minimise the generation of garbage, reuse or gathering the materials that can be recycled.
- Surplus excavated soil should be disposed off at the sites specified in detail engineering design document and approved by the supervision engineer. The proposed disposal sites of the project is the Tan Dong Hiep quarry and resettlement site in Tan Binh Ward;
- Garbage and municipal solid waste will be separated at source. The contractor are required to contract with licensed solid waste dealers to collect and transport municipal solid waste in accordance with Decree 59/2007/ND-CP dated 09 April 2007 regarding management of solid waste and suitable with the actual conditions in the locality, and the Decree 38/2015/ND-CP dated 24 April 2015 regarding management of waste and scrap.
- Waste oil and waste containing oil will be collected and stored properly at the site. in accordance with MONRE Circular 36/2015/TT-BTNMT dated 30 June 2015 for management of the hazardous waste.
- Clean up and reinstate disturbed areas when construction if finished. Carry out pipe installation in stages to minimise social impacts and environmental pollution as well as traffic disturbance. Construction materials are loaded in clean and tidy manner. After completion of each section, all the wastes and residual materials will be collected and transported away.

7.3.4. Traffic and Traffic Safety Control Measures

The contractor must be compliance with Circular No. 22/2010/TT-BXD of the Ministry of Construction on construction safety. The Contractors shall implement, but not limited to, the following measures:

- The means of transportation are not operated exceeding the speed limits. Trucks will be covered during the transportation to avoid dropping into the road. Clean up falling materials within 200m from the WWTP and along other construction sites to ensure the roads are not slippery for traffic means;
- Do not to park machines and trucks on the road where construction is on-going unless for loading/unloading materials and wastes.
- When executing the works in the areas near schools, the contractor arrange staff for traffic direction during rush hours;
- install and maintain the boards and signs to direct traffic to ensure the safety for human and traffic means during the execution;
- Place portable fire fighting equipment at contractors' the site office.
- Execution of the sewer crossing the road, Construction shall be carried out in each half of the road width. The other the half should be for traffic. After road surface is reestablished on one half, the contractor can execute the work on the other half of the road. Signboard, fences, signal lights shall be placed along the section where construction work is going on in order to prevent accidents for the people and traffic means. During the execution, one person should be assigned for traffic observation and instruction. For special cases, the PMU and Contractor will request the Traffic Police for traffic diversion or direction.. Construction works can be performed in the period with less traffic such as night time, at the same time ensure for lighting in the night.
- Before execution along the road, the contractor shall put barriers and sign boards in accordance with current regulations in order to prevent accidents for the public, the workers and traffic means. Steel piles sheets should be placed to maintain access to road side buildings, houses and shops of pipe trenches obstruct access.

7.3.5. Measures to Avoid, Minimise Impacts on Existing Infrastructure and Services

The contractors shall be required to use construction plants and equipment with the size and load within the limits of transportation roads. The Contractors shall be responsible for repairing, restoring all damages of the road, bridge due to overload transportation, the result for overcoming such damages should be ratified by the supervision engineer.

When operating the construction plants such as crane, staff should be assigned to observe the surroundings to signal the operators in order to avoid impacts or damages to electric lines or any other existing infrastructures near by.

Road surface and footpath will be reestablished after pipeline installation is completed. The costs of road surface reinstatement is already included in the project cost estimation.

7.3.6. Measures to Control Social Impacts

In order to maintain and enhance good relationship with the community, to reduce the nuisance from the negative impacts of construction, the contractor will be required to:

- Install and maintain information board at the project at the site to inform the public clearly the full name and telephone number of the Contractor's Chief Engineer so as community can contact when they have suggestions or complaints about safety, environment or health issues related to construction activities. The contractor shall maintain records of such complains and suggestions together with follow up actions for reporting purpose;
- Inform affected community people about the progress of construction and temporary disruptions of existing services, if any.
- Avoid or limit the construction operations at night. If it is impossible to avoid execution of the works at night or avoid causing interruption of existing services such as electricity/ water supply, the PMU and the Contractor shall inform the community at least 2 days and reminded for 1 day in advance.
- Excavation for pipeline installation will be implemented following the rolling method. For the sewers, the pipe trenches will be excavated along the street at 50m long for each section, after the pipes are installed, proceed with refill and road surface temporary instatement immediately, before moving to the next section. Each 50 m long section will be implemented within 24 hours. For asphalt road, final road surface reinstatement will take place within three weeks from excavation. For storm water drainage, each section up to 300 long should be excavated at each time. After installation is completed, refill should be carried out immediately as per technical specifications before moving to the next 300 m section. Avoid excessive excavation and prolonged construction on any street in order to minimise the negative impacts on daily life of the households living along the roads. The excavated soil shall be transported out of excavated areas to the landfill as soon asp possible and within 24 hours.
- Place steel sheets or other acceptable materials for maintain access to roadside buildings if pipe trenches disrupt access.

In order to reduce the impact of the workers to the community, the contractors will be required to implement the following measures

- The contractor is encouraged to use the local labor to implement the simple works. Register the workers who come from other places with local authorities. Provide training about environment, health and safety for the workers before started working.
- The workers of the contractor are forbidden to:
  + cut the trees outside the construction or without authorisation, burn the waste and vegetation after clearance
  + Cause social disturbance or unhygienic conditions at construction sites
  + set fire without being authorised
  + operate the vehicle, machine without authorisation.
  + use or store weapon
  + consume alcohol in the working time;
  + Litter the construction site

+ carry out vehicle, machine maintenance outside designated areas
+ Quarrel, fighting

Failure to comply with the Code of Conduct, or the rules, regulations, and procedures implemented at the construction camp will result in disciplinary actions.

7.3.7. Measures to ensure Safety and Health

The following measures shall be implemented to ensure safety and health for the workers and the community

- Provide training on safety, environmental sanitation and health for the construction worker before commencement of the work;
- Supply clothes and protective equipment for the workers, such as gloves, mask, boots, glass, etc., depending to the nature of work);
- Provide training to the workers to raise awareness on HIV/AIDS and the common diseases epidemics in the project area;
- Ensure mosquito net are provided at workers accommodation to prevent dengue fevers.
- cooperate closely with the local authority to conduct cleaning up activities in dengue fever prevention campaigns
- cooperate with the local authorities in preventing and fighting with social evils (gambling, prostitution etc.);
- Fence WWTP construction site and pumping stations with close metal sheets at least 2 m high.
- Install and maintain fences, reflective bans and sign boards surrounding excavated areas. Provide adequate lighting at night time at these locations
- implement all other measures as necessary ensure the safety for the construction workers and the community in project area;

7.3.8.Hazard Risk Management Measures

The Contractors shall arrange electric lines within his office at construction sites in a safe manner, no wires will be place on the ground and with proper plug. Electrical panel placed outside must be protected from weather and for safety;

Oil, fuel and chemicals will be stored at least 10 m from workers' accommodation and Contractor's Site office. These hazardous must be stored on water-proofed floor, bound and roofed. Warning signs must be placed at that storage area;

In the event that accidental leakage or spillage of diesel/chemicals/chemical wastes takes place, the following response procedures shall be followed immediately by the Contractor(s):

- The person who has identified the leakage/spillage shall immediately check if anyone is injured and shall then inform the Contractor(s), Supervision Engineer and PMU.
- The Contractor(s) shall ensure any injured persons are treated and assess what has spilled/ leaked;
- Should the accidents / incidents generate serious environmental pollution (e.g. spillage / leakage of toxic or chemicals, large scale spillage / leakage, or spillage / leakage into the

nearby water bodies, the Contractor shall immediate inform PMU;

- In such cases, the Contractor(s) shall take immediate action to stop the spillage / leakage and divert the spilled / leaked liquid to nearby non-sensitive areas;
- The Contractor(s) shall arrange maintenance staff with appropriate protective clothing to clean up the chemicals/chemical waste. This may be achieved through soaking with sawdust (if the quantity of spillage/leakage is small), or sand bags (if the quantity is large); and/or using a shovel to remove the topsoil (if the spillage/leakage occurs on bare ground); and
- Depending on the nature and extent of the chemical spill, evacuation of the activity site may be necessary.
- Spilled chemicals must not be flushed to local surface drainage systems. Instead, sawdust or sandbags used for cleanup and removed contaminated soil shall be disposed of by following the procedures for chemical waste handling and disposal already described.

The Contractor(s) shall prepare a report on the incident detailing the accident, clean up actions taken, any pollution problems and suggested measures to prevent similar accidents from happening again in future. The incident report shall then be submitted to the Supervision Engineer and PMU for review and keep in the records. The incident report shall also be submitted to DONRE, if required.

In case occurring the accident, the contractor should immediately cease the execution, take the first aid to the victim then to move to the nearest medical firm, to report the supervisor and investor.

7.3.9. Measures to Control the Impacts on Cultural Heritages

When determining that some construction activities would be carried out near any cultural, historical sites such as pagoda, church, temple, shrine…, the contractor shall schedule construction plan to avoid the days that festival or special events may take place at these cultural sites such as the middle of lunar month, public holidays. When carrying out the works in such areas, the contractor shall implement good site management practice including regularly clean up the site regularly, load materials in a tidy manner, and transport wastes out of the sites as soon as possible.

If artifacts are exposed during construction phase, the Contractor shall follow Chance Find Procedure described below:

If the Contractor discovers archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, the Contractor shall:

- Stop the construction activities in the area of the chance find;
- Delineate the discovered site or area;
- Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the Department of Culture and Information takes over;

- Notify the Construction Supervision Consultant who in turn will notify responsible local or national authorities in charge of the Cultural Property of Viet Nam (within 24 hours or less);
- Relevant local or national authorities would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values;
- Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration and salvage;
- If the cultural sites and/or relics are of high value and site preservation is recommended by the professionals and required by the cultural relics authority, the Project's Owner will need to make necessary design changes to accommodate the request and preserve the site;
- Decisions concerning the management of the finding shall be communicated in writing by relevant authorities;

7.4. Mitigation Measures to be Implemented in Operation Phase

As discussed in Section 7.1, number of potential impacts that risks that may happen in operation phase has been considered during project preparation phase. Therefore, the Project Proposals already includes the measures to address some potential impacts and risks during operation phase, together with environmental friendly solutions and greening opportunity. The costs associated with the mitigation measures, as far as possible, has been included in the total Project cost estimation. Meanwhile, some of the mitigation measures will be detailed in detailed engineering design and construction drawings.

The Sections below only discussed about the measures to be implemented during operation phase of the WWTP to address the potential impacts and risks associated with the WWTP operations.

7.4.1 Wastes Management

The sludge generated from the wastewater treatment plant is be classified as biological sludge (biosolids).When the wastewater treatment plant is operated at capacity of 20,000 m^3/day, the forecast volume sludge generated is 1,142kg/day. The sludge in the form of dry cake will be contained in the store with the roof within the sludge drying unit. The BIWASE will transport this volume of sludge to the South Binh Duong Solid Waste Treatment Complex for compost production or brick-making.

Municipal waste generated by the workers during the operation will be stored in 2 containers with capacity of 100 liters each and transported to the South Binh Duong Solid Waste Treatment Complex for treatment.

The WWTP Operator will register the source of hazardous waste with DONRE as required by MONRE Circular No. 36/2015/TT-BTNMT dated 30 June 2015. Hazardous waste will be contained in the barrels/contained house and labeled in accordance with current regulations. Packaging materials of the chemical will be returned to the supplier. All hazardous waste will be

transported to and disposed of at the South Binh Duong Solid Waste treatment Complex by licensed dealers.

7.4.2. Measures to Control Chemicals-Related Risks

The chemical used for wastewater treatment will be transported to the wastewater treatment plant in specialised means provided by the supplier. The chemical will be stored at the minimum volume in the store within the WWTP, suitable with the production plan. The procedures for storage and usage of the chemicals will be as instructed by the manufacturer.

The operators of the wastewater treatment plant will be trained on occupational health, safety and environment before started working. When being in contact with chemical, the workers will be required to wear the personal safety instruments such as mask, glass, gloves. First aid kits must be provided at the WWTP office, regularly checked and refilled..

7.4.3. Measures to Minimise System Failure Risks

The Workers shall be required to strictly follow the Operational and Maintenance Procedure of the WWTP. A standby generator for the wastewater treatment plant will be included at the WWTP for use in case of electric cut-off. The generator is equipped with the capacity of 480 kVA.

Standby equipment and spare parts will be included, such as pumping machines, air blowers at the intake and ASBR work.

Regularly monitor of the treatment system. Use standby equipment or spare parts in case of system failure, if and when possible.

In the worst case where microorganism are death in the ASBR work, untreated wastewater at the intake will be collected and stored in ten hours for fixing up. During that period, the company will use the similar microorganism from other wastewater treatment plants in Thu Dau Mot and Thuan An to support and restore the microorganism. It is estimated that 6 to 8 hours would be needed for fixing up this problem.

8. ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN

The Environmental and Social Management Plan (ESMP) is prepared to propose implementation arrangements for minimising the potential impacts of the Project, determining monitoring and supervising requirements, identify capacity building needs and budgeting.

The ESMP include the following key contents:

- Summary of the Project's potential impacts, mitigation measures, cost and timing for the implementation of the mitigation measures, implementation and monitoring responsibilities
- Descriptions on the institutional arrangements for environmental mitigation, monitoring and reporting, and supervision
- Environmental monitoring program and cost estimation
- Capacity building and training

Summary of the Environmental and Social Management Plan is summarised in Table 8.1.

Institutional Arrangements for ESMP implementation is discussed in Section 8.1 below.

Table 8-8 Summary on Project Social and Environmental Management Plan, Preparation Phase

No.	Project activities	Social and Environmental impacts	Mitigation Measures	Implementation Cost	Timing	Implemented by	Monitoring by
1	Land acquisition, site clearance	24/57HHaffected by land acquisition will be relocated; 03 companies, 05 organizations partly affected by land acquisition for pumping stations	Compensation in accordance with RAP, including compensate for land at market price; Provide resettlement supports;	Included in total Project Cost (using counterpart fund)	Before construction commencement	Di An Town Compensation and Site Clearance Committee (CSCC)	PMU, Supervision Consultant WB
		Reduced green space	Greening the landscape along Lo O and Cai Cau streams 10 m wide green corridor wide canopy around the fence of the WWTP	Included in total Project Cost (estimated at 2 billions VND)	To be completed when the stream are rehabilitated, the WWTP are built	Contractor, under the Contract with the Project Owner	PMU, Supervision Consultant WB
2	Demolition and ground levelling	Dust, noise	Use equipment with low noise Avoid demolition during 10 pm and 6 am Cover trucks Apply speed limits at 40km/h or less Turn engine off when parking	included in the Project Cost	1 week, when demolition takes place	Contractor, under the Contract with the Project Owner	PMU Di An CSCC

No.	Project activities	Social and Environmental impacts	Mitigation Measures	Implementation Cost	Timing	Implemented by	Monitoring by
		Waste generation	Inform affected HH one week in advance Recycle, reuse where possible Contract licensed dealers to transport the wastes to the Treatment Complex	included in the Project Cost	1 to 2 weeks	Contractor, under the Contract with the Project Owner	PMU Di An CSCC
		Interrupted existing services	Coordinate with service management authorities for relocation/power cut off. Use trucks under load limits	No cost involved	One to a few days	Relevant operation/ management authorities	PMU Di An CSCC
		Risk related to Unexploded materials	Contract specialised force in Bình Dương army to carry out UXO clearance before levelling takes place.	560,000 Millions VND, included in the Project costs	Completed before construction commencement	Provincial Military Staff Committee	PMU Local authority

Table 8-12 Summary on Project Social and Environmental Management Plan, Construction Phase

No.	Project activities	Social & Environmental impacts	Mitigation Measures	Implementation Cost	Timing	Implemented by	Monitoring by
1	Construction, activities: Mobilisation of workers and construction plants transport construction materials and equipment to the sites Levelling excavation, backfilling transport and disposal of construction waste Dredging at the existing streams	Dust; Exhaust gas from construction plant site, noise and vibration	Only use equipment meet **TCVN 6438-2005** Cover trucks Cover, fence off temporary storage area Apply speed limits at 40 km/h or less Arrange truck washing area at entrance Avoid construction at night time and sensitive hours at sites near schools, health care centres etc.	Cost will be included in the construction contract amount	To be implemented and completed during construction phase	Contractor, under the Contract with the Employer.	PMU, Construction Supervisors, Local authority, MONRE
2		Water pollution, sedimentation risks	Stabilise excavated, filling areas Transport materials and wastes away earliest possible Build sedimentation traps in WWTP, clean up regularly Do not load materials near water bodies Arrange truck washing area and sedimentation tank at entrance Use Larsen sheet pile in trenches > 3 m deep Maintain flow at T4 and Cai Cau Excavate in accordance with design				

No.	Project activities	Social & Environmental impacts	Mitigation Measures	Implementation Cost	Timing	Implemented by	Monitoring by
3		Waste generation	Recycle and reuse Dispose waste and designated sites approved by CSC Reinstate the site before completion Manage waste in accordance with GOV Decrees 59/2007/NĐ-CP dated 09/04/2007 38/2015/NĐ-CP dated 24/04/2015 Collect and transport wasted oil to the Treatment Complex				
4		Traffic disturbance and increased traffic safety risks	Install sign boards and fences Apply speed limits Cover trucks Avoid parking trucks on road Arrange staff to direct traffic near schools and markets Carry out construction in stages and maintain road surface for transport where possible				
5		Damages to existing infrastructures and interrupt existing services	Coordinate with relevant agencies. Use trucks within load limits Contractor repair, reinstate damaged roads and bridges Arrange staff to direct drivers to avoid damages to eletrical lines Reinstate road surface and foot path				

No.	Project activities	Social & Environmental impacts	Mitigation Measures	Implementation Cost	Timing	Implemented by	Monitoring by
6		Social disturbance and impacts	Use trucks within load limits Contractor repair, reinstate damaged roads and bridges Train workers on Environmental. Health and Safety Install information borads at the construction sites with names and phone number of Site Engineer Inform communities about construction schedule and interruptions of services Avoid construction at night time other inform communities in advance Carry out construction in stages Reinstate road surface within 24 hours Maintain temporary access on open channels				
7		Healthy and Safety risks	Provide first aid kits				

No.	Project activities	Social & Environmental impacts	Mitigation Measures	Implementation Cost	Timing	Implemented by	Monitoring by
8		Environmental Hazard risks	Follow emergency procedures if hazard happens				
9		Influence to historical cultural works	Schedule construction to avoid festivals and religious events Implement construction in sgates Clean up the areas near historical cultural works regularly, transport waste away as soon as possible				

Table 8-23 Summary on Project Social and Environmental Management Plan, Operation Phase

Social and Environmental impacts	Mitigation Measures	Implementation Cost	Timing	Implemented by	Monitoring by
Impacts on carrying capacity of receiving water body	Rehabilitate, improve wet cross section of Cai Cau stream	Included in Project Proposal and Cost Estimation	Detail Design Construction	Detail Design consultant Contractor	PMU MONRE
Gases and Odor Emission	Odour Treatment Unit included in the design and cost estimation of the WWTP The units generating the most odor will be contained, the gases will be collected and treated	Included in Project Proposal and Cost Estimation	Detail Design Construction	Detail Design consultant Contractor	PMU MONRE
Operators Health and Safety Issues	Measures included in the Plant Operational Manuals Provide training and protective cloths Health and Safety	Included in operational Cost of the WWTP	Before Commissioning	WWTP Plant Owner	MONRE/ DONRE, Relevant authorities
Sludge Generation	Collect and transport to South Binh Duong Treatment Complex for	Included in operational Cost of the WWTP	Operation phase	WWTP Plant Operators	
System failure risks	Use bacteria from other WWTP in Binh Duong to fix	Included in operational Cost of the WWTP	Within 8 hours	WWTP Plant Operators, in coordination with other WWTPs in Binh Duong	

8.1 Implementation Arrangements

8.1.1 Implementation Procedures

The stakeholders involves in the environmental management in the subproject including the Project Management Unit (PMU) established under the Binh Duong Water Supply, Sewerage and Environment Co., Ltd (BIWASE), the Project Owner, detail design consultant, the contractors, construction supervision consultants, MONRE/DONRE, local authority and communities. The roles and responsibilities of each stakeholder are different from each other, and varied from time to time.

To ensure effective implementation of the ESMP, the following actions will be carried out during the implementation of the subproject:

a) During detailed design and bidding document preparation:

During the detailed engineering design and preparation of technical specifications, construction bidding and contract documents for each bid package, the detail design consultant will incorporate into these bidding and contractual documents the parts of the ESMP specific to that contract as well as the specific measures recommended in the ESMP.

During the preparation of bidding and contract documents, PMU will make effort to ensure that the contractors are aware of the environmental safeguard obligations and Project Owner's commitment to comply. Environmental and social specifications must be included in the bidding and contractual documents

b) During pre-construction and construction phase

PMU will assign the Construction Supervision Consultant (CSC) and/or field engineer to be responsible for supervision of safeguard performance of contractor on a daily basis. A generic Terms of Reference (TOR) is provided in Appendix of this ESMP. The CSC and/or field engineers will carry out, but not limited to, the following tasks:

- Before the commencement of the construction, confirm that all compensation for land and facilities are provided and relocation and/or land acquisition/donation has been completed.

- Review and approve Site Environmental and Social Management Plan (SESMP) to be prepared by contractor before the commencement of the construction.

- Closely supervise the implementation of the ESMP throughout the construction period.

- Confirm the compliance with the agreed environmental plan and inspect any damages incurred by the contractor. If necessary, prepare an order to compensate/restore the construction sites as specified in the contracts. Contractor safeguard performance will be included in the subproject progress report.

8.1.2 Roles and Responsibilities

The role and responsibilities of relevant parties in the implementation of ESMP are described in Table 8-4 below:

Table 8-34Roles and Responsibility Summary

Role	Task
(BIWASE)	• BIWASE will be responsible for overseeing the project implementation including ESMP implementation and environmental performance of the project.
PMU	• The PMU will be responsible for monitoring the subproject implementation, including environmental compliance of the project. PMU will have the final responsibility for ESMP implementation and environmental performance of the subproject during both the construction and operational phases. • The PMU is responsible for fostering effective coordination and cooperation between contractor, local authorities, and local communities during construction phase. PMU will be assisted by the environmental staff, and CSC/or field engineer. • Specifically PMU will: i) closely coordinate with local authorities in the participation of the community during subproject detail engineering and construction phase; ii) monitor and supervise ESMP implementation including incorporation of ESMP into the detailed designs, bidding and contractual documents; iii) ensure that an environmental management system is set up and functions properly; iv) be in charge of reporting on ESMP implementation to MONRE and the World Bank. • PMU will assign at least an environmental staff to monitor the environmental aspects of the project.
PMU Environmental Officer	• PMU Environmental Officer will be responsible for monitoring the implementation of the Project's ESMP all stages and process of the subproject. Specifically, he/she will be responsible for: i) reviewing the SESMPs prepared by the contractors to ensure that they follow the project ESMP and meet the government and the Bank requirements; She/he will also carry out rapid review of quarry sites that the contractors proposed to use raw materials from and assess the compliance to Vietnamese environmental legislations of the mentioned quarries; ii) helping PMU/Detail design consultants to incorporate ESMP clauses into the detailed designs and construction bidding and contractual documents; iii) help PMU incorporate responsibilities for ESMP monitoring and supervision into the TORs, bidding and contractual documents for CSC; iv) provide relevant inputs to the consultant selection process; v) reviewing reports submitted by the CSC; vi) conducting periodical; site checks; vii) advising PMU on the solutions to environmental issues of the project; and viii) prepare environmental performance section on the progress and review reports to be submitted to PMU, the Bank, and the local authorities if requested.
Detailed Design Consultant	• Interlock the environmental impact mitigation measures, the environmentally-friendly solutions into the design documents, cost estimate, tender documents, construction supervision contract and other relevant documents of the project
Contractor	• Based on the approved ESMP and environmental specifications/ requirements in the bidding and contractual documents, the Contractor is responsible for establishing a site-specific ESMP for each construction area, submit the plan to the PMU and CSC for review and approval before commencement of construction. In addition, it is required that the Contractor get all permissions for construction (traffic control and diversion, excavation, labor safety, etc. before civil works) following current regulations.

Role	Task
	• Based on the approved ESMP and environmental specifications/ requirements in the bidding and contractual documents, the Contractor is responsible for establishing a site-specific ESMP for each construction area, submit the plan to the PMU and CSC for review and approval before commencement of construction. In addition, it is required that the Contractor get all permissions for construction (traffic control and diversion, excavation, labor safety, etc. before civil works) following current regulations. • The contractor is required to appoint a competent individual as the contractor's site Safety and Environment Officer (SEO) who will be responsible for monitoring the contractor's compliance with the ESMP requirements and the environmental specifications. • Take actions to mitigate all potential negative impacts in line with the objective described in the ESMP. • Actively communicate with local residents and take actions to prevent disturbance during construction. • Ensure that all staff and workers understand the procedure and their tasks in the environmental management program. • Report to the PMU on any difficulties and their solutions. • Report to local authority and PMU if environmental accidents occur and coordinate with agencies and keys stakeholders to resolve these issues.
Construction Supervision Consultant	• The CSC will be responsible for checking and approving documents submitted by the Contractor related to environment, safety and health • Guide the Contractor to carry out the corrective actions when pollution levels exceed limit, in case of complaints or claims from local people, in case of emergencies or unforeseen cases in the construction stage • The CSC shall arrange for periodical Environmental quality monitoring specified in the Project ESIA/ESMP report • The CSC will be responsible for routine supervising and monitoring all construction activities and for ensuring that Contractors comply with the requirements of the contracts and the ESMP. The CSC shall supervise the compliance of the Contractor's ESMP and prepare the monthly report, evaluate the implementation results and propose the supplementary mitigation measures if necessary • The CSC shall engage sufficient number of qualified staff (e.g. Environmental Engineers) with adequate knowledge on environmental protection and construction project management to perform the required duties and to supervise the Contractor's performance. • The CSC also assists PMU in reporting and maintaining close coordination with the local community.
Local Community	• According to Vietnamese practice, the community has the right and responsibility to routinely monitor environmental performance during construction to ensure that their rights and safety are adequately protected and that the mitigation measures are effectively implemented by contractors and the PMU. In case of unexpected problems, they will report to CSC/PMU.
MONRE	• Periodically check the project's environmental performance
DONRE	• Check the project's environmental performance, carry out inspections as and when required or invited

8.1.3Environmental Management Capacity of Project Owner

The Project Owner is Binh Duong Water Supply, Sewerage and Environment Co., Ltd (BIWASE), The PMU has been established and operated under the VUWWP Parent Project. PMU includes the board of managers and five technical divisions with specific functions and tasks. The PMU's model is established based on the model implemented in previous ODA projects in which environmental and safety management function is adhered to the technical divisions. The model has been proved to be effective.

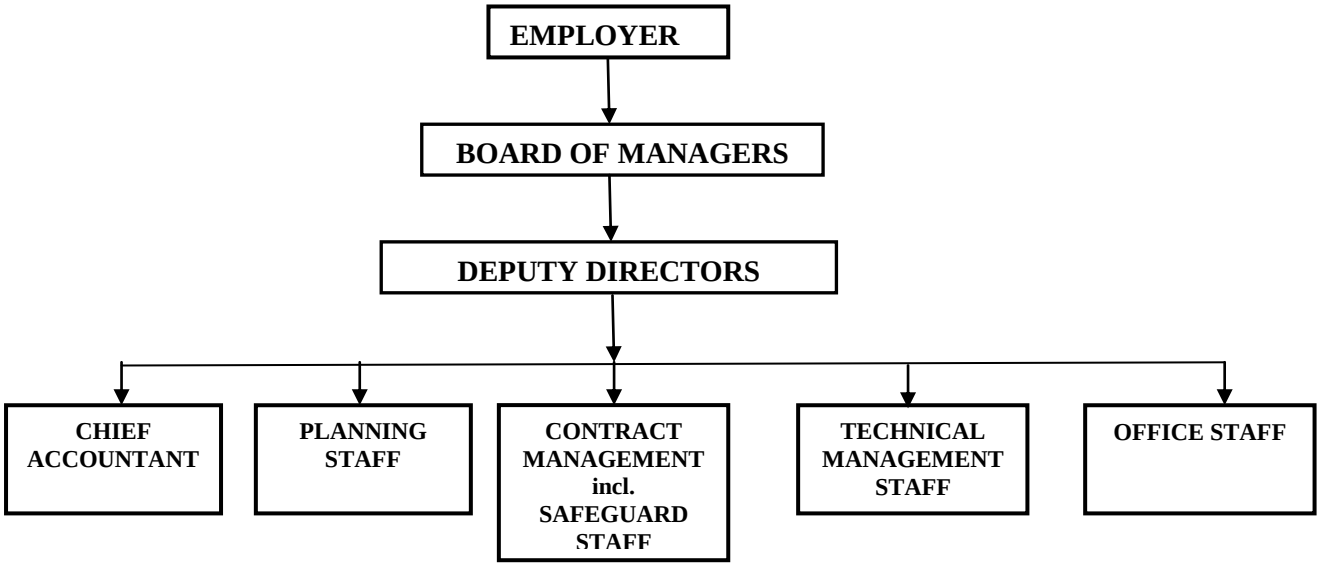


Figure 8-1-1PMU Organization Chart

The PMU has experience to successfully mange the implementation of several projects similar to the proposed additional financing project, typically:

- The South Binh Duong Water Environment Improvement Project in Thu Dau Mot. Thu Dau Mot wastewater treatment plant was constructed and put into operation in May 2013. Currently the WWTP has been being operated stably cat capacity 8,000 m^3/day.

- The South Binh Duong Water Environment Improvement Project in Thuan An. The construction of the WWTP the capacity 17,000m^3/day in phase 1 was started in March 2015.

- Water supply project for My Phuoc Industrial Park capacity of 30,000 m^3/day financed by the WB. The project was put into operation and running at full capacity of 30,000m3/day. Binh Duong PMU shown outstanding environmental safeguard management performance in the parent Project in which the contractor fully complied with environmental management requirements, environmental monitoring was conducted and reports was prepared regularly. Therefore, it is expected that the PMU will continue to apply good practice in managing environmental issues of the proposed additional finance project.

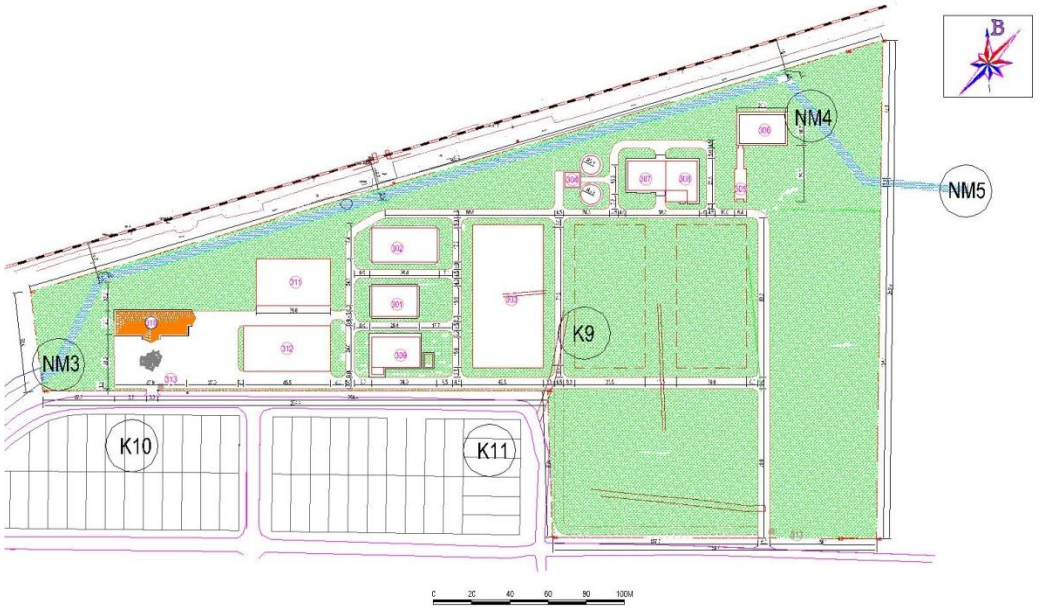
8.2. Environmental Monitoring Program

8.2.1. Monitoring Plan

Table 8-45Environmental Monitoring Plan

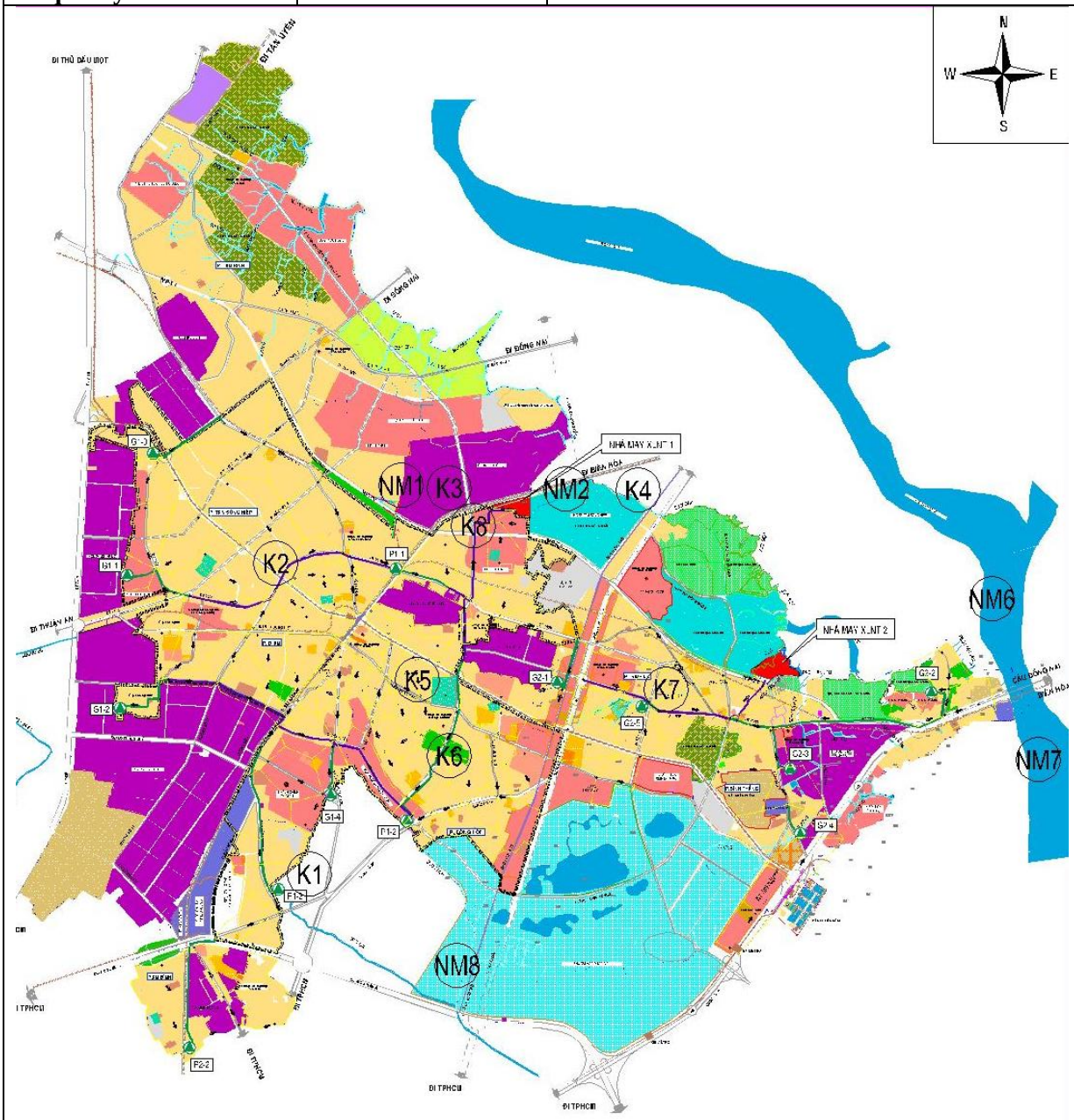
Parameter and frequency	Comparable standard	Monitoring location
CONSTRUCTION PHASE		
A. Air Quality		
Noise, dust, CO, SO_2, NO_x Frequency: every 3 months	QCVN 26:2010/ BTNMT, QCVN 05:2013/BTNMT	K1: Pumping station 3 K2: Construction area of sewer lines on DT743 st. K3: Construction area of sewer lines in T4 canal K4: Construction area of drains in Cai Cau K5: Construction area of drains Tran Hung Dao st. K6: Construction area of sewer lines in T5B canal K7: Construction area in Lo O stream
Noise, dust, CO, SO_2, NO_x, H_2S, NH_3, VOC Frequency: every 6 months	QCVN 26:2010/ BTNMT, QCVN 05:2013/BTNMT	K8: Cross-road area into WWTP K9: Area of WWTP K10: Dong An residential area adjacent to the plant (at the gate of Tan Dong Hiep industrial park) K11: Area of Dong An residential area adjacent to the plant (at the end of the plant)

Figure 8-1-2 –Air Quality Sampling Locations, Construction Stage (K1, K2, K3, K4, K5, K6, K7, K8, NM1, NM2, NM6, NM7, and NM8)



Parameter and frequency	**Comparable standard**	**Monitoring location**
. **Figure 8-1-3. Air Quality Sampling Locations, Construction stage (K9, K10, K11, NM3, NM4, and NM5)** 		
B. Surface Water Quality		
Temperature, pH, DO, COD, BOD_5, SS, mineral oil and grease, ammoniac, nitrate, nitrite, total coliform. Frequency: 3 months/once.	Comparable standard: QCVN 08:2009/BTNMT	NM1: Construction area in T4 canal; NM2: Construction area in Cai Cau ditch; NM3: Sewer at Dong An residential area into T4 canal NM4: T4 canal is an expected location to discharge wastewater at Tan Dong Hiep wastewater treatment station. NM5: Confluent of T4 canal and Cai Cau stream NM6: In Dong Nai river, far away from 100m towards the upstream of a confluence between Tan Van ditch and Dong Nai river NM7: In Dong Nai river, far away from 100m towards the downstream of a confluence between Tan Van ditch and Dong Nai river NM8: The area between Nhum stream and the contiguous area to Ho Chi Minh City

Parameter and frequency	Comparable standard	Monitoring location



. Figure 8-1-4. Surface Water Quality Sampling Locations – Construction Phase

C- Monitoring Flooding Frequency and Depth

Table 8-56 Monitoring at locations frequently flooded after rains in construction stage

No.	Flooding routes, locations	Start point-end point	Length (m)
I	**Binh Thang Ward**		
1	30/4 street	Border between the National University and NH 1A	800
2	Drain of civil group 12	Road of civil group 9, Ngai Thang Ward –District 9	200
3	Area of civil group 11, Hiep Thang	Border of the national historical cultural monument, Long Binh Ward, District 9	100
4	ĐT.743A	Binh Thanh oil station - Trung Thang crossroad	100
II	**Binh An Ward**		
5	NH 1K	Crossroad between Lo O stream and No Hoa market	400
6	NH 1K	Ngoc Hue petrol station, border between Di An & Bien Hoa	500
7	Road group 6, Binh Thang 1 Ward	At the mi dle of route	100
8	ĐT.743a (area of Lo O stream)	Road of inter-civil-group 23-27, Noi Hoa quarter - Lo O stream crossing ĐT.743A	100
9	ĐT.743a (Hung Thinh petrol station)	Binh An martyr gravestone –at the end of Hung Thinh petrol station	150
10	Binh Thung st.	European Foreign Language Center –Teen barber's shop	120
III	**Dong Hoa Ward**		
11	Tran Hung Dao street	Dong Hoa petrol station –the crossroad between Tran Hung Dao - Tran Quang Khai	400
12	Tran Hung Dao st.	Cay Da De street and Mr. Tran Ngoc Giao's house	100
13	Area of civil group 6, Tan Hoa quarter	National University and National Highway No. 1A	Civil group 6
IV	**Di An Ward**		
14	Some routes in the administrative central area	Pho Xanh coffee shop	
15	Xom Ga street	The rear gate of Kim Thien pagoda - Truong Hoc street	
16	Xom Duong St.	Contiguous to Xom Duong – north-south railway	
17	Song Than trade residential area	Street No. 2, Song Than trade residential area, civil groups 31, 32, 33, Nhi Dong quarter and streets No. 2, 4, 6, Linh Chieu ward, Thu Duc district	
IV	**Tan Dong Hiep ward**		
18	ĐT.743b	Entrance ->- at the end of border of America Home Company	1 0
19	ĐT.743a	Hoa Hong kindergarten - Do Tan Phong street	200
20	ĐT.743a	The police office of Tan Dong Hiep ward–Notary Public's Office No. 17	150
21	Nguyen Thi Minh Khai street	Chie Lieu intersection	50
22		Tan Long crossroad	50
23		Phuoc Thanh Bl ck Beer	50

24	Doan Thi Kia street	ĐT.743a (Ong Xa crossroad)- market area	400	
25	Chieu Lieu street	Nam Hai Company–In front of Mr. Chin Bich's house	150	
VI	**An Binh ward**			
26	Di An street - BinhDuong	Di An Market 2 - crossroad between and Ba Giang b idge	800	
27	Dinh Binh Duong street	Frontage road at the abutment of Song Than flyover -Gio Bay bridge	980	
28	An Binh street	Frontage road at the abutment of Song Than flyover - Tran Thi Vung street	800	

Monitoring compliance of quarries used by the contractors: compliance monitoring will be carried out once by PMU Environmental Officer, as soon as the contractor submit proposals on sources of raw maerials and before construction commencement;

OPERATION STAGE		
A. Air Quality		
Temperature, Noise, dust, NH_3, H_2S, CH_4 Frequency: 6 months/once	QCVN 26:2010/BTNMT, QCVN 05:2013/BTNMT and QCVN 06:2009/BTNMT	K1: WWTP K2: Area of Dong An residential area adjacent to the plant (at the gate of Tan Dong Hiep industrial park) K3: Area of Dong An residential area adjacent to the plant (at the end of the plant)
B. Surface water quality		
pH, DO, SS, BOD_5, COD, $N\text{-}NO_3^-$, $N\text{-}NH_4^+$, animal and vegetable oil and grease, Coliform Frequency: 6 months/once	QCVN 08:2008/BTNMT (A2)	NM1: Sewer at Dong An residential area into T4 canal NM2: T4 canal at the discharging point of WWTP NM3: Confluent of T4 canal and stream NM4: In Dong Nai river, far away from 100m towards the upstream of a confluence between Tan Van ditch and Dong Nai river NM5: In Dong Nai river, far away from 100m towards the downstream of a confluence between Tan Van ditch and Dong Nai river NM6: Cai Cau stream at the toll station on the national highway No. 1K
C. Monitoring of wastewater quality		
Temperature, pH, COD, BOD_5, SS, total N, total P, coliform, oil and grease, micro-organism density Frequency: 3 months/once	14:2009/BTNMT-Column A (K_q = 1.0).	T1: Inlet of WWTP T2: Outlet of WWTP
COD, pH, flow, EC, TSS	14:2009/BTNMT-Column A (K_q = 1.0)	Automatic Monitoring at outlet wastewater monitoring ditch

8.2.2 Cost estimate for the Environmental Monitoring

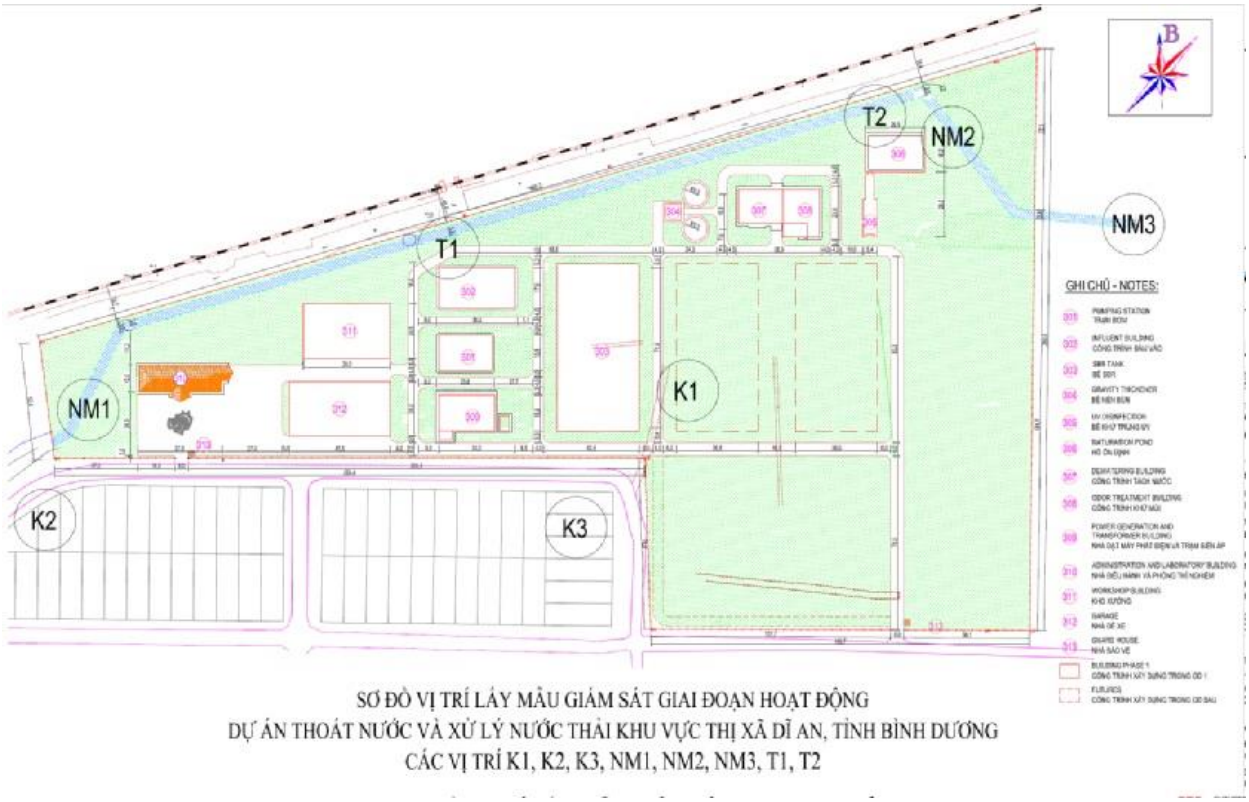
The cost estimate for the environmental monitoring program is based on the Decision No. 33/2015/QĐ-UBND promulgated by the Binh Duong Provincial People's Committee dated 31/08/2015 and in accordance with the quotation of the Center for Environmental Technology and Management (ETMC). The cost for the monitoring program is estimated in the following table:

Table 8-67 The cost estimate for the environmental monitoring

No.	Measurement indices	Unit price (VND)	Number of samples /year	Amount (VND)
CONSTRUCTION STAGE				
I. Air quality				62,013,304
1	Dust	162,586	36	5,853,096
2	SO_2	291,451	36	10,492,236
3	NO_2	291,160	36	10,481,760
4	CO	309,070	36	11,126,520
6	Noise	112,147	36	4,037,292
7	NH_3	251,400	8	2,011,200
8	H_2S	251,400	8	2,011,200
9	VOC	1,100,000	8	8,800,000
10	Labor cost for sampling	200,000	36	7,200,000
II. Monitoring for surface water quality				82,035,680
1	pH	40,951	32	1,310,432
2	COD	147,333	32	414,656
3	BOD_5	114,218	32	3,654,976
4	SS	162,459	32	5,198,688
5	DO	83,476	32	2,671,232
6	Mineral oil and grease	727,344	32	23,275,008
7	NH_4^-	180,026	32	5,760,832
9	Nitrate	205,359	32	6,571,488
10	Nitrite	232,357	32	7,435,424
11	Coliform	470,092	32	15,042,944
12	Labor cost for sampling	200,000	32	6,400,000
III. Cost for transporting the sampling equipment and sample maintenance		800,000đ/time	6	4,800,000
Total (construction stage)				148,848,984
OPERATION STAGE (ANNUALLY)				
No.	Measurement indices	Unit price (VND)	Number of measured samples /year	Amount (VND)
I. Air quality				15,750,396
1	Temperature	420000	420000	420,000
2	Dust	1951032	1951032	1,951,032
3	NH_3	3016800	3016800	3,016,800
4	H_2S	3016800	3016800	3,016,800
6	CH_4	3600000	3600000	3,600,000
7	Noise	1345764	1345764	1,345,764
8	Labor cost for sampling	2400000	2400000	2,400,000
II. Monitoring for surface water quality				27,975,096
1	pH	40,951	12	491,412
2	COD	147,333	12	1,767,996
3	BOD_5	114,218	12	1,370,616

No.	Measurement indices	Unit price (VND)	Number of samples /year	Amount (VND)
4	SS	162,459	12	1,949,508
5	DO	83,476	12	1,001,712
6	Oil and grease	727,344	12	8,728,128
7	NH_4^+	180,026	12	2,160,312
8	Nitrate	205,359	12	2,464,308
9	Coliform	470,092	12	5,641,104
10	Labor cost for sampling	200,000	12	2,400,000
III. Wastewater monitoring				22,014,368
1	pH	40,951	8	327,608
2	COD	205,533	8	1,644,264
3	BOD_5	172,418	8	1,379,344
4	SS	162,459	8	1,299,672
5	Oil and grease	727,344	8	5,818,752
6	NH_4^+	180,026	8	1,440,208
7	Total N	318,538	8	2,548,304
8	Total P	274,435	8	2,195,480
9	Coliform	470,092	8	3,760,736
10	Labor cost for sampling	200,000	8	1,600,000
IV. Cost for transporting the sampling equipment and sample maintenance		800,000đ/trip	4	3,200,000
Total (operation stage)				68,939,860

Figure 8-1-5.Air Quality Sampling Locations– operation stage (K1, K2, K3, NM1, NM2, NM3, T1, and T2)



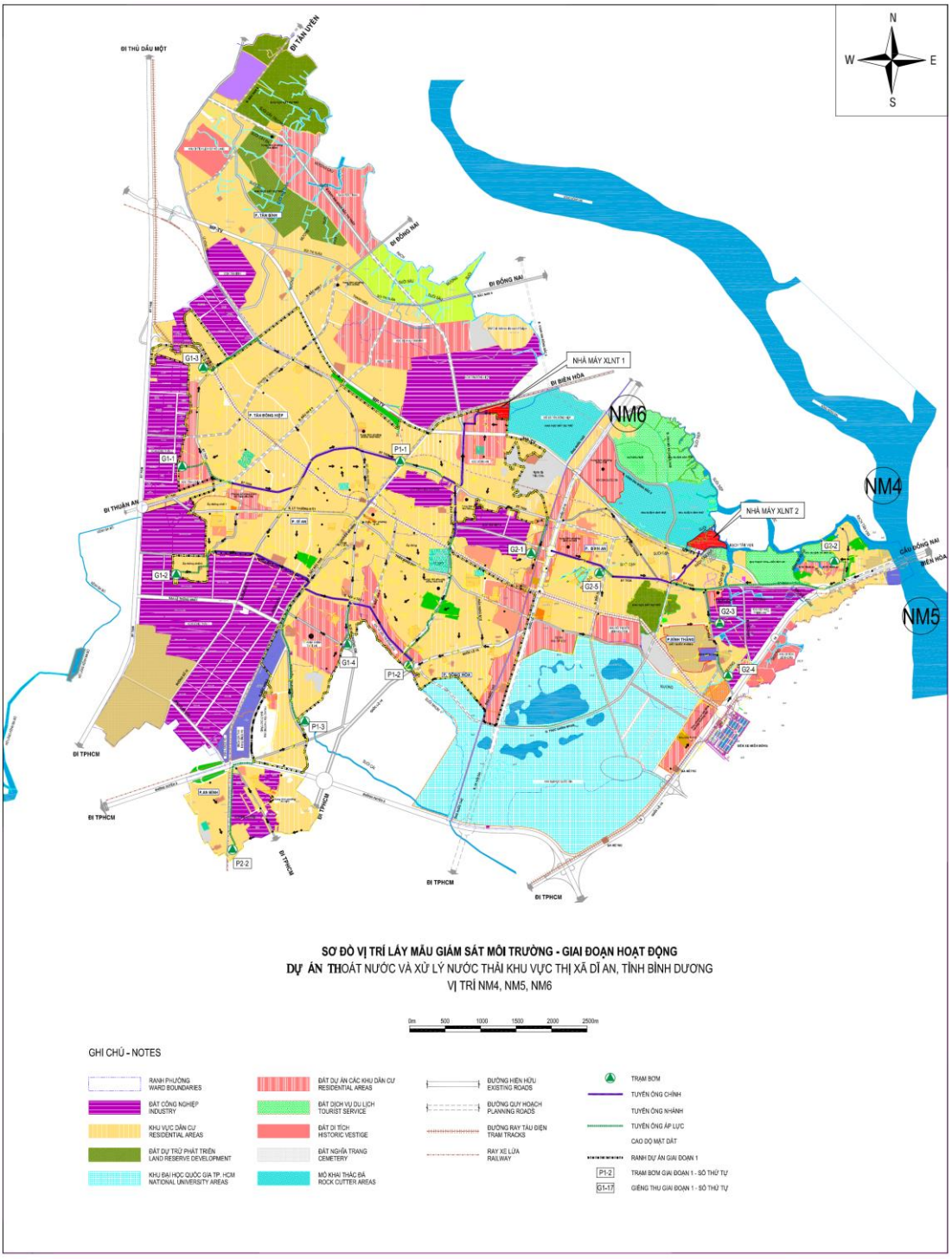


Figure 8-6. Surfacewater Sampling Locations– Operation stage (NM4, NM5, and NM6)

8.4. Reporting Requirements

In the construction stage, the Construction Supervision Consultant shall be responsible for preparing the environmental monitoring reports and the status of compliance for environmental impact mitigation measures. The environmental monitoring report shall be prepared in accordance with the monitoring plan. The supervision report on the Contractor's compliance shall be prepared monthly and interlocked in the construction supervision reports.

In case that the environmental impact mitigation measures are inappropriate to the existing conditions, the replacement measures shall be proposed and referred from the local environmental agencies' comments – Division of Natural Resources and Environment of Di An Town and the community. The below flow chart will show the feedback mechanism and revision.

8.5. Capacity Building for Environmental Management

The training course on the environmental issues is one of the activities for the project preparation, in order to support staffs, engineers, contractors, community, etc. to well implement the environmental monitoring work, effectively apply the mitigation measures and reporting methods.

The PMU has had much experience on the environmental management during the construction of the water plant in the stage 1. Therefore, the training course on the environmental issues will be performed by the PMU. The training program is presented in the following table:

Table 8-7~~8~~ Training program, qualification enhancement on the environmental awareness and management

Participating objects	Training course	Training contents	Implementing frequency	Source
Contractor: - The Contractor's representative shall be in charge of reporting works to the PMU.	- Mitigation measures to be implemented; - To periodically report.	- The brief description on the periodic supervision works; - Supervise the Contractor's tasks under the Contract; - Monthly report (or as per the request): content, object, supervision method, implementation of mitigation measures, determination of arisen issues and solutions, submission of reports, responsibility.	- Periodically as per request	Included in the construction supervision contract amount
Workers, staffs: - The Workers, staffs' representative shall be responsible	- Safety and environmental sanitation	- Social safety and environmental issues; - Workers, staffs' duties; - Safety control and environmental sanitation in works - Proposed mitigation measures; -Working safety and emergency prevention measures;	- Before and after the project completion	Cost for project operation

Participating objects	Training course	Training contents	Implementing frequency	Source
		- Countermeasures in case of emergencies.		
Community: - Leader/Deputy leader of civil group; - Community's representative for sensitive areas	- Monitor the site.	- Summary on general environmental supervision; - Community's duties; - Content and form of supervision ; - Recording methods at the site; - Receive, collect the claims of local people; - Summarize and report to PMU	- Immediately after the commencement of the project	Voluntary supervision

8.6. Total cost estimate

Table 8-89 Summary on the cost estimate for ESMP

No.	Item	Amount	Note
I. Cost for mitigation measures in the preparation stage			
1.1	Compensation, land acquisition and resettlement	11,330,000,000	Cost for compensation
1.2	Environmental impact mitigation measures and environmentally friendly solutions to be interlocked in design Cost for green trees: VND 2 billion Odor treatment work: VND 17,256,589,000	-	Included in the construction contract amount
II. Cost for mitigation measures in the construction stage			
2.1	Mine clearance	560,000,000	In the Project cost
2.2	Environmental impact mitigation measures in the preconstruction stage and the construction stage to be implemented (presented in the Clauses of the Construction Contract)	-	Included in the construction contract amount
III. Cost for mitigation measures in the operation stage			
3.1	Environmental mitigation	-	Included in operation cost
IV. Cost for environmental monitoring and supervision			
4.1	Environmental monitoring in the construction stage	148,848,984	Included in the construction contract amount
4.2	Supervision of the Contractor's environmental compliance	-	Included in the construction contract amount
4.3	Environmental monitoring in the operation stage	68,939,860	Including the cost for operation
V	Cost for training, qualification enhancement on environmental awareness and management	-	Included in the construction contract amount

8.6. Complaints Grievances

Agencies, permanent unit in the implementation process for settling complaints during compensation, support and land acquisition include: People's Committee of Binh Duong Province, the relevant departments, Council of compensation and resettlement and People's Committee of wards/communes in the affected area. Depending on the functions and tasks of each level, the complaint process of affected people will be adjusted according to the State Law.

Detailed process of the complaint process will be established for the project to ensure the opportunities of affected people to present their claims for compensation, support and resettlement. The objective is to resolve complaints quickly for affected people according to the process. This mechanism will be designed to be simple, straight forward, quick and reasonable method. Complaint process for each type of project will certainly help accelerate the process of project implementation. The affected people do not agree with the decision on compensation, support and resettlement, will be entitled to make claims based on the provisions of the law.

Complaint regulation based on decisions on compensation, support, land acquisition and resettlement, responsibility for claims reconciliation, the validity and the mediation process will be conducted based on Law on Complaint 02/2011/QH13 dated 11/11/2011, Decree No.75/2012/ND-CP dated 03/10/2012 of the Government on detailing a number of articles of the Law on Complaints and Law on Land in 2013.

However, while waiting for the mediation of complaints, affected people must follow the decision of land acquisition and handover land as scheduled and plans have been decided by by State agencies.

8.1 Complaint process

All inquiries and complaints of the affected households and displaced households about entitlements to compensation, support, policy and price of compensation, support and resettlement (if any) when land is recovered, resettlements and entitlements relating to recovery support program will be recorded and processed by functional units.

The social organizations locally as the Fatherland Front, Farmers' Association, Women's Union, Reconciliation,…are mobilized to participate actively in the process of settling complaints and inquiries from the displaced households by the project.

According to the complaint process, the affected people is not required to pay any administrative and legal fees. The steps of the complaint process is expressed as follows:

8.2 Grievances redress procedures include the following 4 steps:

Step 1: The complaint questions the affected people on the resettlement program, or the loss is not resolved will be moved to the People's Committee of commune in document or direct reflection. May discuss the questions in an informal meeting between the complainant and Chairman of ward/commune. People's Committee of communes/wards will take responsibility to solve the problem within 15 days of receiving their questions.

Step 2: If within 15 days of registering the complaint, did not agree or do not reconcile, or if the affected people does not get answered of People's Committee of ward/commune, they can complain to the Council of compensation, support and resettlement of Town. Inquiries should be addressed within 1 month from the date of the original complaint. Council of compensation, support and resettlement of Town must have decision within 1 month from receive complaints.

Step 3: If the affected people does not agree with the decision of the People's Committee of Town or the representative of the commitee, or the People's Committee of Town no reply within 1 month (30 days), the affected people can appeal to the People's Committee of Province. People's Committee of Province and representatives will make decisions within 1 month (30 days) from the date of receive complaints.

Step 4: If the affected people still disagrees with the decision of the People's Committee of Province or the Council of compensation, support and resettlement, or the People's Committee of Province has not answered in the time stipulated, then the affected people can appeal their case to the administrative court to be settled with under the law.

9. PUBLIC CONSULTATION AND DISCLOSURE

9.1. Public consultation

During establishment of the ESIA report, the consultant has been collaborating with the Project's Board of Management to carry out consultation with potential affected households. The consultation aims at updating mitigation measures of negative impacts of the project on the environment during construction period and operation period as well as proposing management plan of the negative impacts.

Binh Duong's Water Supply – Sewerage – Environment Company Limited has sent consultation dispatches to People's Committee and People's Council of Di An Ward, An Binh Ward, Tan Dong Hiep Ward, Tan Binh Ward, Dong Hoa Ward, Binh An Ward and Binh Thang Ward for advisory on making ESIA report of the project. People's Committee of the Wards has invited almost affected households, representative of the residential clusters and quarters and social associations attending the consultation meetings (meeting minutes are attached in the appendix).

Consultation meetings with affected households have been conducted from 22/9/2015 to 19/12/2015. Participants include representatives of People's Committee of the Wards in Di An Town, the investor, F/S consultant, ESIA consultant and affected households.

Each consultation meeting had been taken place in 3 hours. Contents of the consultation meetings had been informed to participants including: i) Brief introduction of the contents and benefits of the projects; ii) ESIA consultant presents briefly on potential negative impacts arising in construction and operation of the project as well as mitigation measures for those negative impacts; iii) Discussion on the project's contents and impacts of the project. Final section is conclusion and closing.

All the participants had agreed with the presented negative impacts on the environment of the project and proposed mitigation measures and whished for the project being carried out soon to help resolve the pressing issued of waste water and environmental hygiene of the community. The participants also requested the project's owner, Binh Duong's Water Supply – Sewerage – Environment Company Limited, complying with environmental protection measures during the implementation of the project had been presented by the ESIA consultant. Details of community's comments and feedbacks of the Investor are briefly introduced in below table:

Table 9-1Synthesize public consultation results

Date, time, location	Participant/gender/ethnic	Community's comments	Feedback from Project's Board of Management and Consultant
22/09/2015 14h, Tan Binh Ward	-Participant: Representative of People's Committee of the Ward, local institutions, social associations and community in the Ward - Number of participants: 56 people - Ethnic minority: none	- Highly appreciated with the implementation of the project. Many areas in the Ward are lack of drainage system leading to partial flooding. Domestic waste water generated from lodging houses is penetrated into the soil or flowed over the roads' surface affecting badly on the environment. Request the project to construct sewer system and drainage system to mitigate the partial flooding and pollution in the area.	
		- Request the investor to implement mitigation measures to reduce impacts of dust, noise, traffic congestion on households living on the roads of construction routes of the project.	- The investor will request construction contractors to commit all the construction vehicle and machines qualifying technical and safety requirements as being regulated before taking into operation. Any violation arising during the construction, the contractors will be punished and the contract will be cancelled if the contractor breaks the rules more than 3 times and replaced by another contractor. - During the construction, the investor will request the contractors assign at least 2 people to collaborate with the Ward regulating the traffic in peak hours; place sign boards, signal lamp as being regulated (the lamp will be lightened from 6 pm to 5 45' am).

		- The Ward is lowland area in Di An Town receiving rain water and waste water from An Phu Ward and Thuan Giao Ward of Thuan An Town so the community request for a pumping station to collect waste water to the WWTP in Tan Dong Hiep Ward to increase the percentage of the collection of households to higher than suggested in the project.	- The company will ask the People's Committee of the Province for addition of 01 pump station and increase the percentage of collection of waste water in the Ward and report to the community.
22/9/2015 8h30 Dong Hoa Ward	-Participant: Representative of People's Committee of the Ward, local institutions, social associations and community in the Ward - Number of participants: 65 people - Ethnic minority: none	- Local waste water in the Ward is almost penetrated into the soil affecting badly on the environment. Therefore the community agree with the construction of the sewer system in the area to improve environment quality and reduce surface water pollution. - Surrounding area of Tran Hung Dao Street is often flooded especially in heavy rain days. The community request the investor to carry out the construction of drainage system on Tran Hung Dao Street and T5B canal to reduce flooding. - Topography of the Ward is lower than that of Tan Dong Hiep area so the community wonder how the waste water in the Ward can be collected to the WWTP in Tan Dong Hiep Street. - Request the investor to implement mitigation measures to reduce impacts of dust, noise, traffic congestion on households living on the roads of the construction .	- Waste water from lowland areas will be collected to pumping stations and pumped to WWTP. There will be a pump station placed at opposite side to Big C super market in Dong Hoa Ward. - During the construction, the investor will request the contractors assign at least 2 people to collaborate with the Ward regulating the traffic in peak hours; place sign boards, signal lamp as being regulated.
10/10/2015	-Participant: Representative	- Existing drainage system in the area is	- The project will construct new drainage on

8h30, Tan Dong Hiep Ward	of People's Committee of the Ward, local institutions, social associations and community in the Ward - Number of participants: 36 people - Ethnic minority: none	overloading, especially the drains in Dong An residential quarter due to Siep Stream receives rain water from residential areas and treated water from Industrial Parks and factories outside the Industrial Parks resulting in highly flood in the area. Therefore, the community request the investor to implement construction of drainage system on T4 canal and Siep canal as soon as possible. - Related to the construction's site of the WWTP in Dong An Quarter of Tan Dong Hiep Ward, the community want to know beside the land of the households within the boundary of the construction's site will be acquired, will the land of the households outside the boundary of the construction's site be reclaimed? - When the WWTP being taken into operation, delivery of residual sludge, solid waste and transportation of the workers will generate odor and air pollution affecting directly to local people in long term. The community request the investor to construct separate roads for delivery of the wastes that will not go through internal roads of Dong An residential area. - Roads on the construction route of the sewer system will be enlarged or not? Will the land of households living along sides of the sewer network be acquired? - When the WWTP is taken into operation,	T4 canal and dredge Siep Stream to reduce flooding in the area. - The project will only acquire land of 58 households inside the construction's site. Land of the households outside the construction's site will not be reclaimed. People's Committee of the Ward will discuss with affected households to get an agreement for compensation and assistance plan. - At the present, the project is planned to use existing roads in Dong An residential area for delivery of waste and materials of the project. The project's owner will ask the People's Committee of the Province for arrangement of the delivery roads for the project and inform to the People's Committee of the Ward to declare to the community. - Sewers will be constructed on the existing roadbeds so that the existing roads will not be enlarged. - The WWTP will install odor collection and treatment system as well as plant trees to isolate the WWTP with Dong An residential area. - The ground clearance will be carried out in the beginning of 2016 and the construction

		residences of Dong An residential area will be affected. Will the project's owner give any assistance to local people? - The community request the investor to public time of ground clearance and construction of the WWTP to the local people for preparation. - The investor has to commit to the People's Committee of the Ward and declare to the community on the fixation of the roads due to the delivery of soil, rock and materials of the project. - Request the investor to conduct consultation meetings and trainings for affected community during implementation of the project.	of the WWTP will be undertaken from January 2017 to June 2018. - The project's owner will commit to the People's Committee of the Ward and declare to the community on the fixation of the roads affected by delivery of soil, rock and materials of the project. - During the implementation of the project, the investor will conduct meeting with the community to get the comments of the community for different periods of the project including ground clearance period, before construction period and during construction period.
30/10/2015 Binh Thang Ward	-Participant: Representative of People's Committee of the Ward, local institutions, social associations and community in the Ward - Number of participants: 24 people - Ethnic minority: none	- The community is highly appreciated with construction of the project in the area of Di An Town in general and in Binh Thang Ward in particular, aiming at improving quality of water environment and reducing pollution of surface water in the area. - Request the investor to identify specifically location of pump stations in the Ward and declare to the community. - How the waste water in some areas of the Ward that are having no drainage and situating on lowland area will be collected? - Request for a sewer on the Ward going through National highway 1A one more	- The investor will collaborate with People's Committee of the Ward to select suitable positions for pump stations in order to minimize impacts on local people. The selected positions will be disclosed to the community. The investor will collaborate with People's Committee of the Ward to discuss with affected households to get an agreement for compensation and assistance plan. - Waste water from lowland areas will be collected to pumping stations and pumped to WWTP. - At the present, the project has not been designed to collect waste water on the other side of National Highway 1A. The project's

		pump station at the area.	owner will ask the People's Committee of the Province for arrangement of a collection network through National Highway 1A and addition of 01 pump station at the area and inform to the People's Committee of the Ward to declare to the community.
04/11/2015 Binh An Ward	-Participant: Representative of People's Committee of the Ward, local institutions, social associations and community in the Ward - Number of participants: 21people - Ethnic minority: none	- Is the chosen location for construction's site of the WWTP in the Ward suitable for collection of waste water of Binh An Ward and Binh Thang Ward? Why don't construct WWTP in Binh Thang Ward due to the fact that topography of Binh Thang Ward is much lower than that of Binh An Ward? Request the investor to examine some other places such as areas near Chau Thoi mountain. - The WWTP is situated in Binh An Ward that is higher than Binh Thang Ward so can not collect the waste water. - Request the investor to identify specifically location of pump stations in the Ward and declare to the community. - Siep Stream in Binh An Ward only is dredged for 200m without dredging for lower stream, can cause flooding for the area. - Public compensation price list and resettlement plan to the community as soon as the ground clearing plan is approved. - Request the investor to implement the	- At the present, Binh Thang Ward has no vacant land for construction of the WWTP. The anticipated site for WWTP in Binh An Ward is mostly agricultural land with a few households affected. The site shares borders with stone quarry to the North, My Phuoc Tan Van Street to the South, Logistic depot to the East so that the operation of the WWTP will affect insignificantly to surrounding areas. On the other hand, the WWTP in Binh An Ward will be implemented in phase II of the project so that the investor will continue to survey for some another places. - Due to the low altitude of Binh Thang Ward, the project will place 3 pump stations to deliver waste water to WWTP. - The constructions in Binh An Ward will be carried out in period of 2020-2030 so that the locations of pump stations will be disclosed to the community. - The project will dredge Siep Stream for about 200m long section in Binh An Ward, the lower stream section will be undertaken by Department of Agriculture and Rural Development.

		project as soon as possible.	- The investor will make the compensation price list and resettlement plan and inform to the People's Committee of the Ward to declare to the community as soon as the construction's site of the WWTP has been approved by the People's Committee of the Province.
17/11/2015 20h, An Binh Ward	-Participant: Representative of People's Committee of the Ward, residential quarters and community in the Ward - Number of participants: 20 people - Ethnic minority: none	- The community is highly appreciated with construction of the project in the area of Di An Town in general and in An Binh Ward in particular, aiming at improving quality of water environment and reducing pollution of surface water in the area. - The project will collect and treat waste water from households so will the people pay fee for that? - Will the project collect excrement beside domestic waste water? - How the progress of the project will be?	- The households discharging waste water into sewerage system of the project will have to pay fee for waste water treatment and maintenance of pump stations and pipeline system. However, fee for waste water treatment will be approved by People's Council of the Province and declared to the community. - The project will collect waste water including excrement. Waste water will not need to be treated by septic tank before discharged into collection system. - The project will be carried out from 2015 to 2019. Progress of the project will be disclosed to the public at the office of People's Committee of the Ward.
19/12/2015, 8h30, Di An Ward	-Participant: Representative of People's Committee of the Ward, residential quarters and community in the Ward - Number of participants: 45 people - Ethnic minority: none	- Local people support the implementation of domestic wastewater collection in Di An ward. - Is the wastewater collection sewer line be implemented in the ward as same as the clean water supply pipeline? - Do households contribute to carry out the	- The wastewater collection sewer line is arranged under the road bed, not as same as the clean water supply pipeline. - In the project, the local people shall not contribute. However, the project will be

		project? - Do the local people pay for wastewater treatment charge? - Does the sewer line construction on routes follow the implementation of mitigation measures as the presented report? - For households far way from the main sewer line, how is the collection implemented? The wastewater collection sewer lines have three (3) sewer lines: main sewer line, secondary sewer line and tertiary sewer line. The tertiary sewer line will be implemented in the alley of each household with connection boxes to connect the wastewater into these households.	financed by WB loan for implementation. - At current, for Thu Dau Mot city and Thuan An town, the wastewater collection and treatment system in Thu Dau Mot and Thuan An, Binh Duong was put into operation without wastewater treatment charge collection. However, in the future, it is expected Binh Duong provincial People's Committee will build the charge for local wastewater treatment. - For the sewer lines, the construction will be implemented installment and the road surface will be returned within the day.

9.2. Public disclosure

The Final Draft in English and Vietnamese versions of the Project ESIA has will be disclosed on the website of World Bank on 30 December 2015. The Vietnamese version of the ESIA has also been disclosed locally on 31 December 2015. Brief report of the Environmental Management Plant of the project in Vietnamese will also be published at the Wards in the project area before carrying out construction.

ANNEXES

Annex 1 – Legal documents

1.1 Binh Duong PPC Decision dated 23 April 2012approving the location of Di An WWTP

1.2 Di An CPC decision on land acquistion at the WWTP

1.3 Binh Duong PPC approval on budget allocation for buying land for resettlement site, December 2014

1.4 Binh Duong PPC approval on unit price of land for resettlement site, December 2014

1.5 Di An CPC approval on WWTP project site

1.6 Di An CPC approval on booster pumping stations location

1.7 MONRE's approval decision no. 296/QĐ-BTNMT dated 04/02/2016 approving ESIA of "Drainage and Wastewater system in Di An town-Binh Duong province"

1.1PPC approving the location of Di An WWTP, 23 April 2012

ỦY BAN NHÂN DÂN
TỈNH BÌNH DƯƠNG

Số: 1076/QĐ-UBND

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

Bình Dương, ngày 23 tháng 4 năm 2012

QUYẾT ĐỊNH

Về việc chấp thuận quy hoạch xây dựng Trạm xử lý nước thải sinh hoạt thuộc dự án Thoát nước và xử lý nước thải khu vực thị xã Dĩ An

CHỦ TỊCH ỦY BAN NHÂN DÂN TỈNH

Căn cứ Luật Tổ chức Hội đồng nhân dân và Ủy ban nhân dân ngày 26 tháng 11 năm 2003;

Căn cứ Nghị định 88/2007/NĐ-CP ngày 25/5/2007 của Chính phủ v/v Thoát nước đô thị và khu công nghiệp;

Căn cứ Nghị định số 12/2009/NĐ-CP ngày 10/02/2009 của Chính phủ về Quản lý dự án đầu tư xây dựng công trình, Nghị định 83/2009/NĐ-CP ngày 15/10/2009 của Chính phủ về sửa đổi, bổ sung một số điều của Nghị định số 12/2009/NĐ-CP;

Xét tờ trình số 572/TTr-SXD ngày 17/04/2012 của Sở Xây dựng Bình Dương,

QUYẾT ĐỊNH:

Điều 1. Chấp thuận quy hoạch xây dựng Trạm xử lý nước thải sinh hoạt thuộc dự án Thoát nước và xử lý nước thải khu vực thị xã Dĩ An, với nội dung sau:

1. Vị trí, địa điểm xây dựng: thuộc Khu phố Tân An - phường Tân Đông Hiệp - thị xã Dĩ An - tỉnh Bình Dương.

2. Quy mô diện tích: khoảng 6,2ha.

3. Ranh giới khu đất:

+ Phía Đông: giáp mỏ đá Công ty cổ phần Đầu tư Xây dựng 3/2.

+ Phía Tây: giáp đất dân.

+ Phía Nam: giáp đường sắt Bắc – Nam.

+ Phía Bắc: giáp Khu dân cư Đông An.

4. Mặt bằng vị trí được thể hiện trên bản vẽ tỷ lệ 1/1.000 đính kèm.

Điều 2. Công ty TNHH một thành viên Cấp thoát nước – Môi trường Bình Dương là Chủ đầu tư có trách nhiệm triển khai các bước tiếp theo đúng quy định hiện hành.

Điều 3. Chánh Văn phòng Ủy ban nhân dân tỉnh, Giám đốc các Sở: Xây dựng, Tài nguyên và Môi trường, Kế hoạch và Đầu tư, Tài chính; Chủ tịch UBND thị xã Dĩ An, Chủ tịch UBND phường Tân Đông Hiệp, Giám đốc Công ty TNHH một thành viên Cấp thoát nước – Môi trường Bình Dương chịu trách nhiệm thi hành Quyết định này, kể từ ngày ký./.

Nơi nhận:
- CT, PCT. UBND tỉnh;
- Như Điều 3;
- LĐVP,Km;
- Lưu: VT.

KT. CHỦ TỊCH
PHÓ CHỦ TỊCH

Trần Thanh Liêm

1.2 Di An town decision on land acquistion at the WWTP

ỦY BAN NHÂN DÂN
THỊ XÃ DĨ AN

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

Số: 140 /TB- UBND

Dĩ An, ngày 9 tháng 1 năm 2013

THÔNG BÁO

Về việc thu hồi đất để thực hiện việc bồi thường, giải phóng mặt bằng dự án: Xây dựng Trạm xử lý nước thải sinh hoạt thuộc dự án Thoát nước và xử lý nước thải khu vực thị xã Dĩ An, tỉnh Bình Dương.

Căn cứ Luật Đất đai ngày 26 tháng 11 năm 2003;

Căn cứ Nghị định số 69/2009/NĐ-CP ngày 13 tháng 8 năm 2009 của Chính phủ quy định bổ sung về quy hoạch sử dụng đất, giá đất, thu hồi đất, bồi thường, hỗ trợ và tái định cư;

Căn cứ Thông tư 14/2009/TT-BTNMT ngày 01 tháng 10 năm 2009 của Bộ Tài nguyên và Môi trường Quy định chi tiết về bồi thường, hỗ trợ, tái định cư và trình tự, thủ tục thu hồi đất, giao đất, cho thuê đất;

Căn cứ Quyết định số 87/2009/QĐ-UBND ngày 21 tháng 12 năm 2009 của UBND tỉnh Bình Dương về việc ban hành quy định về chính sách, trình tự, thủ tục bồi thường, hỗ trợ và tái định cư khi Nhà nước thu hồi đất trên địa bàn tỉnh Bình Dương;

Căn cứ Quyết định số 2536/QĐ- UBND ngày 23 tháng 8 năm 2010 của UBND tỉnh Bình Dương V/v ủy quyền cho Ủy ban nhân dân các huyện, thị ban hành thông báo thu hồi đất đối với các dự án triển khai trên địa bàn do huyện, thị quản lý;

Căn cứ Quyết định số 1076/QĐ-UBND ngày 23 tháng 4 năm 2012 của UBND tỉnh Bình Dương về việc chấp thuận quy hoạch xây dựng Trạm xử lý nước thải sinh hoạt thuộc dự án Thoát nước và xử lý nước thải khu vực thị xã Dĩ An, tỉnh Bình Dương.

Thực hiện chủ trương đầu tư dự án: Xây dựng Trạm xử lý nước thải sinh hoạt thuộc dự án Thoát nước và xử lý nước thải khu vực thị xã Dĩ An, tỉnh Bình Dương, để triển khai công tác bồi thường, giải phóng mặt bằng thực hiện dự án, Ủy ban nhân dân thị xã Dĩ An thông báo đến các hộ gia đình, cá nhân và tổ chức về địa điểm, phạm vi giải phóng mặt bằng của dự án như sau:

1) Địa điểm của dự án: khu phố Đông An, phường Tân Đông Hiệp, thị xã Dĩ An, tỉnh Bình Dương.

2) Diện tích và hiện trạng giải phóng mặt bằng:

Phần diện tích đất nằm trong dự án khoảng 6,2 ha thuộc phường Tân Đông Hiệp, thị xã Dĩ An, tỉnh Bình Dương.

Hiện trạng khu vực thực hiện dự án: là nhà ở các hộ dân, tổ chức và khu đất trống.

Đối tượng giải tỏa: Hộ gia đình, cá nhân và tổ chức có đất đai, nhà ở, các công trình xây dựng cơ bản, cây cối, hoa màu thuộc phạm vi giải phóng mặt bằng.

3) Chính sách bồi thường, hỗ trợ và tái định cư:

Thực hiện theo Nghị định số 69/2009/NĐ-CP ngày 13 tháng 8 năm 2009 của Chính phủ và Quyết định số 87/2009/QĐ- UBND ngày 21 tháng 12 năm 2009 của UBND tỉnh Bình Dương về việc ban hành quy định về chính sách, trình tự, thủ tục bồi thường, hỗ trợ và tái định cư khi Nhà nước thu hồi đất trên địa bàn tỉnh Bình Dương.

UBND thị xã thông báo đến các hộ gia đình, cá nhân về việc thu hồi đất để thực hiện dự án: Xây dựng Trạm xử lý nước thải sinh hoạt thuộc dự án Thoát nước và xử lý nước thải khu vực thị xã Dĩ An, tỉnh Bình Dương như trên./.

Nơi nhận:
- TTHU,HĐND;
- CT, các PCT;
- TTPTQĐ;
- UBND phường Tân Đông Hiệp;
- Lưu VT.

KT. CHỦ TỊCH
PHÓ CHỦ TỊCH

Võ Văn Giàu

1.3 PPC approval of budget allocation for buying land for resettlement site, December 2014

ỦY BAN NHÂN DÂN
TỈNH BÌNH DƯƠNG

Số: 3814/QĐ-UBND

CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

Bình Dương, ngày 31 tháng 12 năm 2014

QUYẾT ĐỊNH
Về việc phê duyệt kinh phí mua đất phục vụ tái định cư dự án Hệ thống thoát nước và xử lý nước thải khu vực Dĩ An

CHỦ TỊCH ỦY BAN NHÂN DÂN TỈNH

Căn cứ Luật Tổ chức Hội đồng nhân dân và Ủy ban nhân dân ngày 26/11/2003,

Căn cứ Luật Đất đai ngày 26/11/2013;

Căn cứ Nghị định số 47/2014/NĐ-CP ngày 15/5/2014 của Chính phủ quy định về bồi thường, hỗ trợ, tái định cư khi Nhà nước thu hồi đất;

Xét Tờ trình số 1429/TT-CTN.MT ngày 22/12/2014 của Công ty TNHH một thành viên Cấp thoát nước – Môi trường Bình Dương,

QUYẾT ĐỊNH:

Điều 1. Phê duyệt kinh phí mua đất phục vụ tái định cư dự án hệ thống thoát nước và xử lý nước thải khu vực Dĩ An, cụ thể như sau:

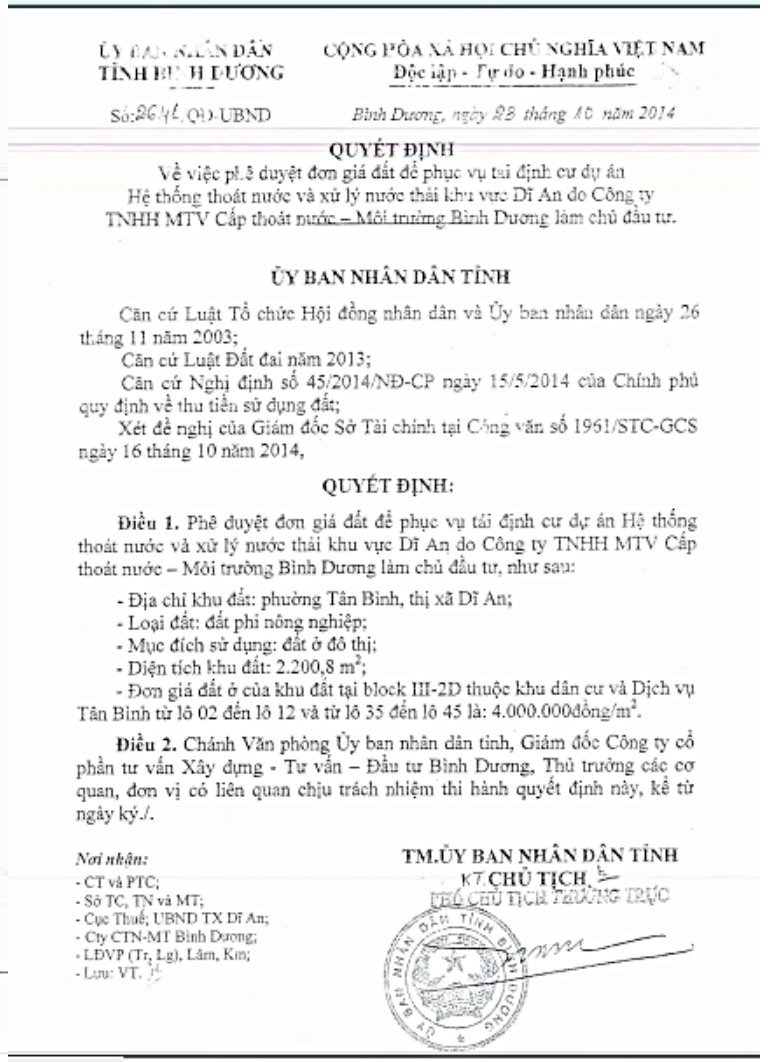
- Tổng diện tích nền tái định cư: 24 nền x 100 m^2 = 2.400,28 m^2 (có lô góc diện tích 100,28 m^2)
- Đơn giá 1 m^2 đất ở của khu đất theo quyết định số 2641/QĐ-UBND là: 4.000.000 đồng/m^2
- Tổng kinh phí mua đất phục vụ tái định cư: 2.400,28 m^2 x 4.000.000 đồng/m^2 = 9.601.120.000 đồng (Bằng chữ: Chín tỷ, sáu trăm lẻ một triệu, một trăm hai mươi ngàn đồng)
- Nguồn vốn: Vốn ngân sách tỉnh

Điều 2. Chánh Văn phòng Ủy ban nhân dân tỉnh, Giám đốc các Sở: Tài chính, Xây dựng, Kế hoạch và Đầu tư, Chủ tịch Ủy ban nhân dân thị xã Dĩ An, cùng Thủ trưởng các ban ngành có liên quan chịu trách nhiệm thi hành quyết định này, kể từ ngày ký./.

Nơi nhận:
- CT và PCT;
- Như điều 2;
- Cty CTN – MT Bình Dương;
- LĐVP, Km, TH;
- Lưu VT.

KT. CHỦ TỊCH
PHÓ CHỦ TỊCH THƯỜNG TRỰC

1.4 PPC approval of unit price of land for resettlement site, December 2014



ỦY BAN NHÂN DÂN
TỈNH BÌNH DƯƠNG

Số: 2641/QĐ-UBND

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

Bình Dương, ngày 28 tháng 10 năm 2014

QUYẾT ĐỊNH
Về việc phê duyệt đơn giá đất để phục vụ tái định cư dự án Hệ thống thoát nước và xử lý nước thải khu vực Dĩ An do Công ty TNHH MTV Cấp thoát nước – Môi trường Bình Dương làm chủ đầu tư.

ỦY BAN NHÂN DÂN TỈNH

Căn cứ Luật Tổ chức Hội đồng nhân dân và Ủy ban nhân dân ngày 26 tháng 11 năm 2003;

Căn cứ Luật Đất đai năm 2013;

Căn cứ Nghị định số 45/2014/NĐ-CP ngày 15/5/2014 của Chính phủ quy định về thu tiền sử dụng đất;

Xét đề nghị của Giám đốc Sở Tài chính tại Công văn số 1961/STC-GCS ngày 16 tháng 10 năm 2014,

QUYẾT ĐỊNH:

Điều 1. Phê duyệt đơn giá đất để phục vụ tái định cư dự án Hệ thống thoát nước và xử lý nước thải khu vực Dĩ An do Công ty TNHH MTV Cấp thoát nước – Môi trường Bình Dương làm chủ đầu tư, như sau:

- Địa chỉ khu đất: phường Tân Bình, thị xã Dĩ An;
- Loại đất: đất phi nông nghiệp;
- Mục đích sử dụng: đất ở đô thị;
- Diện tích khu đất: 2.200,8 m^2;
- Đơn giá đất ở của khu đất tại block III-2D thuộc khu dân cư và Dịch vụ Tân Bình từ lô 02 đến lô 12 và từ lô 35 đến lô 45 là: 4.000.000đồng/m^2.

Điều 2. Chánh Văn phòng Ủy ban nhân dân tỉnh, Giám đốc Công ty cổ phần tư vấn Xây dựng - Tư vấn – Đầu tư Bình Dương, Thủ trưởng các cơ quan, đơn vị có liên quan chịu trách nhiệm thi hành quyết định này, kể từ ngày ký./.

Nơi nhận:
- CT và PTC;
- Sở TC, TN và MT;
- Cục Thuế; UBND TX Dĩ An;
- Cty CTN-MT Bình Dương;
- LĐVP (Tr, Lg), Lâm, Km;
- Lưu: VT.

TM.ỦY BAN NHÂN DÂN TỈNH
KT. CHỦ TỊCH
PHÓ CHỦ TỊCH THƯỜNG TRỰC

1.5 Di An CPC approval of WWTP project site

ỦY BAN NHÂN DÂN
THỊ XÃ DĨ AN

Số :2522/UBND-QH

V/v Thống nhất vị trí xây dựng nhà máy xử lý nước thải trên địa bàn thị xã Dĩ An.

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

Dĩ An , ngày 28 tháng 8 năm 2015.

Kính gửi : Công ty TNHH Một thành viên Cấp thoát nước-Môi trường Bình Dương.

UBND thị xã Dĩ An có nhận Tờ trình số 1132/TT-CTN.MT ngày 21/8/2015 của Công ty TNHH MTV Cấp thoát nước-Môi trường Bình Dương về việc thuận chủ trương quy hoạch vị trí và công suất nhà máy xử lý nước thải tại thị xã Dĩ An.

Căn cứ địa hình thực tế, định hướng quy hoạch, phát triển kinh tế xã hội thị xã Dĩ An giai đoạn 2016-2020 và đề xuất của Công ty TNHH MTV Cấp thoát nước-Môi trường Bình Dương , Ủy ban nhân dân thị xã Dĩ An có ý kiến như sau:

- Thống nhất vị trí và quy mô dự kiến đặt 02 nhà máy xử lý nước thải thuộc địa bàn thị xã Dĩ An gồm:

1. Nhà máy số 01, tọa lạc khu phố Đông An, phường Tân Đông Hiệp với quy mô 6,8ha . Hiện đang triển khai công tác đo đạc, cắm mốc và lập phương án đền bù, đã được bố trí danh mục thu hồi đất năm 2015.

2. Nhà máy số 02, dự kiến đặt tại khu phố Châu Thới, phường Bình An với quy mô 7ha, nằm xa khu dân cư, đặc thù đất vùng trũng, còn trồng, giá trị đền bù thấp, triển khai nhanh và thuận tiện cho việc đấu nối, dẫn nước thải từ các khu vực lân cận về nhà máy.

Đề nghị Công ty TNHH MTV Cấp thoát nước-Môi trường Bình Dương lập tờ trình xin chủ trương của UBND tỉnh Bình Dương để làm cơ sở triển khai các bước tiếp theo đúng trình tự quy định. .

Nay phúc đáp ./.

Nơi nhận :
- Như trên;
- UBND tỉnh (thay BC);
- TT Thị ủy-TTHĐND;
- Phòng TNMT, QLĐT;
- Phường Tân Đông Hiệp;
- Lưu : VT .

KT.CHỦ TỊCH
PHÓ CHỦ TỊCH

Nguyễn Văn Nghĩa

1.6 Di An CPC approval of booster pumping stations location

ỦY BANNHÂN DÂN
THỊ XÃ DĨ AN

Số: 2895 /UBND-ĐT

V/v thống nhất vị trí quy hoạch các trạm bơm nâng thuộc dự án thoát nước và xử lý nước thải.

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

Dĩ An, ngày 02 tháng 10 năm 2015

Kính gửi: Công ty TNHH MTV cấp thoát nước-môi trường Bình Dương.

Xét Công văn số 1288/TT-CTN.MT ngày 22/9/2015 của Công ty TNHH MTV cấp thoát nước-môi trường Bình Dương về việc thỏa thuận vị trí và công suất các trạm bơm nâng thuộc dự án thoát nước và xử lý nhà máy xử lý nước thải tại thị xã Dĩ An. Ủy ban nhân dân thị xã Dĩ An có ý kiến như sau:

1. Về chủ trương, thống nhất vị trí 07 trạm bơm nâng theo đề xuất của đơn vị tư vấn và dự phòng 01 vị trí theo đề xuất của phường An Bình, cụ thể:

*** Phường Tân Đông Hiệp**:
- Trạm bơm P1-1 có diện tích 338m^2, vị trí thuộc đất dự án khu công nghiệp Tân Đông Hiệp B.
- Trạm bơm G1-3 có diện tích 213m^2, vị trí thuộc đất công do UBND phường Tân Đông Hiệp quản lý (gần văn phòng khu phố Chiêu Liêu).
- Trạm bơm G1-1 có diện tích 115m^2, vị trí đất thuộc đất công do UBND phường Tân Đông Hiệp quản lý (khu phố Tân Long).

*** Phường Dĩ An**:
- Trạm bơm G1-2 có diện tích 77m^2, vị trí thuộc đất dự án đầu tư nâng cấp mở rộng đường D1 do Ban QLDA thị xã làm chủ đầu tư.
- Trạm bơm G1-4 có diện tích 95m^2, vị trí thuộc đất quy hoạch trạm xử lý nước thải khu dân cư đô thị trung tâm hành chính thị xã Dĩ An do Công ty cổ phần Đại Nam làm chủ đầu tư.

*** Đông Hòa**:
- Trạm bơm P1-2 có diện tích 332m^2, vị trí thuộc đất quy hoạch trạm xử lý nước thải khu dân cư dịch vụ thương mại Quảng Trường Xanh do Công ty cổ phần đầu tư Thái Bình làm chủ đầu tư.

*** An Bình**:
- Trạm bơm P1-3 có diện tích 236m^2, vị trí thuộc đất công do UBND phường An Bình quản lý (gần ngã ba đường Dĩ An-Bình Đường-Lê Văn Tách).

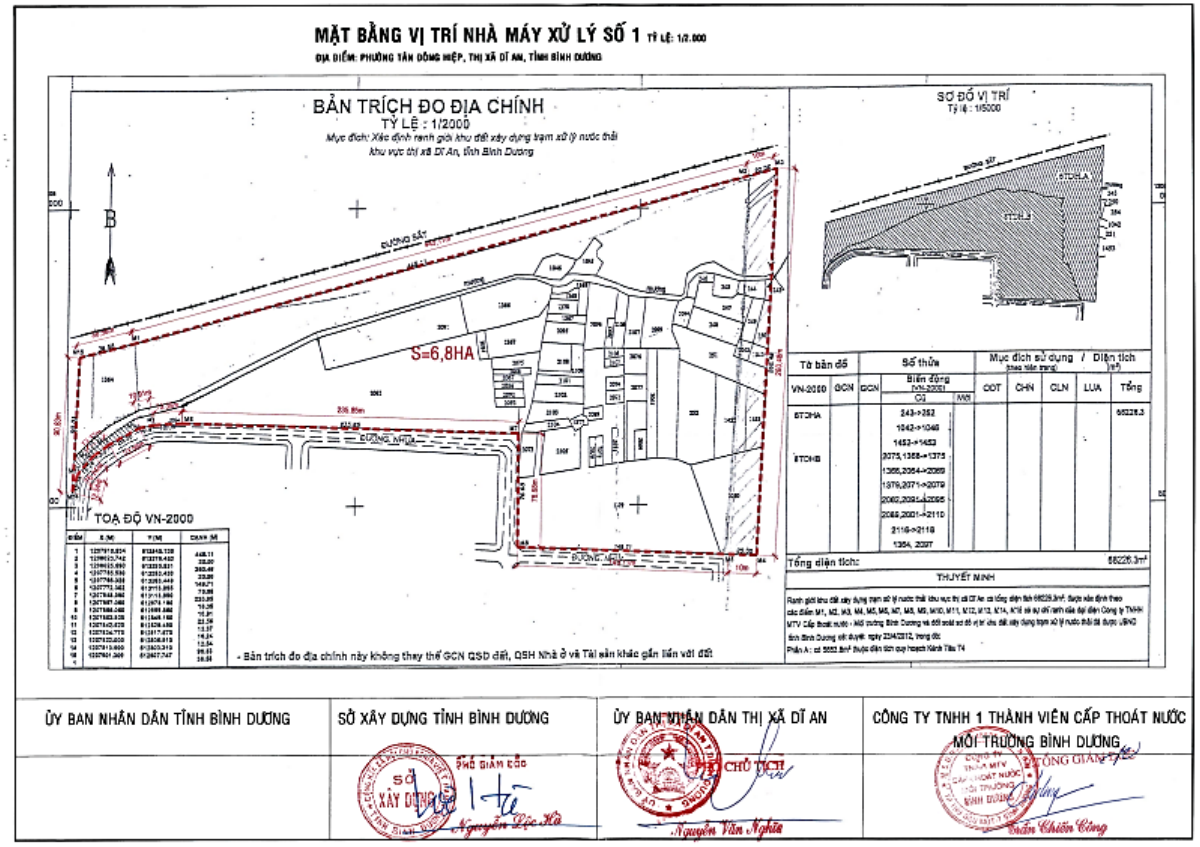
*** Vị trí trạm bơm nâng dự phòng:**
- Trạm bơm có diện tích khoảng 100m^2, vị trí thuộc đất quy hoạch trạm xử lý nước thải do công ty TNHH MTV ĐT-XD Hương Sen làm chủ đầu tư.

2. Đề nghị Công ty TNHH MTV cấp thoát nước môi trường Bình Dương triển khai thực hiện các bước tiếp theo theo trình tự, thủ tục quy định./.

Nơi nhận:
- Như trên;
- Phòng QLĐT;
- UBND các phường: AB, ĐH, DA, TĐH;
- Lưu: VT.

KT.CHỦ TỊCH
PHÓ CHỦ TỊCH

Nguyễn Văn Nghĩa



1.7 MONRE's approval decision no. 296/QĐ-BTNMT dated 04/02/2016 approving EIA of "Drainage and Wastewater system in Di An town-Binh Duong province"

BỘ TÀI NGUYÊN VÀ MÔI TRƯỜNG
Số: 296 /QĐ-BTNMT

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

Hà Nội, ngày 04 tháng 02 năm 2016

QUYẾT ĐỊNH
Phê duyệt báo cáo đánh giá tác động môi trường của Dự án "Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An, tỉnh Bình Dương, công suất 20.000 m^3/ngày.đêm"

BỘ TRƯỞNG BỘ TÀI NGUYÊN VÀ MÔI TRƯỜNG

Căn cứ Luật Bảo vệ môi trường ngày 23 tháng 6 năm 2014;

Căn cứ Nghị định số 21/2013/NĐ-CP ngày 04 tháng 3 năm 2013 của Chính phủ quy định chức năng, nhiệm vụ, quyền hạn và cơ cấu tổ chức của Bộ Tài nguyên và Môi trường;

Căn cứ Nghị định số 18/2015/NĐ-CP ngày 14 tháng 02 năm 2015 của Chính phủ quy định về quy hoạch bảo vệ môi trường, đánh giá môi trường chiến lược, đánh giá tác động môi trường và kế hoạch bảo vệ môi trường;

Căn cứ Thông tư số 27/2015/TT-BTNMT ngày 29 tháng 5 năm 2015 của Bộ Tài nguyên và Môi trường về đánh giá môi trường chiến lược, đánh giá tác động môi trường và kế hoạch bảo vệ môi trường;

Theo đề nghị của Hội đồng thẩm định báo cáo đánh giá tác động môi trường của Dự án "Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An, tỉnh Bình Dương, công suất 20.000 m^3/ngày.đêm" họp ngày 19 tháng 01 năm 2016 tại Hà Nội;

Xét nội dung báo cáo đánh giá tác động môi trường của Dự án "Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An, tỉnh Bình Dương, công suất 20.000 m^3/ngày.đêm" đã được chỉnh sửa, bổ sung kèm theo Văn bản số 117/CTNMT-BQL ngày 26 tháng 01 năm 2016 của Công ty TNHH Một thành viên Cấp thoát nước - môi trường Bình Dương;

Theo đề nghị của Tổng Cục trưởng Tổng cục Môi trường,

QUYẾT ĐỊNH:

Điều 1. Phê duyệt nội dung báo cáo đánh giá tác động môi trường của Dự án "Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An, tỉnh Bình Dương, công suất 20.000 m^3/ngày.đêm" (sau đây gọi là Dự án) được lập bởi Công ty TNHH Một thành viên Cấp thoát nước - môi trường Bình Dương (sau đây gọi là Chủ dự án) với các nội dung chủ yếu sau đây:

1. Phạm vi, quy mô, công suất:

Dự án được thực hiện tại thị xã Dĩ An, tỉnh Bình Dương nhằm giải quyết tình trạng ngập úng, thu gom và xử lý nước thải sinh hoạt và cải thiện môi trường sống khu vực thị xã Dĩ An. Nội dung của Dự án như sau:

- Hệ thống thoát nước mưa: xây dựng các tuyến cống mới T4, T5B, đường Trần Hưng Đạo và cải tạo rạch Cái Cầu, suối Lồ Ô. Tổng diện tích khu vực thu gom nước mưa là 1.690 ha.

- Hệ thống thu gom và xử lý nước thải sinh hoạt: xây dựng mạng lưới thu gom nước thải cho 4 phường gồm Dĩ An, Tân Đông Hiệp, Đông Hòa, An Bình và xây dựng trạm xử lý nước thải công suất 20.000 m^3/ngày.đêm.

Chi tiết các công trình trong hệ thống thoát nước mưa, hệ thống thu gom và xử lý nước thải sinh hoạt của Dự án được nêu trong báo cáo đánh giá tác động môi trường phê duyệt kèm theo Quyết định này.

2. Yêu cầu bảo vệ môi trường đối với Dự án:

2.1. Xây dựng và vận hành hệ thống xử lý nước thải bảo đảm toàn bộ nước thải sinh hoạt được thu gom, xử lý đạt QCVN 14:2008/BTNMT- Quy chuẩn kỹ thuật quốc gia về nước thải sinh hoạt cột A với hệ số K = 1 trước khi thải vào rạch Cái Cầu và chảy vào sông Đồng Nai.

2.2. Lắp đặt hệ thống quan trắc tự động để kiểm soát liên tục: lưu lượng, pH, COD, TSS của nước thải trước cửa xả của trạm xử lý nước thải và kết nối kết quả quan trắc tự động về Sở Tài nguyên và Môi trường tỉnh Bình Dương để theo dõi, giám sát.

2.3. Thiết kế, lắp đặt và vận hành hệ thống xử lý mùi của trạm xử lý nước thải đạt QCVN 19:2009/BTNMT - Quy chuẩn kỹ thuật quốc gia về khí thải công nghiệp đối với bụi và các chất vô cơ cột B với hệ số K_p = 1,0 và K_v = 0,8 (với các thông số NH_3, H_2S) và đạt QCVN 20:2009/BTNMT - Quy chuẩn kỹ thuật quốc gia về khí thải công nghiệp đối với một số chất hữu cơ (với thông số CH_3SH).

2.4. Thu gom, lưu giữ, vận chuyển và xử lý toàn bộ các loại bùn thải, chất thải sinh hoạt, chất thải thông thường và chất thải nguy hại phát sinh trong quá trình thực hiện Dự án theo đúng quy định tại Nghị định số 38/2015/NĐ-CP ngày 24 tháng 4 năm 2015 của Chính phủ về quản lý chất thải và phế liệu và Thông tư số 36/2015/TT-BTNMT ngày 30 tháng 6 năm 2015 của Bộ Tài nguyên và Môi trường quy định về quản lý chất thải nguy hại.

2.5. Bảo đảm các yêu cầu về vệ sinh môi trường và chỉ được đổ thải bùn nạo vét, vật liệu đất đá, phế thải xây dựng phát sinh trong quá trình thực hiện Dự án vào các vị trí được cơ quan có thẩm quyền ở địa phương và các tổ chức, cá nhân có liên quan chấp thuận.

2.6. Tiến hành trồng cây xanh trong khuôn viên Dự án, bảo đảm diện tích đất được trồng cây xanh theo quy định.

2.7. Thiết lập phương án phòng ngừa, ứng phó sự cố thiên tai, thời tiết bất thường, trượt lở, sụt lún, lũ lụt, mất điện, sửa chữa hoặc thay thế thiết bị của trạm xử lý nước thải, các nhà bơm và mạng lưới thu gom nước thải.

2.8. Thực hiện chương trình quản lý, giám sát môi trường và các công trình, biện pháp bảo vệ môi trường khác như đã đề xuất trong báo cáo đánh giá tác động môi trường, số liệu giám sát phải được cập nhật và lưu giữ để cơ quan quản lý nhà nước kiểm tra.

2

2.9. Trong quá trình thi công xây dựng và vận hành, Dự án phải đáp ứng các Quy chuẩn kỹ thuật quốc gia về môi trường.

3. Các điều kiện kèm theo:

3.1. Tuân thủ các quy định về phòng cháy, chữa cháy, ứng phó sự cố, an toàn lao động và các quy phạm kỹ thuật có liên quan trong các hoạt động của Dự án.

3.2. Thực hiện các quy định hiện hành về xả nước thải vào nguồn nước trong quá trình triển khai thực hiện Dự án.

Điều 2. Chủ dự án có trách nhiệm:

1. Lập và gửi kế hoạch quản lý môi trường của Dự án để niêm yết công khai theo quy định pháp luật.

2. Thực hiện nghiêm túc các yêu cầu về bảo vệ môi trường, các điều kiện nêu tại Điều 1 Quyết định này và các nội dung bảo vệ môi trường khác đã đề xuất trong báo cáo đánh giá tác động môi trường.

3. Báo cáo kết quả thực hiện các công trình bảo vệ môi trường để được kiểm tra, xác nhận hoàn thành trước khi đưa Dự án vào vận hành chính thức theo quy định pháp luật hiện hành về bảo vệ môi trường.

4. Trong quá trình thực hiện nếu Dự án có những thay đổi so với báo cáo đánh giá tác động môi trường đã được phê duyệt, Chủ dự án phải có văn bản báo cáo và chỉ được thực hiện những thay đổi sau khi có văn bản chấp thuận của Bộ Tài nguyên và Môi trường.

Điều 3. Quyết định phê duyệt báo cáo đánh giá tác động môi trường của Dự án là căn cứ để cấp có thẩm quyền xem xét, quyết định các bước tiếp theo của Dự án theo quy định tại Khoản 2 Điều 25 Luật Bảo vệ môi trường.

Điều 4. Ủy nhiệm Tổng cục Môi trường chủ trì, phối hợp với Sở Tài nguyên và Môi trường tỉnh Bình Dương và các đơn vị liên quan thuộc Bộ Tài nguyên và Môi trường thực hiện kiểm tra các nội dung bảo vệ môi trường trong báo cáo đánh giá tác động môi trường đã được phê duyệt tại Quyết định này.

Điều 5. Quyết định này có hiệu lực thi hành kể từ ngày ký./.

Nơi nhận:
- Công ty TNHH MTV CTN-MT Bình Dương;
- UBND tỉnh Bình Dương;
- Sở TN&MT tỉnh Bình Dương;
- Lưu: VT, VPMC, TCMT(06).VTH12.

BỘ TRƯỞNG

Nguyễn Minh Quang

Annex 2 – Using Sutton model to calculate on the transportation of project's excavated materials

The soil excavation, backfilling process will also generate the necessarily transported amount of excavated soil. According to the WHO's rapid assessment documents, the scattered sand, soil transport process generates dust during the soil transport course with the coefficient of 10 gam/km/truck.

Table1: Dust load from Transport

No.	Item	Construction period (quarter)	Number of transport turn (truck/day)	Load of arisen dust (g/km)	Load (mg/m.s)
1	WWTP	2	123	1230	0,4678
2	Primary sewer line	6	17	170	0,837
3	Secondary sewer line	6	16	158	2,598
4	Tertiary sewer line	6	55	548	3,732
5	Sewer lineT4	2	1	9	0,562
6	Pumping station	4	47	474	0,380
7	Sewer lineT5B	4	87	873	0,33
8	Cai Cau Ditch	6	66	665	0,421
9	Sewers on Tran Hung Dao street	4	35	349	0,559
10	Loo stream	4	17	175	0,332

Sutton diffusion model:

In which: C: $C = 0,8.E.\frac{\left\{EXP\left[-\frac{(z+h)^2}{2.\sigma_z^2}\right]+EXP\left[-\frac{(z-h)^2}{2.\sigma_z^2}\right]\right\}}{\sigma_z.u}$ Pollutant concentration in the atmosphere (mg/m^3);

- E:Pollutant load of each waste source (mg/m.s);
- In case of the project has the Northeast prevailing wind direction in winter and the Southeast ones in summer; the line angles $45^0$and$45^0$are formed respectively. Accordingly, the pollutant loads are adjusted to be E*=E.sin45^o and E.sin45^orespectively;
- z: Height of design point (m)(z=1.5m);
- h:Height of road surface in comparison with the surrounding ground (m)(h=2.5m);
- u: Mean wind velocity (m/s)(utb=2.1m/s and 1.9m/sin winter and summer, respectively);
- z: Directional pollutant diffusion coefficient z(m).

The value of longitudinal pollutant diffusion coefficient σz with the atmospheric stability at the project site B is determined based on the formula:

$\sigma_Z = 0.53.x^{0.73}$(m)

In which: x: Distances of the design points in comparison with the waste sources in accordance with the wind, m

Table 2. The forecast on the concentration of dust emission during the transport activities (mg/m^3)

Item	Meteorological season	Distance-based concentration allocation (*)				
		5m	10m	25m	50m	100m
WWTP	Winter	0.080	0.064	0.041	0.026	0.016
	Summer	0.093	0.075	0.048	0.031	0.019
Primary sewer line Secondary sewer line	Winter	0.142	0.115	0.074	0.047	0.029
	Summer	0.166	0.134	0.086	0.055	0.034
Tertiary sewer line Sewer line T4	Winter	0.142	0.115	0.074	0.047	0.029
	Summer	0.166	0.134	0.086	0.055	0.034
Pumping station Sewer lineT5B	Winter	0.442	0.358	0.229	0.146	0.090
	Summer	0.515	0.417	0.267	0.171	0.105
Cai Cau Ditch Sewers on Tran Hung Dao street	Winter	0.635	0.514	0.329	0.210	0.130
	Summer	0.740	0.599	0.383	0.245	0.151
Loo stream Primary sewer line	Winter	0.096	0.077	0.049	0.032	0.020
	Summer	0.112	0.090	0.058	0.037	0.023
Secondary sewer line Tertiary sewer line	Winter	0.065	0.052	0.033	0.021	0.013
	Summer	0.075	0.061	0.039	0.025	0.015
Sewer line T4 Pumping station	Winter	0.095	0.038	0.028	0.017	0.011
	Summer	0.05	0.042	0.031	0.019	0.012
Sewer lineT5B Cai Cau Ditch	Winter	0.085	0.057	0.022	0.017	0.002
	Summer	0.09	0.042	0.031	0.019	0.012
Sewers on Tran Hung Dao street	Winter	0.065	0.027	0.019	0.007	0.003
	Summer	0.05	0.032	0.026	0.009	0.004

The calculation result compared with the value of suspended dust concentration limit (TSP) in the Standard QCVN 05:2013/BTNMT is 0.3mg/m^{3}of dust concentration at almost all distances which meet the permissive standard. However, at the location of canal T4 and the tertiary sewer line, the dust concentration exceeds the permissive standard. Especially as follows:

+ Sewer lineT4: the dust concentration exceeds the permissive standard at the distances of 5m, 10m from the construction site.

+ The tertiary sewer line3: the dust concentration exceeds the permissive standard at the distances of 5m, 10m, 25m from the construction site.

Annex 3: The term for environment, safety and health

Before commencement, the contractor should make the plan for environmental management concretely of the contract package (SEMP) to present to the Supervision Consultant for consideration and ratification. The contents of the SEMP report will describe in detail the solutions that the contractor will implement to ensure the healthy, safety and traffic during the execution

The contractors are required to use raw materials for filling and construction such as sand, rocks, soil etc. from legally operating pits/quarries only. The existing borrow pits and quarries listed in Table 2.10, section 2.3.8 of the ESIA are recommended. Before construction commencement, the contractors are required to submit copy of the license (s) of borrow pits/quarries to the Construction Supervisor and PMU for review and approval.

SEMP will construct basing on the demands listed below and the other demands during the execution indicated in the Report for assessment of the environmental impact of the project.

1. Requirement of the labor force and camp/ Accommodation

The contractor is encouraged to use the local labor for implementation of the simple works. The Contractor is required to organize training about the environment, safety and health for the worker before construction commencement.

The camp and accommodation of the workers should satisfy the minimum requirement.

- Include adequate water supply, bath-room and sanitation facilities for use by the workers. Have separate bath-room and toilet for male and female. Periodically clean up these facilities.
- Have ditch to lead wastewater away from the camp/accommodation, not to let the waste water overflow on the ground.
- Have at least a septic-tank toilet for each group of 25 workers. If there are female workers, there should be a separate toilet for male and female, outside with the instruction of the "WC for male" or "WC for female". The WC should have full light, with roof, partition, door and lock. Where has even the male and female workers working together, in each toilet or restroom should have the lock inside, the WC should be cleansed
- Have bin with cover to contain the solid waste, the solid waste should be collected and disposed of appropriately.
- Electrical equipment should be arranged safely.
- Cooking area should be arranged safely and ensured hygiene.
- Have first aid kit and it should be refilled right after use.

The workers of the contractor will be forbidden to implement the following actions:

- Cut the trees out the areas for execution, burn out the waste, plants after clearing.
- Cause social disruption in public areas.
- Burn the waste outside the camp.
- Operate vehicles or means for execution without being authorised.
- use weapon (except the security forces trusted the mission);
- Consume alcohol in working time;
- Litter the site;

- maintain vehicle, machine and equipment outside designated areas;
- quarrel, fight with each other to disorder publicly.

2. Traffic control, Ensure Traffic Safety

The contractor must be compliance with Circular No. 22/2010/TT-BXD of the Ministry of Construction on construction safety. The Contractors shall implement, but not limited to, the following measures:

- The means of transportation are not operated exceeding the speed limits. Trucks will be covered during the transportation to avoid dropping into the road. Clean up falling materials within 200m from the WWTP and along other construction sites to ensure the roads are not slippery for traffic means;
- Do not park machines and trucks on the road where construction is on-going unless for loading/unloading materials and wastes.
- When executing the works in the areas near schools, the contractor arrange staff for traffic direction during rush hours;
- install and maintain the boards and signs to direct traffic to ensure the safety for human and traffic means during the execution;
- Place portable fire fighting equipment at contractors' the site office.
- Execution of the sewer crossing the road, Construction shall be carried out in each half of the road width. The other the half should be for traffic. After road surface is reestablished on one half, the contractor can execute the work on the other half of the road. Signboard, fences, signal lights shall be placed along the section where construction work is going on in order to prevent accidents for the people and traffic means. During the execution, one person should be assigned for traffic observation and instruction. For special cases, the PMU and Contractor will request the Traffic Police for traffic diversion or direction.. Construction works can be performed in the period with less traffic such as night time, at the same time ensure for lighting in the night.
- Before execution along the road, the contractor shall put barriers and sign boards in accordance with current regulations in order to prevent accidents for the public, the workers and traffic means.. Steel piles sheets should be placed to maintain access to road side buildings, houses and shops of pipe trenches obstruct access.

3. Minimise Impacts on Vegetation Cover

The contractor should ensure that site clearance is carried out within designated areas. Avoid over cutting of trees or removing of vegetation cover if not necessary. Top soil from WWTP shall be retain along the side of the WWTP for tree planting in later stage.

4. Minimise Disruption to Existing Infrastructure and Services

Before construction commencement, the contract should contact with the institutions for traffic/ electricity, telephone and cable (if any) management authorities in order to be instructed about the procedures, order for removing the affected works.

The contractors are required to use construction plants and equipment with the size and load within the limits of transportation roads. The Contractors shall be responsible for repairing,

restoring all damages of the road, bridge due to overload transportation, the result for overcoming such damages should be ratified by the supervision engineer.

When operating the construction plants such as crane, staff should be assigned to observe the surroundings to signal the operators in order to avoid impacts or damages to electric lines or any other existing infrastructures near by.

Road surface and footpath will be reestablished after pipeline installation is completed. The costs of road surface reinstatement is already included in the project cost estimation.

5. Dust, noise and Vibration Control

The following measures will be implemented for dust, noise and vibration control to reduce the impact to the air quality and human health:

- Only use machines with emission rates below allowable limits specified in TCVN 6438-2005
- Arrange washing areas for vehicles at the entrance/ exit of the WWTP construction site. Wastewater from there will be collected and sedimented before drainage to the environment;
- Water the access road at least 2 times per day when the weather is dry, hot and not to cause muddy condition. Watering at least 200 m of access road to and from the entrance/exit of the WWTP site, and along road sections with medical centres and schools;
- Cover tightly the vehicle transporting loose materials;
- Cover or bind temporary storage areas larger than 20 m3 to avoid dust dispersion;
- Not to be burnt the waste on site;
- Apply speed limit at 40 km/h or less within 200m from any construction sites;
- Where possible, maintain noise level at or below 90db.
- Avoid implementing the operations generating loud noise in sensitive time (early morning or late at night in the sensitive locations (residential area, medical station, etc...). If executing in the night is unavoidable, affected communities should be informed in advance at least 2 days in advance;
- Locate machines and tools generating loud noise at sites that allows the noise at residential area not more than 70dBA;
- Use static compactors instead of vibration compactors if feasible for vibration control.

6. Waste Management

The contractor will manage and control the solid waste and hazardous waste by the following measures:

- Minimise the generation of garbage, reuse or gathering the materials that can be recycled.
- Surplus excavated soil should be disposed off at the sites specified in detail

engineering design document and approved by the supervision engineer. The proposed disposal sites of the project is the Tan Dong Hiep quarry and resettlement site in Tan Binh Ward;

- Garbage and municipal solid waste will be separated at source. The contractor are required to contract with licensed solid waste dealers to collect and transport municipal solid waste in accordance with Decree 59/2007/ND-CP dated 09 April 2007 regarding management of solid waste and suitable with the actual conditions in the locality, and the Decree 38/2015/ND-CP dated 24 April 2015 regarding management of waste and scrap.
- Waste oil and waste containing oil, used lubricant, battery and other hazardous waste will be collected and stored properly at the site. in accordance with MONRE Circular 36/2015/TT-BTNMT dated 30 June 2015 for management of the hazardous waste.
- Clean up and reinstate disturbed areas when construction if finished. Carry out pipe installation in stages to minimise social impacts and environmental pollution as well as traffic disturbance. Construction materials are loaded in clean and tidy manner. After completion of each section, all the wastes and residual materials will be collected and transported away.

7. Water Pollution and Sedimentation Control

The Contractor will be required to be responsible to control the quality of surface runoff discharged from construction sites, to ensure that the effluent meets QCVN 08:2008/BTNMT – National Standard on Surface Water Quality. The Contractor shall ensure that:

- Excavation and filling activities will be controlled, especially in rainy season. The contractor shall ensure that excavated and filled areas are always stable, disturbance to the surrounding must be minimised. Materials and waste generated during excavation will be gathered, collected and transported out the site soonest possible but no later than two working days. If the contractor suggests new disposal site, the CSC and PMU will consider and ratify after relevant documents are submitted with reasons clearly justified.
- Create and maintain the ditches for drainage within the construction site of the wastewater treatment plant. Sedimentation traps shall be created to allow sedimentation of soil and solids before surface runoff is discharged to any existing water body. The sedimentation traps must be maintained and cleaned up periodically.
- Temporary loading of construction materials and wastes must be at least 200 from any existing stream and rivers where construction activities does not take place.
- ground disturbance is minimised, the measures to stabilise the disturbed areas are implemented soonest possible.
- used oil and lubricants are not left on barren ground or disposed off into drains, channels or any waterbodies.
- Construction materials and waste are not temporarily loaded at places where erosion or land slide, soil subsidence may occur, or at places that such loading may affect land or property of local people. Excavate drainage ditches within construction sites as instructed by the supervision Engineer to avoid localised flooding.
- An area for vehicle washing is established at the entrance and exit of the WWTP site. Sedimentation trap/manhole will be included to allow setting of solids before wastewater is discharged into the environment;
- At the excavated places which are at risks of soil subsidence or sliding, such as deep pipe trench or pumping station, support/piles or other acceptable materials shall be installed to protect the walls of the ditch. Where excavation is deeper than 3 m, Larsen piles should

be used for slope/wall protection. All support materials will be disassembled when construction is completed. Excavated hole will be dried by pump (if underwater) to pump water in the holes to the area accepted by the Site Engineer.

- Contractor's site office and any disturbed areas disturbed during construction will be dismantled, packed up and reinstated before handing over the site. The soil contaminated with oil, if any, will be removed and transported to acceptable disposal site. Sanitation facilities including septic tank, drainage ditch etc. will be refilled and covered safely.
- The drains and water bodies disturbed by construction activities must be cleaned and be free of debris and garbage. Surplus soil, construction materials and wastes shall be collected and removed entirely from the construction sites then transported to approved disposal sites;
- The areas for execution is limited within the acquired land area. top soil will be retained for tree planting within the WWTP in later stage. Construction materials loaded within the WWTP will be at least 50 m from any water source.
- Collect and transport the excavated soil out of construction sites 24 hours;
- Gravels are applied on internal roads of the wastewater treatment plant;
- Ground levelling shall be implemented at the Southwestern part first, then, Northeastern area which is connected to the Cai Cau stream in order to create natural slope for rainwater drainage overflowing to the Cai Cau stream which is located at the eastern corner of the project;

For T4 channels and Cai Cau stream dredging the contractors shall:

- Diver flow to maintain drainage functions of these;
- Carry out dredging the bottom only when there is no flow, ensure that dredging is carried out to the designed depth and ensure that the dredged materials do not enter T4 and Cai Cau stream flows.

8. Prevention and protection of soil sliding

At the place where the soil is easy sliding it should drive stake to protect the wall of the ditch or use the system for prevention or the other materials for stability. The reinforced wall after executing for installation of sewer completely it will be disassembled and cleared neatly. The excavating hole will be dried during execution by pump (if there is the underwater), to pump for exhaustion of water into the permitted region.

9. Minimizing Social impacts

The contractor should use the routes for transportation to the site of the project following the agreement with the supervision engineer. Just to be used the kinds of means with the size, tonnage in the permitted limit of the routes. The contractor should be responsible to repair, restore all damages of the road, the bridge due to transportation in overload. The result for restriction of such damages should be ratified by the supervision engineer.

The contractor is encouraged to use the local labor to implement the simple works. Register the workers who come from other places with local authorities. Provide training about environment, health and safety for the workers before started working.

In order to reinforce the relationship with the community, to minimize the difficulties due to the negative impact of the execution. The contractor will:

- Install and maintain information board at the project at the site to inform the public clearly the full name and telephone number of the Contractor's Chief Engineer so as community can contact when they have suggestions or complaints about safety, environment or health issues related to construction activities. The contractor shall maintain records of such complains and suggestions together with follow up actions for reporting purpose;
- Inform affected community people about the progress of construction and temporary disruptions of existing services, if any.
- Avoid or limit the construction operations at night. If it is impossible to avoid execution of the works at night or avoid causing interruption of existing services such as electricity/ water supply, the PMU and the Contractor shall inform the community at least 2 days and reminded for 1 day in advance.
- For excavation in execution of the pipeline will be implemented following the rolling solution to each route for execution. For sewer in gathering the waste water for each portion of route for execution with the length 50m. to execute and return the surface for each portion of route is implemented within 24 hours. For the portions of the route necessary for spreading asphalt, the duration for spreading asphalt not exceeding 3 weeks from the date to return the surface. For the system for gathering rain water, to perform for execution in each portion maximum 300m. after installation completely it should fill up immediately correctly the technical demand. Then it is continued excavating the ditch for next 300m. To avoid the case excavating extensively and execute long to affect the daily life of the households in the both sides of the road. the excavated soil id transported immediately to the fixed place out the region of the site.
- Place steel sheets or other acceptable materials for maintain access to roadside buildings if pipe trenches disrupt access.

10.Safety and health for the workers, Communication

- Provide training on safety, environmental sanitation and health for the construction worker, including awareness raising on HIV-AIDS and common diseases in project aarea, before commencement of the work;
- Provide clothes and equipment for labour safety (gloves, mask, boots, glass, etc., according to the nature of work) to the construction workers and to compel them to use;
- Ensure mosquito net are provided at workers accommodation to prevent dengue fevers.
- cooperate closely with the local authority to conduct cleaning up activities in dengue fever prevention campaigns
- cooperate with the local authorities in preventing and fighting with social evils (gambling, prostitution etc.);
- Fence WWTP construction site and pumping stations with close metal sheets at least 2 m high.
- Install and maintain fences, reflective bans and sign boards surrounding excavated areas. Provide adequate lighting at night time at these locations
- Arrange electric lines in office at construction sites in a safe manner, no wires will be place on the ground and with proper plug. Electrical panel placed outside must be protected from weather and for safety;

- Oil, fuel and chemicals will be stored at least 10 m from workers' accommodation and Contractor's Site office. These hazardous must be stored on water-proofed floor, bound and roofed. Warning signs must be placed at that storage area;
- implement all other measures as necessary ensure the safety for the construction workers and the community in project area;

11. Reinstate Disturbed Areas

All disturbed sites during the execution will be disassembled, cleaned and reinstated before handover of the site. The land where is polluted the lubricant oil will be shoveled and transported and buried in the regions for containing the garbage with the agreement of the supervision engineer. The sanitary holes, septic tanks, ditches for exhaustion of waste water will be filled up and covered safely.

Water bodies and drains should be free of soil and crushed stone, ditch should be checked in order to make sure they are clean. Disturbed areas should be cleaned, solid, stone, odd materials should collected and transported out the site to disposal site in accordance with applicable laws and regulations.

12. Emergency Response

In case of accident, immediately the contractor should cease the execution, take a first aid for the victims then to transfer to the nearest medical facility, to report to the supervisor and investor.

In case leaking the fuel, chemicals then the contractor should perform:

- The person who has identified the leakage/spillage shall immediately check if anyone is injured and shall then inform the Contractor(s), Supervision Engineer and PMU.
- The Contractor(s) shall ensure any injured persons are treated and assess what has spilled/ leaked;
- Should the accidents / incidents generate serious environmental pollution (e.g. spillage / leakage of toxic or chemicals, large scale spillage / leakage, or spillage / leakage into the nearby water bodies, the Contractor shall immediate inform PMU;
- In such cases, the Contractor(s) shall take immediate action to stop the spillage / leakage and divert the spilled / leaked liquid to nearby non-sensitive areas;
- The Contractor(s) shall arrange maintenance staff with appropriate protective clothing to clean up the chemicals/chemical waste. This may be achieved through soaking with sawdust (if the quantity of spillage/leakage is small), or sand bags (if the quantity is large); and/or using a shovel to remove the topsoil (if the spillage/leakage occurs on bare ground); and
- Depending on the nature and extent of the chemical spill, evacuation of the activity site may be necessary.
- Spilled chemicals must not be flushed to local surface drainage systems. Instead, sawdust or sandbags used for cleanup and removed contaminated soil shall be disposed of by following the procedures for chemical waste handling and disposal already described.

After the event or accident, the contractor should establish the detailed report to describe the matter, the implemented actions, the report of this event should be presented to the

supervision engineer and Management Board of the project for consideration and save. The report of this event is also presented to the Department of Resources and Environment or the authorized institutions if required.

13. Chance Find Procedure.

When determining that some construction activities would be carried out near any cultural, historical sites such as pagoda, church, temple, shrine…, the contractor shall schedule construction plan to avoid the days that festival or special events may take place at these cultural sites such as the middle of lunar month, public holidays. When carrying out the works in such areas, the contractor shall implement good site management practice including regularly clean up the site regularly, load materials in a tidy manner, and transport wastes out of the sites as soon as possible.

If artifacts are exposed during construction phase, the Contractor shall follow Chance Find Procedure described below:

a) Stop the construction activities in the area of the chance find;
b) Delineate the discovered site or area;
c) Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the Department of Culture and Information takes over;
d) Notify the Construction Supervision Consultant who in turn will notify responsible local or national authorities in charge of the Cultural Property of Viet Nam (within 24 hours or less);
e) Relevant local or national authorities would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values;
f) Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration and salvage;
g) If the cultural sites and/or relics are of high value and site preservation is recommended by the professionals and required by the cultural relics authority, the Project's Owner will need to make necessary design changes to accommodate the request and preserve the site;
h) Decisions concerning the management of the finding shall be communicated in writing by relevant authorities.

Annex 4 – Photos and Minutes of Public Consultations

Tan Binh ward

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

BIÊN BẢN HỌP THAM VẤN CỘNG ĐỒNG DÂN CƯ CHỊU TÁC ĐỘNG TRỰC TIẾP CỦA DỰ ÁN

- Tên dự án: Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An, của Công ty TNHH 1 TV Cấp thoát nước-Môi trường Bình Dương.

- Thời gian bắt đầu: 14 giờ 00 ngày 22 tháng 09 năm 2015.

- Địa điểm nơi họp: Hội trường UBND Phường Tân Bình

1. Thành phần tham dự

1.1. Đại diện Ủy ban nhân dân phường Tân Bình:

- Ông : Nguyễn Văn Yêm Chức vụ: Phó Chủ tịch phường
- Ông : Trương Thanh Huy Chức vụ: Cán bộ môi trường

1.2. Chủ dự án: Công ty TNHH 1 TV Cấp thoát nước-Môi trường Bình Dương

- Bà: Nguyễn Thị Thu Vân Chức vụ: Phó tổng giám đốc
- Ông: Dương Hoài Ly Chức vụ: Giám đốc Ban Quản lý Dự án

1.3. Đơn vị tư vấn lập báo cáo đánh giá tác động môi trường: Trung tâm Quan trắc Tài nguyên và Môi trường Bình Dương

- Ông Nguyễn Thế Tùng Lâm – Phó phòng Tư vấn - Nghiệp vụ Kỹ thuật
- Ông Trần Lê Nhật Giang - Nhân viên

1.4. Đại biểu tham dự:

Danh sách đính kèm.

2. Nội dung và diễn biến phiên họp:

2.1. Đại diện người chủ trì thông báo lý do cuộc họp và thành viên tham dự:

Đại diện Ủy ban nhân dân phường thông báo: Thực hiện quy định Luật Bảo vệ môi trường năm 2014 và xét đề nghị của Công ty TNHH MTV Cấp thoát nước Môi trường Bình Dương tại Văn bản số 1243/CTNMT-BQL ngày 15 tháng 09 năm 2015, Uy ban nhân dân phường Tân Bình phối hợp Ủy ban mặt trận tổ quốc phường Tân Bình tổ chức buổi tham vấn cộng đồng cho dự án "Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An" cho nhân dân trên địa bàn phường.

2.2. Chủ dự án và đơn vị tư vấn trình bày nội dung báo cáo:

- Đại diện chủ dự án: Giới thiệu sơ lược về dự án, về mục tiêu, ý nghĩa của dự án đối với thị xã Dĩ An và tỉnh Bình Dương;

- Đại diện đơn vị tư vấn: Trình bày về nội dung của dự án "Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An".

- Đại diện đơn vị tư vấn: Trình bày về những tác động trong quá trình chuẩn bị, xây dựng, hoạt động của dự án; cũng như trình bày những biện pháp giảm thiểu sẽ áp dụng đối với dự án.

2.3. Thảo luận, trao đổi giữa cộng đồng dân cư chịu tác động với chủ dự án:

2.3.1 Thảo luận của các hộ dân:

- Đại diện Khu phố Tân Phú 2: Ủng hộ cao việc thực hiện dự án. Hiện nay trên địa bàn khu phố chưa có hệ thống thoát nước mưa, nên khi mưa to gây ngập cục bộ. Nước thải sinh hoạt từ các hộ kinh doanh nhà trọ cho tự thấm hoặc chảy tràn trên mặt đường tự nhiên ảnh hưởng môi trường khu vực. Đề nghị dự án có hệ thống thu gom nước thải và đầu tư hệ thống thoát nước mưa để giảm tình trạng ngập úng và mất vệ sinh khu vực.

- Đại diện Khu phố Tân Thắng: Thống nhất cao với việc thực hiện dự án. Hiện nay tuyến đường liên huyện chưa có hệ thống cống thu gom nên nước thải sinh hoạt của nhân dân chảy tràn gây ô nhiễm môi trường và gây mất vệ sinh khu vực đặc biệt là khi trời nắng. Đề nghị có tuyến cống thu gom nước thải trên tuyến đường này.

- Đại diện Khu phố Tân Phước: Đồng ý việc thực hiện dự án. Đề nghị chủ đầu tư trong quá trình thi công dự án có biện pháp hiệu quả để giảm thiểu tác động từ bụi, tiếng ồn, kẹt xe và ảnh hưởng buôn bán các hộ dân sống dọc các đường thi công của dự án.

- Đại diện Khu phố Tân Phú 1: phường Tân Bình tập trung nhiều tuyến thoát nước mưa, thải các các phường An Phú, Thuận Giao và là khu vực trũng trên địa bàn thị xã đề nghị sớm bố trí 01 trạm bơm nước thải tại phường để thu gom về Nhà máy xử lý nước thải Tân Dông Hiệp nhằm nâng tỷ lệ hộ dân được thu gom xử lý lên cao hơn so với dự án đặt ra (10% năm 2020, 20% năm 2025, 40% năm 2030).

2.3.2 Ý kiến trả lời của chủ đầu tư

- Công ty TNHH MTV Cấp thoát nước Môi trường Bình Dương đã hoàn thành dự án "Thu gom, xử lý nước thải trên địa bàn thành phố Thủ Dầu Một – Giai đoạn 1", dự án "Thu gom, xử lý nước thải trên địa bàn thị xã Thuận An", để

2

giảm thiểu tác động quá trình thi công dự án Công ty yêu cầu các đơn vị thi công phải cam kết các phương tiện thiết bị, thi công phải đảm bảo an toàn kỹ thuật theo quy định trước khi đi vào hoạt động. Nếu phát hiện trong quá trình thi công sẽ phạt hợp đồng nếu quá 3 lần sẽ cắt hợp đồng và thay thế nhà thầu khác.

- Đối với quá trình điều tiết giao thông khu vực thi công, công ty yêu cầu đơn vị thi công bố trí ít nhất 2 người cùng với Phường tham gia điều tiết giao thông vào các khung giờ cao điểm. Đặt biển báo, đèn hiệu đúng quy định, đèn hiệu sẽ được mở vào chiều sớm (18 giờ và tắt vào 5 giờ 45 phút sáng).

- Công ty sẽ xin ý kiến Ủy ban nhân dân tỉnh về việc bổ sung 01 trạm bơm và nâng tỷ lệ thu gom trên địa bàn phường và báo kết quả cho Ủy ban nhân dân phường để thông báo cho nhân dân được biết.

3. Kết luận phiên họp:

- Đồng ý với việc thực hiện dự án. Ủy ban nhân dân phường sẽ cộng đồng trách nhiệm cùng Công ty TNHH MTV Cấp thoát nước môi trường Bình Dương thực hiện dự án trên địa bàn phường.

- Đồng ý với các biện pháp giảm thiểu tác động môi trường, xã hội nêu trong báo cáo.

- Đề nghị dự án đẩy nhanh tiến độ thực hiện để giải quyết vấn đề thu gom, xử lý nước thải và thoát mưa cho nhân dân.

- Đề nghị triển khai 01 trạm bơm trên địa bàn phường Tân Bình trong giai đoạn năm 2015-2020. Nâng tỷ lệ thu gom, xử lý nước thải trên địa bàn phường từ 10% (năm 2020) lên 20% (năm 2020).

ĐẠI DIỆN ỦY BAN NHÂN DÂN PHƯỜNG TÂN BÌNH	**ĐẠI DIỆN CHỦ DỰ ÁN**
KT. CHỦ TỊCH	P.TỔNG GIÁM ĐỐC
PHÓ CHỦ TỊCH	
Nguyễn Văn Yêm	Nguyễn Thị Thu Vân

DANH SÁCH ĐẠI BIỂU THAM DỰ CUỘC HỌP

Stt	Họ và tên	Chức danh	Ký tên
1	Phạm Văn Chiểu	Tổ trưởng	
2	Phạm Văn Ngọc	Tổ 8 bảy	
3	Ngô Kim Liêm	Tân Thắng	
4	Võ Thị Kim Tuyết	Tân Thắng	
5	Trần Thị Diễm	Tân phú 1	
6	Đồng Ngọc Vàng	Tân Hiệp	
7	Phan Quang Bình	Tân Phước	
8	Trần Danh [illegible]	Tân phú 1	
9	[illegible]	[illegible]	
10	Lâm Thị Út	Tân Hiệp	
11	Phạm Thị Hà	tổ trưởng 161	
12	[illegible]	Tân Hiệp	
13	Nguyễn Văn Dũng	Tân Phú I (A5)	
14	[illegible]	Kp Tân phú 1	
15	Trần Văn Lập	Kp Tân phú 1	
16	Nguyễn Văn Tiến	CCB	
17	Nguyễn Thị Dân	Tân Phước	
18	[illegible]	Tân phước [illegible]	
19	Lê Thị Tuyết	Tân phú 2	

Stt	Họ và tên	Chức danh	Ký tên
20	Lê Thị [illegible]	Tân phước	
21	Ngô Minh Sang	Tân Hiệp	
22	[illegible]	Tân Hiệp	
23	[illegible]	Tân Hiệp	
24	Phan Ngọc Tài	T Hiệp	
25	Mai Công Hòa	Tân Phước	
26	[illegible]	TTĐT	
27	[illegible]	[illegible]	
28	Trần Văn Thuận	[illegible]	
29	Nguyễn [illegible]	KP Tân Hiệp	
30	Nguyễn Văn Liêm	K.P.Tân Phú II	
31	Nguyễn [illegible]	Kp Tân [illegible]	
32	Phạm Tú Hải	Kp Tân phước	
33	Nguyễn Ngọc Chinh	KP Tân Phước	
34	Lê Văn [illegible]	Tổ [illegible] Tân phước	
35	Lê Minh Châu	Tổ 8A Tân Phước	
36	Ngô Thanh [illegible]	Tân phú I	
37	[illegible] Văn Minh	Tân phú I	
38	[illegible]	Tổ 8 KP Tân Hiệp	
39	Tạ Tâm Hiếu	Tân Thắng	

DANH SÁCH ĐẠI BIỂU THAM DỰ CUỘC HỌP

Stt	Họ và tên	Chức danh	Ký tên
40	Bùi Kim Kỳ	Tân Thắng	
41	Nguyễn Văn Tài	Tân phước	
42	Tăng Đình Phong	Tân phước	
43	Nguyễn Văn Chiêu	Tân phước	
44	[illegible] Kim Châu Hồ	Tân Bình	
45	Trịnh Văn Tư	Tân Bình	
46	Phan Văn [illegible]	Tân phú 2	
47	Ngô Văn [illegible]	T Phú 2	
48	[illegible]	T phú 2	
49	Trần Văn Thanh	T phú 2	
50	Nguyễn Thành [illegible]	Tân phú 2	
51	Lê Trọng Nghĩa	Tân phú 2	
52	Nguyễn [illegible]	Tân phú 2	
53	[illegible] Văn Nghi	Tân phú 2	
54	Lê Tấn [illegible]	Tân phú 2	
55	Lê Văn [illegible]	Tân phú 2	
56	Trương Thanh Tùng	CBMT	

Di An ward

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

BIÊN BẢN HỌP THAM VẤN CỘNG ĐỒNG DÂN CƯ CHỊU TÁC ĐỘNG TRỰC TIẾP CỦA DỰ ÁN

- Tên dự án: Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An, thị xã Dĩ An của Công ty TNHH 1 TV Cấp thoát nước-Môi trường Bình Dương.

- Thời gian họp: Ngày 19 tháng 12 năm 2015.

- Địa điểm nơi họp: Hội trường UBND Phường Dĩ An

1. Thành phần tham dự

1.1. Đại diện Ủy ban nhân dân phường Dĩ An:

- Ông : Trần Hữu Luận Chức vụ: CT.UBND phường
- Ông : Tô Đình Phương Chức vụ: Cán bộ môi trường

1.2. Chủ dự án: Công ty TNHH 1 TV Cấp thoát nước-Môi trường Bình Dương

- Bà: Nguyễn Thị Thu Vân Chức vụ: Phó Tổng Giám đốc
- Ông: Bùi Minh Duy Chức vụ: Ban quản lý dự án

1.3. Đơn vị tư vấn lập báo cáo đánh giá tác động môi trường: Trung tâm Quan trắc-Kỹ thuật Tài nguyên và Môi trường Bình Dương

- Bà: Đoàn Thị Thùy Nga - Nhân viên
- Ông: Trần Lê Nhật Giang - Nhân viên

1.4. Đại biểu tham dự:

Danh sách đính kèm.

2. Nội dung và diễn biến phiên họp:

2.1. Đại diện người chủ trì thông báo lý do cuộc họp và thành viên tham dự:

Đại diện Ủy ban nhân dân phường thông báo: Thực hiện quy định Luật Bảo vệ môi trường năm 2014 và xét đề nghị của Công ty TNHH MTV Cấp thoát nước Môi trường Bình Dương tại Văn bản số 1243/CTNMT-BQL ngày 15/09/2015, UBND phường Dĩ An tổ chức buổi tham vấn cộng đồng cho dự án "Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An" cho nhân dân trên địa bàn phường.

2.2. Chủ dự án và đơn vị tư vấn trình bày nội dung báo cáo:

- Đại diện chủ dự án: Giới thiệu sơ lược về dự án, về mục tiêu, ý nghĩa của dự án đối với thị xã Dĩ An và tỉnh Bình Dương;

- Đại diện đơn vị tư vấn: Trình bày về nội dung của dự án "Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An".

- Đại diện đơn vị tư vấn: Trình bày các tác động và biện pháp giảm thiểu của hệ thống thu gom nước thải, trạm bơm đối với dân cư phường Dĩ An.

2.3. Thảo luận, trao đổi giữa cộng đồng dân cư chịu tác động với chủ dự án:

2.3.1 Thảo luận của các hộ dân:

- Người dân ủng hộ việc thực hiện thu gom nước thải sinh hoạt trên địa bàn phường Dĩ An.

- Tuyến cống thu gom nước thải thực hiện trên địa bàn phường có trùng với tuyến ống cấp nước sạch hay không?

- Hộ dân có phải đóng góp để thực hiện dự án hay không?

- Người dân có phải đóng phí xử lý nước thải sinh hoạt hay không?

- Việc thi công tuyến cống trên các tuyến đường có đảm bảo thực hiện các biện pháp giảm thiểu như báo cáo đã trình bày hay không?

- Đối với các hộ dân không nằm gần tuyến cống chính vậy sẽ thu gom ra sao?

2.3.2 Ý kiến trả lời của chủ đầu tư

- Tuyến cống thu gom nước thải được bố trí dưới lòng đường, không trùng với tuyến ống cấp nước sạch.

- Dự án này người dân không phải đóng góp, mà sẽ được vay vốn từ Ngân hàng Thế giới để thực hiện.

- Hiện nay, đối với thành phố Thủ Dầu Một và thị xã Thuận An đã đi vào vận hành hệ thống thu gom và xử lý nước thải trên địa bàn Thủ Dầu Một và Thuận An, tỉnh Bình Dương chưa tiến hành thu gom phí xử lý nước thải. Tuy nhiên, dự kiến trong tương lai UBND tỉnh Bình Dương sẽ xây dựng mức giá thu phí xử lý nước thải sinh hoạt.

- Đối với các tuyến cống sẽ được thi công cuốn chiếu và hoàn trả lại mặt đường trong ngày.

- Tuyến cống thu gom nước thải có 3 tuyến cống: tuyến cống chính, tuyến cống cấp 2 và tuyến cống cấp 3. Tuyến cống cấp 3 sẽ đi vào ngõ ngách từng hộ dân và có hộp đấu nối để dân đấu nối nước thải vào.

2

3. Kết luận phiên họp:

- Ủy ban nhân dân phường đồng ý với việc thực hiện dự án, đồng ý với các biện pháp giảm thiểu tác động môi trường, xã hội nêu trong báo cáo.

- Đối với 2 trạm bơm đặt trên địa bàn phường, đề nghị dự án cần thực hiện chống thấm, chống ăn mòn đảm bảo nước thải không rò rỉ ra bên ngoài, nắp hầm bơm phải đậy kín, tránh phát sinh mùi hôi.

- Đề nghị dự án đẩy nhanh tiến độ thực hiện để giải quyết vấn đề thu gom nước mưa, xử lý nước thải trên địa bàn phường.

ĐẠI DIỆN UBND PHƯỜNG DĨ AN	ĐẠI DIỆN CHỦ DỰ ÁN KT. TỔNG GIÁM ĐỐC
Trần Hữu Luận	Nguyễn Thị Thu Vân

3

DANH SÁCH NGƯỜI THAM DỰ CUỘC HỌP THAM VẤN CỘNG ĐỒNG
PHƯỜNG DĨ AN, THỊ XÃ DĨ AN, TỈNH BÌNH DƯƠNG
Dự án "Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An,tỉnh Bình Dương"

STT	Họ tên	Chức danh/Địa chỉ	Ký tên
1	Ngô Thị Phương Lan	Khu phố Thắng Lợi 1	
2	Trần Thị Kim Loan	K.Phố Thắng Lợi 1	
3	Phạm Văn Huỳnh	Kphố Thắng Lợi 1	
4	Kiềm Ngọc Mỹ	KP Thắng Lợi 1	
5	Nguyễn Thành Nhân	NT	
6	Lê Thanh Long	TL1	
7	Tô Văn Bực	TL2	
8	Trần Ngọc Tính	Tổ 21 KP BM1	
9	Nguyễn Văn Kỳ	BM1	
10	Phạm Tuấn Vũ	ĐT	
11	Nguyễn Đình Bảo	Kp Bình Minh 2	
12	Huỳnh Tấn Thành	Kp BM2	
13	Lý Văn Việt	KP BM2	
14	Bùi Văn Mừng	NP Phường	
15	Đào Minh Hùng	TN1	
16	Đinh Quang Sinh	TN1	
17	Hoàng Văn Cảnh	TN1	
18	Vũ Xuân Trình	Tổ 35 TN2	
19	Hoàng Minh Mạnh	Tổ 12B TN2	
20	Nguyễn Quang Cười	Kp TN2	
21	Bùi Minh Hoan	TN1	
22	Trần Hữu		
23	Lê Ngọc Mai	TN1	
24	Lê Thanh Phú	KP BM1	
25	Cao Huỳnh Mai	TN1	
26	Vũ Thị Oanh	KP BM 2	
27	Danh Bích Liên	"	
28	Hoàng Văn Hào	KP Thống Nhất 1	
29	Ngô Đình Quế	KP TN 1	
30	Nguyễn Thị Thắm	Kp Bình Minh 1	
31	Nguyễn Thái Kiên	Nhị Đồng 2	
32	Trần Quốc Hùng	NĐ 2	
33	Nguyễn Xuân Trường	NĐ 2	
34	Hoàng Thị Thanh Thủy	NĐ 2	
34	Đỗ Thị Kim Sa	NĐ 2	
35	Lê Thị Hảo	BM1	
36	Lê Thị Tất	TL2	
37	Đặng Ngọc Thảo	KP Bình Minh 2	
38	Phạm Thị Phải	TN1	
39	Trần Thị Thủy	TL2	
40	Vũ Thị Kim Thoa	TN II	
41	Trần Thị Ngọt	TN II	
42	Trương Thị Điểm	TN2	
43	Trần Kim Hường	TN2	
44	Nguyễn Thị Khuya	TN1	
45	Hồ Đình Toàn	TN 2	

DONG HOA WARD

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

BIÊN BẢN HỌP THAM VẤN CỘNG ĐỒNG DÂN CƯ CHỊU TÁC ĐỘNG TRỰC TIẾP CỦA DỰ ÁN

- Tên dự án: Thoát nước và xử lý nước thải khu vực thị xã Dĩ An, thị xã Dĩ An của Công ty TNHH 1 TV Cấp thoát nước-Môi trường Bình Dương.

- Thời gian họp: Ngày 22 tháng 9 năm 2015.

- Địa điểm nơi họp: Hội trường UBND Phường Đông Hòa

1. Thành phần tham dự

1.1. Đại diện Ủy ban nhân dân phường Đông Hòa:

- Ông: Huỳnh Công Minh Chức vụ: Phó Chủ tịch
- Bà: Đặng Thị Ngọc Diệp Chức vụ: Cán bộ môi trường

1.2. Chủ dự án: Công ty TNHH 1 TV Cấp thoát nước-Môi trường Bình Dương

- Bà: Nguyễn Thị Thu Vân Chức vụ: Phó Tổng Giám đốc
- Ông: Bùi Minh Duy Chức vụ: Ban quản lý dự án

1.3. Đơn vị tư vấn lập báo cáo đánh giá tác động môi trường: Trung tâm Quan trắc Tài nguyên và Môi trường Bình Dương

- Ông: Nguyễn Thế Tùng Lâm – Trưởng phòng Phòng Tư vấn
- Bà: Đoàn Thị Thúy Nga - Nhân viên

1.4. Đại biểu tham dự:

Danh sách đính kèm.

2. Nội dung và diễn biến phiên họp:

2.1. Đại diện người chủ trì thông báo lý do cuộc họp và thành viên tham dự:

Đại diện Ủy ban nhân dân phường thông báo: Thực hiện quy định Luật Bảo vệ môi trường năm 2014 và xét đề nghị của Công ty TNHH MTV Cấp thoát nước Môi trường Bình Dương tại Văn bản số 1243/CTNMT-BQL ngày 15/09/2015, UBND phường Đông Hòa tổ chức buổi tham vấn cộng đồng cho dự án "Thoát nước và xử lý nước thải khu vực thị xã Dĩ An" cho nhân dân trên địa bàn phường.

2.2. Chủ dự án và đơn vị tư vấn trình bày nội dung báo cáo:

- Đại diện chủ dự án: Giới thiệu sơ lược về dự án, về mục tiêu, ý nghĩa của dự án đối với thị xã Dĩ An và tỉnh Bình Dương;

- Đại diện đơn vị tư vấn: Trình bày về nội dung của dự án "Thoát nước và xử lý nước thải khu vực thị xã Dĩ An".

- Đại diện đơn vị tư vấn: Trình bày các tác động và biện pháp giảm thiểu của hệ thống thu gom nước thải, trạm bơm đối với dân cư phường Đông Hòa.

2.3. Thảo luận, trao đổi giữa cộng đồng dân cư chịu tác động với chủ dự án:

2.3.1 Thảo luận của các hộ dân:

- Nước thải sinh hoạt trên địa bàn phường hầu hết đều tự thấm ảnh hưởng đến môi trường khu vực. Do đó, thống nhất việc bố trí hệ thống thu gom nước thải trên địa bàn phường góp phần nhằm cải thiện môi trường khu vực, giảm thiểu ô nhiễm nguồn nước mặt trên địa bàn.

- Khu vực đường Trần Hưng Đạo thường xuyên ngập, đặc biệt vào những ngày mưa lớn. Đề nghị dự án sớm tiến hành triển khai hệ thống thu gom nước mưa trên đường Trần Hưng Đạo, xây dựng tuyến T5B để giảm ngập của khu vực.

- Khu vực phường có địa hình thấp hơn so với phường Tân Đông Hiệp, vậy làm sao để thu gom nước thải tại các khu vực này về trạm xử lý nước thải tại phường Tân Đông Hiệp?

- Đề nghị chủ đầu tư trong quá trình thi công dự án có biện pháp hiệu quả để giảm thiểu tác động từ bụi, tiếng ồn, kẹt xe và ảnh hưởng buôn bán các hộ dân sống dọc tuyến đường thi công của dự án.

2.3.2 Ý kiến trả lời của chủ đầu tư

- Đối với các khu vực thấp trên địa bàn phường thì dự án sẽ bố trí các trạm bơm nâng để thu gom nước thải tại các khu vực này đưa về trạm xử lý nước thải. Đối với phường Đông Hòa bố trí 1 trạm bơm đặt tại khu đất đối diện siêu thị Big C.

- Đối với quá trình điều tiết giao thông khu vực thi công, công ty yêu cầu đơn vị thi công đặt biển báo, đèn hiệu đúng quy định, bố trí ít nhất 2 người cùng với Phường tham gia điều tiết giao thông vào các khung giờ cao điểm.

3. Kết luận phiên họp:

- Ủy ban nhân dân phường đồng ý với việc thực hiện dự án, đồng ý với các biện pháp giảm thiểu tác động môi trường, xã hội nêu trong báo cáo.

- Đề nghị dự án đẩy nhanh tiến độ thực hiện để giải quyết vấn đề thu gom nước mưa, xử lý nước thải trên địa bàn phường.

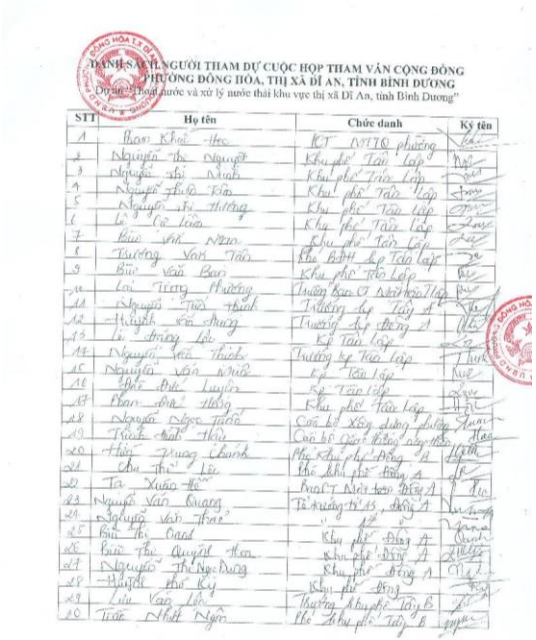
ĐẠI DIỆN UBND
PHƯỜNG ĐÔNG HÒA
CHỦ TỊCH

Huỳnh Công Minh

ĐẠI DIỆN CHỦ DỰ ÁN
P.TỔNG GIÁM ĐỐC

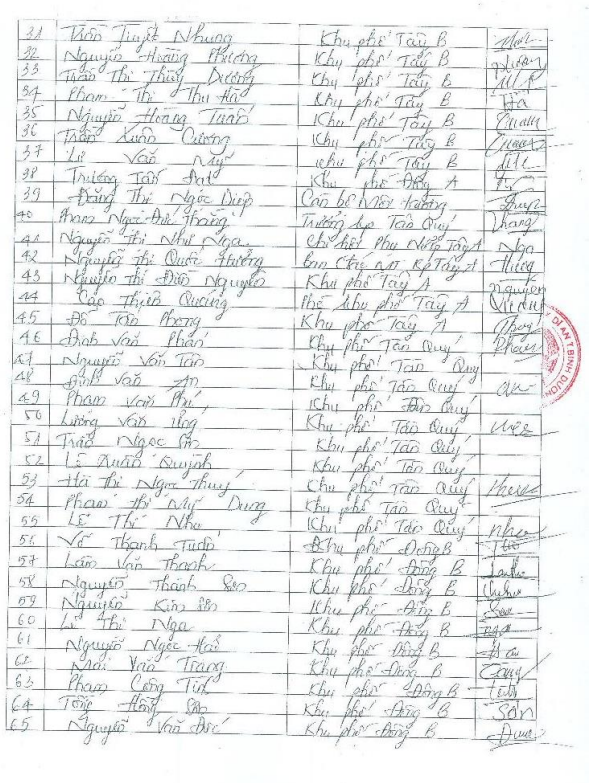
Nguyễn Thị Thu Vân

Đoàn Thị Thúy Nga



DANH SÁCH NGƯỜI THAM DỰ CUỘC HỌP THAM VẤN CỘNG ĐỒNG
PHƯỜNG ĐÔNG HÒA, THỊ XÃ DĨ AN, TỈNH BÌNH DƯƠNG
Dự án: "Thoát nước và xử lý nước thải khu vực thị xã Dĩ An, tỉnh Bình Dương"

STT	Họ tên	Chức danh	Ký tên
1	Phan Khắc Học	KT NTTQ phường	
2	Nguyễn Thị Nguyệt	Khu phố Tân Lập	
3	Nguyễn Thị Ninh	Khu phố Tân Lập	
4	Nguyễn Thiếu Hiền	Khu phố Tân Lập	
5	Nguyễn Thị Hường	Khu phố Tân Lập	
6	Lê Tấn Lâm	Khu phố Tân Lập	
7	Khưu Văn Nhơn	Khu phố Tân Lập	
8	Trương Văn Tân	Phó BTH Chi Tân Lập	
9	Bùi Văn Ban	Khu phố Tân Lập	
10	Lại Trọng Phương	Trưởng ban CTMT Tân Lập	
11	Nguyễn Thị Thiết	Trưởng ấp Tây A	
12	Huỳnh Văn Thưng	Trưởng ấp Đông A	
13	Lê Thắng Lợi	Kế Tân Lập	
14	Nguyễn Văn Thiết	Trưởng ấp Tân Lập	
15	Nguyễn Văn Nhỏ	Kế Tân Lập	
16	Phạm Đức Luận	Kế Tân Lập	
17	Phan Văn Hồng	Khu phố Tân Lập	
18	Nguyễn Ngọc Thảo	Cán bộ Xây dựng Đảng	
19	Trần Thanh Thủy	Cán bộ Giảm nghèo	
20	Hồ Trung Chánh	Phó Khu phố Đông A	
21	Chu Thị Lê	Thư ký khu phố Đông A	
22	Tạ Xuân Hè	Trưởng ấp Tây A	
23	Nguyễn Văn Quang	Tổ trưởng tổ 45, Đông A	
24	Nguyễn Văn Thao		
25	Bùi Thị Oanh	Khu phố Đông A	
26	Bùi Thị Quỳnh Hoa	Khu phố Đông A	
27	Nguyễn Thị Ngọc Dung	Khu phố Đông A	
28	Huỳnh Thế Kỷ	Khu phố Đông	
29	Lưu Văn Lợi	Trưởng Khu phố Tây B	
30	Trần Nhất Ngôn	Phó Khu phố Tây B	



31	Trần Thị Nhung	Khu phố Tây B	
32	Nguyễn Hoàng Phương	Khu phố Tây B	
33	Trần Thị Thùy Dương	Khu phố Tây B	
34	Phạm Thị Thu Hà	Khu phố Tây B	
35	Nguyễn Hoàng Thảo	Khu phố Tây B	
36	Trần Xuân Cường	Khu phố Tây B	
37	Lê Văn Mỹ	Khu phố Tây B	
38	Trương Tấn Đạt	Khu phố Tây A	
39	Đặng Thị Ngọc Diệp	Cán bộ Nữ công	
40	Phan Ngọc Đức Thắng	Trưởng ấp Tân Quý	
41	Nguyễn Thị Như Nga	Chi hội Phụ nữ Tây A	
42	Nguyễn Thị Quốc Hương	Ban Công tác Mặt trận Tây A	
43	Nguyễn Thị Diễm Nguyên	Khu phố Tây A	
44	Lâu Thiên Quang	Phó Khu phố Tây A	
45	Đỗ Tấn Phương	Khu phố Tây A	
46	Đoàn Văn Phấn	Khu phố Tân Quý	
47	Nguyễn Văn Tấn	Khu phố Tân Quý	
48	Đinh Văn Tín	Khu phố Tân Quý	
49	Phạm Văn Phú	Khu phố Tân Quý	
50	Lương Văn Hồng	Khu phố Tân Quý	
51	Trần Ngọc Tho	Khu phố Tân Quý	
52	Lê Xuân Quỳnh	Khu phố Tân Quý	
53	Hà Thị Ngọc Thuy	Khu phố Tân Quý	
54	Phan Thị Mỹ Dung	Khu phố Tân Quý	
55	Lê Thị Nhu	Khu phố Tân Quý	
56	Võ Thanh Tuấn	Khu phố Đông B	
57	Lâm Văn Thanh	Khu phố Đông B	
58	Nguyễn Thanh Sáo	Khu phố Đông B	
59	Nguyễn Kim Sáo	Khu phố Đông B	
60	Lê Thị Nga	Khu phố Đông B	
61	Nguyễn Ngọc Hải	Khu phố Đông B	
62	Mai Văn Trang	Khu phố Đông B	
63	Phạm Công Tứ	Khu phố Đông B	
64	Tống Hồng Sơn	Khu phố Đông B	
65	Nguyễn Văn Đức	Khu phố Đông B	

TAN DONG HIEP WARD

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

BIÊN BẢN HỌP THAM VẤN CỘNG ĐỒNG DÂN CƯ CHỊU TÁC ĐỘNG TRỰC TIẾP CỦA DỰ ÁN

Tên dự án: Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An, thị xã Dĩ An của Công ty TNHH MTV Cấp thoát nước-Môi trường Bình Dương.

Thời gian họp: Ngày 10 tháng 10 năm 2015.

Địa điểm nơi họp: Hội trường khu phố Đông An, Phường Tân Đông Hiệp

1. Thành phần tham dự

1.1. Đại diện Ủy ban nhân dân phường Tân Đông Hiệp:

- Bà : Huỳnh Thị Tuyết Hạnh — Chức vụ: CT-UBMTTQ.
- Ông : Trần Long Phước — Chức vụ: Cán bộ môi trường.
- Ông : Đinh Quang Minh — Chức vụ: BĐH KP Đông An.

1.2. Chủ dự án: Công ty TNHH MTV Cấp thoát nước-Môi trường Bình Dương

- Ông: Bùi Minh Duy — Chức vụ: Ban quản lý dự án

1.3. Đơn vị tư vấn lập báo cáo đánh giá tác động môi trường: Trung tâm Quan trắc Tài nguyên và Môi trường Bình Dương

- Ông Nguyễn Thế Tùng Lâm — Chức vụ: Trưởng phòng Tư vấn
- Ông Trần Lê Nhật Giang — Chức vụ: Nhân viên

1.4. Đại biểu tham dự:

Danh sách đính kèm.

2. Nội dung và diễn biến phiên họp:

2.1. Đại diện người chủ trì thông báo lý do cuộc họp và thành viên tham dự:

Đại diện Ủy ban nhân dân phường thông báo: Thực hiện quy định Luật Bảo vệ môi trường năm 2015 và xét đề nghị của Công ty TNHH MTV Cấp thoát nước Môi trường Bình Dương tại Văn bản số 1243/CTNMT-BQL ngày 15/09/2015 UBND phường Tân Đông Hiệp phối hợp UBMTTQ phường Tân Đông Hiệp tổ chức buổi tham vấn cộng đồng cho dự án "Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An" cho nhân dân trên địa bàn phường.

2.2. Chủ dự án và đơn vị tư vấn trình bày nội dung báo cáo:

- Đại diện chủ dự án: Giới thiệu sơ lược về dự án, về mục tiêu, ý nghĩa của dự án đối với thị xã Dĩ An và tỉnh Bình Dương;

1

- Đại diện đơn vị tư vấn: Trình bày về nội dung của dự án "Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An".

- Đại diện đơn vị tư vấn: Trình bày về những tác động và biện pháp giảm thiểu của các hạng mục: Thu gom nước thải, nhà máy xử lý nước thải, trạm bơm đối với dân cư phường Tân Đông Hiệp. Đặc biệt, mô tả cụ thể tác động và biện pháp giảm thiểu của hoạt động nhà máy xử lý nước thải đối với khu dân cư Đông An.

2.3. Thảo luận, trao đổi giữa cộng đồng dân cư chịu tác động với chủ dự án:

2.3.1 Thảo luận của các hộ dân:

- Các tuyến cống thu gom nước mưa hiện nay đang bị quá tải, đặc biệt tại khu phố Đông An do suối Siệp tiếp nhận nước mưa từ khu dân cư, nước thải sau xử lý của Khu công nghiệp, các công ty ngoài khu, vì vậy khi mưa lớn khu vực này bị ngập nặng. Đề nghị chủ đầu tư nhanh chóng thực hiện dự án xây dựng tuyến T4, cải tạo suối Siệp.

- Khu đất xây dựng nhà máy xử lý nước thải tại khu phố Đông An, phường Tân Đông Hiệp chỉ những người trong khu đất bị thu hồi đất, còn những người ngoài ranh giới khu đất có bị thu hồi đất hay không?

- Khi nhà máy xử lý nước thải đi vào vận hành, việc vận chuyển bùn thải, rác thải, công nhân ra vào nhà máy sẽ phát sinh ô nhiễm mùi, không khí tác động trực tiếp đến những người dân trong khu phố Đông An lâu dài. Đề nghị chủ dự án xây dựng tuyến đường vận chuyển chất thải riêng, không đi vào đường của khu dân cư Đông An.

- Các tuyến đường đặt hệ thống thu gom nước thải có mở rộng đường hiện hữu hay không? Đối với hộ dân sống hai bên các tuyến đường thu gom nước thải có bị thu hồi đất hay không?

- Khi nhà máy xử lý nước thải đi vào hoạt động thì những người ở khu dân cư Đông An chịu tác động trực tiếp. Vậy chủ dự án có hỗ trợ gì cho người dân hay không?

- Đề nghị công khai thời gian giải phóng mặt bằng nhà máy xử lý và thời gian xây dựng nhà máy để người dân khu vực chuẩn bị.

- Chủ dự án phải có cam kết với phường và công khai với dân về việc sẽ khắc phục, sửa chữa đường khi bị hư hỏng do việc vận chuyển đất, đá, nguyên vật liệu.

- Đề nghị chủ dự án tổ chức các buổi tham vấn, tập huấn nhân dân bị tác động trong quá trình triển khai, thực hiện dự án.

2.3.2 Ý kiến trả lời của chủ đầu tư

- Dự án "Thoát nước và xử lý nước thải khu vực thị xã Dĩ An" có thực hiện xây mới tuyến T4 (làm cống hộp) và cải tạo suối Siệp để giảm ngập úng khu vực.

2

- Khu đất nhà máy xử lý nước thải sẽ giải tỏa 58 hộ dân trong khu đất dự án. Các hộ dân ngoài ranh giới khu đất sẽ không bị thu hồi đất. Đối với các hộ dân bị giải tỏa, Trung tâm phát triển quỹ đất sẽ phối hợp cùng Ủy ban nhân dân phường làm việc với các hộ dân để thống nhất phương án bồi thường, hỗ trợ cho người dân.

- Hiện nay, theo dự án các tuyến đường vào nhà máy xử lý nước thải sẽ sử dụng các tuyến đường sẵn có của khu dân cư Đông An. Chủ dự án sẽ xin ý kiến của UBND tỉnh về việc bố trí tuyến đường vận chuyển riêng và sẽ báo kết quả cho UBND phường để thông báo cho người dân được biết.

- Các tuyến cống thu gom nước thải sẽ được đặt trên lòng đường hiện hữu, các tuyến đường này sẽ không bị mở rộng.

- Nhà máy xử lý nước thải sẽ có thiết bị thu hồi xử lý mùi hôi phát sinh, đồng thời sẽ trồng dải cây xanh cách ly giữa nhà máy và khu dân cư Đông An.

- Thời gian tiến hành giải phóng mặt bằng dự kiến đầu năm 2016, thời gian xây dựng nhà máy xử lý nước thải dự kiến 1/2017 đến 6/2018.

- Chủ dự án sẽ cam kết với phường và công khai với dân về việc sẽ khắc phục, sửa chữa đường khi bị hư hỏng do việc vận chuyển đất, đá, nguyên vật liệu.

- Trong quá trình triển khai, thực hiện dự án, chủ đầu tư sẽ tổ chức các cuộc họp với dân để lắng nghe ý kiến dân theo các giai đoạn: giải phóng mặt bằng, ý kiến của cộng đồng về môi trường dự án, trước khi thi công, trong thời gian thi công…

3. Kết luận phiên họp:

- Đây là dự án tốt cho môi trường của thị xã nói chung và của phường Tân Đông Hiệp nói riêng. Ủy ban nhân dân phường đồng ý với việc thực hiện dự án. Ủy ban nhân dân phường sẽ phối hợp với Công ty TNHH MTV Cấp thoát nước môi trường Bình Dương thực hiện dự án trên địa bàn phường, đảm bảo dự án thực hiện đạt yêu cầu chất lượng và đúng tiến độ.

- Thống nhất với các biện pháp giảm thiểu tác động môi trường, xã hội nêu trong báo cáo.

- Đề nghị dự án đẩy nhanh tiến độ thực hiện để giải quyết vấn đề thu gom, xử lý nước thải và thoát mưa cho nhân dân.

- Đề nghị xây dựng tuyến đường riêng cho việc vận chuyển, ra vào nhà máy xử lý nước thải.

ĐẠI DIỆN UBND PHƯỜNG TÂN ĐÔNG HIỆP	ĐẠI DIỆN CHỦ DỰ ÁN
CHỦ TỊCH	
Đoàn Xuân Bình	Bùi Minh Duy

3

DANH SÁCH ĐẠI BIỂU THAM DỰ CUỘC HỌP

Stt	Họ và tên	Chức danh	Ký tên
1	Cô Khắc Thiên	Đông An TPH - DA - BP	
2	Lê Văn Cường	nt	
3	Lâm	"	
4	Đặng Thế Vinh	"	
5	Phan Tấn Phúc	"	
6	Võ Thanh Khiêm	"	
7	Đồng Văn Thành		
8	Nguyễn T Tuyết Chinh	nt	
9	Vũ Thị Loan	"	
10	Đặng Văn Dũng	"	
11	Mai Thị Thanh	"	
12	Trương Sức Thái	"	
13	Trần Anh Tuấn	"	
14	Đoàn Văn Cường		
15	Nguyễn Công Đức	"	
16	Vũ Đình Ba	"	
17	Ngô Phúc Duy	"	
18	Triệu Huỳ Hải	"	
19	Lê Đăng Dưỡng	"	

Stt	Họ và tên	Chức danh	Ký tên
20	Nam Đức Thuận		
21	Ngô Văn Lợi		
22	Hoàng Văn Thủy		
23	Ngô Công Tịnh		
24	Tạ Thị Tuệ		
25	Nguyễn Xuân Lập		
26	Phạm Đoàn Mỹ		
27	phạm văn thành		
28	Mai Đức Tiến		
29	Võ văn Bé		
30	Nguyễn Văn Lợi		
31	Trần Minh Thanh		
32	Nguyễn T Hồ Hiền		
33	nguyễn Văn Sáng		
34	Phan Quy T Phúy		
35	Phan tấn Nông	(Bích Hường) Bánh đa	
36	Phạm Hùng Long		

BINH THANG WARD

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

BIÊN BẢN HỌP THAM VẤN CỘNG ĐỒNG DÂN CƯ CHỊU TÁC ĐỘNG TRỰC TIẾP CỦA DỰ ÁN

- Tên dự án: Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An, thị xã Dĩ An của Công ty TNHH MTV Cấp thoát nước - Môi trường Bình Dương.

- Thời gian họp: Ngày 30 tháng 10 năm 2015.

- Địa điểm nơi họp: Hội trường UBND Phường Bình Thắng

1. Thành phần tham dự

1.1. Đại diện Ủy ban nhân dân phường Bình Thắng:

- Ông : Phạm Văn Đại — Chức vụ: PCT.UBND phường
- Bà : Phan Thị Thúy Liên — Chức vụ: Cán bộ môi trường

1.2. Chủ dự án: Công ty TNHH MTV Cấp thoát nước - Môi trường Bình Dương

- Bà: Nguyễn Thị Thu Vân — Chức vụ: Phó Tổng Giám đốc
- Ông: Bùi Minh Duy — Chức vụ: Ban quản lý dự án

1.3. Đơn vị tư vấn lập báo cáo đánh giá tác động môi trường: Trung tâm Quan trắc Tài nguyên và Môi trường Bình Dương

- Bà: Đoàn Thị Thùy Nga — Chức vụ: Nhân viên
- Bà: Hoàng Hải Vân — Chức vụ: Nhân viên

1.4. Đại biểu tham dự:

Danh sách đính kèm.

2. Nội dung và diễn biến phiên họp:

2.1. Đại diện người chủ trì thông báo lý do cuộc họp và thành viên tham dự:

Đại diện Ủy ban nhân dân phường thông báo: Thực hiện quy định Luật Bảo vệ môi trường năm 2014 và xét đề nghị của Công ty TNHH MTV Cấp thoát nước Môi trường Bình Dương tại Văn bản số 1243/CTNMT-BQL ngày 15/09/2015, UBND phường Bình Thắng tổ chức buổi tham vấn cộng đồng cho dự án "Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An" cho nhân dân trên địa bàn phường.

1

2.2. Chủ dự án và đơn vị tư vấn trình bày nội dung báo cáo:

- Đại diện chủ dự án: Giới thiệu sơ lược về dự án, về mục tiêu, ý nghĩa của dự án đối với thị xã Dĩ An và tỉnh Bình Dương;

- Đại diện đơn vị tư vấn: Trình bày về nội dung của dự án "Hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An".

- Đại diện đơn vị tư vấn: Trình bày các tác động và biện pháp giảm thiểu của hệ thống thu gom nước thải, trạm bơm đối với dân cư phường Bình Thắng.

2.3. Thảo luận, trao đổi giữa cộng đồng dân cư chịu tác động với chủ dự án:

2.3.1 Thảo luận của các hộ dân:

- Thống nhất cao về việc thực hiện dự án thu gom nước thải trên địa bàn thị xã Dĩ An nói chung và phường Bình Thắng nói riêng, nhằm cải thiện môi trường khu vực, giảm thiểu ô nhiễm nguồn nước mặt trên địa bàn.

- Đề nghị chủ dự án xác định rõ vị trí các trạm bơm nước thải trên địa bàn phường và công khai với người dân.

- Một số khu vực trên địa bàn phường không có hệ thống thoát nước, địa hình thấp, trũng sẽ tiến hành thu gom nước thải như thế nào?

- Đề nghị có tuyến cống thu gom nước thải trên địa bàn phường phía qua quốc lộ 1A và bổ sung thêm 1 trạm bơm tại khu vực này.

2.3.2 Ý kiến trả lời của chủ đầu tư

- Chủ đầu tư sẽ phối hợp với Ủy ban nhân dân phường chọn lựa vị trí trạm bơm sao cho ít ảnh hưởng đến người dân nhất. Sau khi các trạm bơm được xác định vị trí cụ thể, chủ dự án sẽ công khai với dân trên địa bàn. Đối với các hộ dân bị giải tỏa để xây dựng trạm bơm, chủ dự án sẽ phối hợp với Ủy ban nhân dân phường làm việc với các hộ dân để thống nhất phương án bồi thường, hỗ trợ cho người dân.

- Đối với các khu vực thấp, trũng trên địa bàn phường thì dự án sẽ bố trí các trạm bơm nâng để thu gom nước thải tại các khu vực này đưa về trạm xử lý nước thải.

- Hiện nay, dự án chưa thiết kế thu gom nước thải khu vực phía qua quốc lộ 1A. Chủ dự án sẽ xin ý kiến của UBND tỉnh về việc bố trí tuyến đường thu gom phía qua quốc lộ 1A và bổ sung 1 trạm bơm tại khu vực này và sẽ báo kết quả cho UBND phường để thông báo cho người dân được biết.

2

3. Kết luận phiên họp:

- Ủy ban nhân dân phường đồng ý với việc thực hiện dự án, đồng ý với các biện pháp giảm thiểu tác động môi trường, xã hội nêu trong báo cáo.

- Đề nghị chủ đầu tư cần quan tâm hơn trong việc khảo sát, chọn lựa vị trí trạm bơm sao cho ít ảnh hưởng đến người dân nhất. Đồng thời thực hiện các biện pháp giảm thiểu mùi hôi phát sinh khi các trạm bơm đi vào hoạt động.

- Chủ đầu tư cần tính toán lưu lượng nước thải thu gom trên địa bàn phường cho phù hợp với sự phát triển dân số đến năm 2030.

- Đề nghị dự án đẩy nhanh tiến độ thực hiện để giải quyết vấn đề thu gom, xử lý nước thải trên địa bàn phường.

ĐẠI DIỆN UBND PHƯỜNG BÌNH THẮNG	ĐẠI DIỆN CHỦ DỰ ÁN P.TỔNG GIÁM ĐỐC
KT. CHỦ TỊCH P. CHỦ TỊCH	
Phạm Văn Đại	Nguyễn Thị Thu Vân

3

BINH AN WARD

DANH SÁCH ĐẠI BIỂU THAM DỰ CUỘC HỌP THAM VẤN CỘNG ĐỒNG
PHƯỜNG BÌNH AN, THỊ XÃ DĨ AN, TỈNH BÌNH DƯƠNG
Dự án "Thoát nước và xử lý nước thải khu vực thị xã Dĩ An, tỉnh Bình Dương"

STT	Họ tên	Chức danh	Ký tên
1	Lê Thanh Liêm		
2	Lê Tuyết Sang		
3	Lê Văn Du		
4	Nguyễn Đình Thuận	Trưởng khu phố	
5	Lê Minh Chánh		
6	Phạm thị Sơ		
7	NGUYỄN VĂN BA		
8	NGUYỄN HỒNG THANH THỦY		
9	PHAN THỊ LAN		
10	Đặng Ngọc Diễm Phương		
11	Hồ văn Long	cty cp. đá núi nhỏ	
12	nguyễn kim Liên		
13	Võ thị ngọc Điệp		
14	nguyễn thị tuyết phượng		
15	Huỳnh thanh Hùng		
16	Mai Đình Quang		
17	Bùi Thanh Tú		
18	Châu Anh Hảo	Nông dân B.A	
19	Trần thị Hoàn Yến		
20	Nguyễn Thị Ngọc Lệ		
21	Bùi Hồng Ân		
22			
23			

Date: ....

CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

BIÊN BẢN
V/v Lấy ý kiến dự án Nhà máy xử lý nước thải

Thời gian: 9 giờ 10 phút ngày 04/11/2015.
Địa điểm: Hội trường UBND phường
Thành phần:
- Ông Bùi Minh Duy – Ban QLDA Cty TNHH MTV cấp thoát nước BD.
- Phường: lãnh đạo Đảng, HĐND, UBND, từng ban, ngành, đoàn thể.
- KP: BĐH KP Bình Thung 2, đại diện tổ chức, nhân dân.

Nội dung

* Bà Bùi Thị Thanh Thuý – VP UBND:
- Thông qua thành phần dự họp.
- Thông qua chương trình buổi họp.

* Bà Đoàn Thị Thuỳ Nga – đại diện Trung tâm Quan trắc TNMT
- Căn cứ công văn số 193/UBND-KTN ngày 19/01/2012 của UBND tỉnh Bình Dương v/v quy hoạch, cắm mốc và đền bù đất xây dựng nhà máy xử lý nước thải khu vực Dĩ An, P Tân Đông Hiệp, TX Dĩ An.
- Căn cứ công văn số 1805/UBND-KTN ngày 28/6/2012 của UBND tỉnh v/v lập dự án đền bù đất xd nhà máy xử lý nước thải khu vực Dĩ An, P Tân Đông Hiệp, TX Dĩ An.
- Căn cứ công văn số 2522/UBND-QLĐT ngày 28/8/2015 của UBND TX v/v thống nhất vị trí xd nhà máy xử lý nước thải trên địa bàn TX Dĩ An.

Dự án đầu tư hệ thống thoát nước và xử lý nước thải khu vực thị xã Dĩ An nằm trong quy hoạch tổng thể hệ thống thoát nước.

Date: ....

Dự án bao gồm các cấu phần: hệ thống thoát nước mưa, hệ thống thu gom nước thải và nhà máy xử lý nước thải.
- Đặt trạm xử lý nước thải số 2 tại phường Bình An diện tích 7,2 ha.
Tỷ lệ thu gom đến năm 2020 đạt khoảng 60%.
- Xây dựng 2 trạm bơm tại phường: G2-5, G2-2.
- Góp phần cải tạo khu vực suối Lồ Ồ hướng ra Quốc lộ 1K.
- Nước thải phát sinh từ 2 phường còn lại An Bình và Bình Thắng theo các tuyến ống thu gom nước thải được đưa về trạm xử lý nước thải tập trung 2 đặt tại phường Bình An. Công suất xử lý của nhà máy là 10.000 m³/ngày.
- Vị trí của bể bơm: đặt 1 trạm bơm gần đường ĐT743.
- Ảnh hưởng đến môi trường: bụi, tiếng ồn, chất thải, mùi hôi.
- Thi công theo hình thức cuốn chiếu.
- Trạm bơm nước thải: bố trí máy bơm chìm đặt trong hầm bơm.
Trạm bơm được xây dựng chìm dưới đất để giảm thiểu mùi hôi.
- Công trình bể lắng
- Công nghệ xử lý mùi: xử lý kín trong nhà.

* Ông Hùng – PCT UBND:
- Vị trí lắp đặt nhà máy do đơn vị tư vấn trình bày nhằm mục đích lấy ý kiến cộng đồng về tác động môi trường. Do đó, đề nghị các hộ dân tại buổi họp có ý kiến đóng góp vì dự án này sẽ ảnh hưởng trực tiếp đến đời sống của các hộ dân.
* Ý kiến của các hộ dân:
- Vị trí đặt nhà máy hợp lý chưa, nơi có nhiều hộ dân đang sinh sống.
- Phường đã bố trí sau khi quy hoạch ra sao.
- Tác động của mùi hôi khi xd nhà máy xử lý
- Lợi ích khi xây dựng nhà máy cũng như tác hại tới môi trường
- Địa hình phường khu vực xây dựng nhà máy chủ yếu là đồi núi hợp lý chưa
- Trạm bơm đặt tại khu vực nào phải xác định rõ vị trí để mời họp dân cho đúng chính xác.

Date: ....

- Đề nghị cho biết vị trí cụ thể của dự án.
- Đề nghị đơn vị đáp nhật thông tin quy hoạch.
- Việc xả nước thải sau khi xử lý có đảm bảo khu vực 200m hiện tại đang ngập úng khi sau bơm mưa lớn.
- Quyền lợi của các hộ dân, nơi sinh sống đã lâu, có Miếu Gò Me thiêng liêng, điều kiện sống còn khó khăn (khoảng 50 hộ đang sinh sống, sao không chọn Bãi Châu Thới nơi còn đất trống hay tại phường Bình Thắng có đất

* Bà Huế - CTHĐND:
- Đơn vị tư vấn ghi nhận lại toàn bộ ý kiến của dân báo về công ty.
- Khảo sát thêm vị trí khu tái định cư Bình An hiện đang là đất trống; ít dân sinh sống.
- Đề nghị các ngành phối hợp chọn vị trí xây dựng thích hợp.

* Bà Ông Bùi Minh Duy - Ban QLDA Cty TNHH MTV cấp thoát nước MT BD
- Tiếp thu ý kiến của hộ dân báo về công ty, lãnh đạo cấp trên.
- Khu vực đất trống do nằm vướng dự án của Logistics nên không bố trí được nơi đây.
- Công nghệ xử lý mùi: xử lý mùi kín.
- Khi triển khai dự án, thực hiện bố trí tái định cư cho các hộ.
- Quỹ đất xdựng nhà máy ở phường Bình Thắng không còn.
- Khu vực xây dựng: bắc giáp mỏ đá Châu Thới, đông giáp dự án Logistics, Nam giáp đường MP-TV; Tây giáp đường vào phân xưởng đá 3.

* Ông Hùng - PCT UBND.
- ~~Dự thảo~~ Ghi nhận ý kiến của các hộ báo về công ty.
- Phương án bồi thường, tái định cư cho các hộ dân.
- Việc triển khai dự án để chọn vị trí đề nghị chủ đầu tư tiến hành khảo sát thêm vị trí khác để hạn chế ảnh hưởng đến cuộc sống người dân. Nếu khả thi (thấp nhất) thực hiện, còn không thì thực hiện theo phương án đã thông qua.

Buổi đóng họp kết thúc lúc 10 giờ 20 phút cùng ngày.

Thư ký

Bùi Thị Thanh Thủy

Date: ....

ĐD Cty cấp thoát nước môi trường Bình Dương

Bùi Minh Duy

PHÓ CHỦ TỊCH

Hảo

Châu Anh Hảo

Trần Thanh Hùng

Nguyễn Văn Thùy

Nguyễn Thanh Hải

Nguyễn Bích Thuận

Ý kiến của các hộ dân

Người dân chúng tôi tại khu vực xóm Miếu Gò Me thuộc khu phố Bình Thung 2, không đồng ý đặt nhà máy xử lý nước thải tại đây, vì đây là khu vực dân cư đang ở, trên địa bàn phường có các khu đất trống, tại sao không quy hoạch đặt nhà máy xử lý nước thải mà lại đưa vào khu dân cư đang ở, sinh sống mà quy hoạch là không phù hợp, do đó người dân chúng tôi yêu cầu di dời nhà máy ra khu vực đất trống không có người ở để đặt nhà máy xử lý nước thải

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vừa không gây tốn kém kinh phí của nhà nước

Date: vừa tránh gây thiệt hại cho nhân dân chúng tôi.

Trương Thị Cúc

tôi có đi dự họp ngày 4-11

Ký tên theo

Lê Thị Dung

Thảo

Đỗ Văn Bảy

Đỗ T. Thu Trang

Đỗ Thanh Cây đang ngụ Miếu Gò Me

Trương Thị Cúc

Nguyễn Văn Kim

Không đồng ý

Đỗ Tuyết Sang

Nguyễn Trường Lâm

Đỗ Thị Phượng

Điệp

Nguyễn Thanh Hơn

Võ Thị Ngọc Điệp

Không đặt nhà máy tại đây Nguyễn Thị Tuyết Phương

Phương

Đỗ Minh Đức

Bùi Nhật Nam

Nam

Dương Văn Quang

Không đồng ý đặt nhà máy tại đây

Đỗ Văn Thuận

Không đồng ý

Nguyễn Văn Thảo

Thảo

Phan Thị Mai

Dương Hoài Nhân

Tùng

Lê Văn Tùng

Phúc

Đỗ Bá Thắng

Dương Tấn Nghĩa

Quế Minh Phúc

Huỳnh Thanh Phú

Dương Tấn Hiệp

Quang

Dương Hoài Tấn

Khúc Đình Quang

Nguyễn Văn Tài

An binh ward

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

BIÊN BẢN HỌP THAM VẤN CỘNG ĐỒNG DÂN CƯ CHỊU TÁC ĐỘNG TRỰC TIẾP CỦA DỰ ÁN

- Tên dự án: Thoát nước và xử lý nước thải khu vực thị xã Dĩ An của Công ty TNHH 1 TV Cấp thoát nước-Môi trường Bình Dương.

- Thời gian họp: Ngày 17 tháng 11 năm 2015.

- Địa điểm nơi họp: Văn phòng khu phố Bình Đường 1, phường An Bình

1. Thành phần tham dự

1.1. Đại diện Ủy ban nhân dân phường An Bình:

- Ông : Nguyễn Ngọc Ấn Chức vụ: Chủ tịch UBND phường
- Ông:Nguyễn Xuân Vinh Chức vụ: nhân viên môi trường

1.2. Chủ dự án: Công ty TNHH 1 TV Cấp thoát nước-Môi trường Bình Dương

- Bà: Nguyễn Thị Thu Vân Chức vụ: Phó Tổng Giám đốc
- Ông: Bùi Minh Duy Chức vụ: Ban quản lý dự án

1.3. Đơn vị tư vấn lập báo cáo đánh giá tác động môi trường: Trung tâm Quan trắc Tài nguyên và Môi trường Bình Dương

- Bà: Đoàn Thị Thùy Nga - Nhân viên
- Ông: Trần Lê Nhật Giang - Nhân viên

1.4. Đại biểu tham dự:

Danh sách đính kèm.

2. Nội dung và diễn biến phiên họp:

2.1. Đại diện người chủ trì thông báo lý do cuộc họp và thành viên tham dự:

Đại diện Ủy ban nhân dân phường thông báo: Thực hiện quy định Luật Bảo vệ môi trường năm 2014 và xét đề nghị của Công ty TNHH MTV Cấp thoát nước Môi trường Bình Dương tại Văn bản số 1243/CTNMT-BQL ngày 15/09/2015, UBND phường An Bình tổ chức buổi tham vấn cộng đồng cho dự án "Thoát nước và xử lý nước thải khu vực thị xã Dĩ An" cho nhân dân trên địa bàn phường.

1

2.2. Chủ dự án và đơn vị tư vấn trình bày nội dung báo cáo:

- Đại diện chủ dự án: Giới thiệu sơ lược về dự án, về mục tiêu, ý nghĩa của dự án đối với thị xã Dĩ An và tỉnh Bình Dương;

- Đại diện đơn vị tư vấn: Trình bày về nội dung của dự án "Thoát nước và xử lý nước thải khu vực thị xã Dĩ An".

- Đại diện đơn vị tư vấn: Trình bày các tác động và biện pháp giảm thiểu của hệ thống thu gom nước thải, trạm bơm đối với dân cư phường An Bình.

2.3. Thảo luận, trao đổi giữa cộng đồng dân cư chịu tác động với chủ dự án:

2.3.1 Thảo luận của các hộ dân:

- Ủng hộ cao về việc thực hiện dự án thu gom nước thải trên địa bàn phường An Bình nói riêng để cải thiện môi trường khu vực, giảm thiểu ô nhiễm nguồn nước mặt trên địa bàn.

- Dự án thu gom và xử lý nước thải, vậy người dân có phải trả phí hay không?

- Dự án thu gom nước thải sinh hoạt của người dân, vậy có thu luôn phân hay không?

- Tiến độ của dự án như thế nào?

2.3.2 Ý kiến trả lời của chủ đầu tư

- Khi đấu nối vào hệ thống thu gom và xử lý nước thải, người dân sẽ phải đóng 1 khoản phí để đơn vị thoát nước có kinh phí xử lý nước thải, bảo dưỡng trạm bơm, đường ống. Tuy nhiên, phí xử lý nước thải sẽ được hội đồng nhân dân tỉnh phê duyệt, chi p hí này sẽ được công khai cho người dân được biết.

- Dự án sẽ thu gom trực tiếp nước thải sinh hoạt phát sinh của người dân (bao gồm phân), nước thải vệ sinh phát sinh không cần qua bể tự hoại mà đấu nối trực tiếp vào hệ thống thu gom.

- Dự kiến, dự án sẽ triển khai từ năm 2015-2019, đến quý 2 năm 2020 dự án sẽ đi vào hoạt động. Tiến độ triển khai dự án sẽ được công khai tại phường UBND cho người dân được biết.

3. Kết luận phiên họp:

- Ủy ban nhân dân phường đồng ý với việc thực hiện dự án, đồng ý với các biện pháp giảm thiểu tác động môi trường, xã hội nêu trong báo cáo.

- Đề nghị dự án đẩy nhanh tiến độ thực hiện để giải quyết vấn đề thu gom, xử lý nước thải trên địa bàn phường. Đồng thời, công khai tiến độ thực hiện dự

2

án, bản đồ quy hoạch cho người dân được biết. Khi triển khai thực hiện dự án, phải đảm bảo các quy định về Bảo vệ môi trường, đất đai, xây dựng.

ĐẠI DIỆN UBND PHƯỜNG AN BÌNH	**ĐẠI DIỆN CHỦ DỰ ÁN**
CHỦ TỊCH	P.TỔNG GIÁM ĐỐC
Nguyễn Xuân Vinh	CÔNG TY TNHH MTV CẤP THOÁT NƯỚC MÔI TRƯỜNG BÌNH DƯƠNG
U.B.N.D PHƯỜNG AN BÌNH T.X DĨ AN T.BÌNH DƯƠNG	Nguyễn Thị Thu Vân
Nguyễn Ngọc Ẩn	

3

DANH SÁCH NGƯỜI THAM DỰ CUỘC HỌP THAM VẤN CỘNG ĐỒNG PHƯỜNG AN BÌNH, THỊ XÃ DĨ AN, TỈNH BÌNH DƯƠNG

Dự án "Thoát nước và xử lý nước thải khu vực thị xã Dĩ An, tỉnh Bình Dương"

STT	Họ tên	Chức danh	Ký tên
01	Phạm Thị Tết	hộ dân khu phố BĐ1	
02	Nguyễn Thị Chung [illegible]	"	
03	Phạm Thị [illegible]	"	
04	Ngô Văn Kiên	(Lê Văn Tách)	
05	Trần Văn Phú	"	
06	Trịnh Ngọc [illegible]	"	
07	[illegible]	"	
08	Đỗ Thế Trung	"	
09	Đào Thị Thêu	"	
10	Ng~ Văn Học	"	
11	Đặng Văn Phiến	TRưởng khu phố	
12	[illegible] Văn Thành		
13	Ng~ Ngọc Đô		
14	Ng~ Xuân Hoan		
15	Nguyễn Thị Thanh Nhã	Tổ trưởng tổ 29	
16	Đinh Cao Đệ		
17	Nguyễn Quang Vinh	T² Tổ 45	
18	Đoàn Ngọc Thắng	T 39 BĐT	
19	Ng~ Văn [illegible]	BĐ1	
20	Trần Văn Vụ	BĐ1	

Annex 5 – TOR on Environmental Supervision by Construction Supervision Team

Overview

In order to prevent the harmful operations for the community where implementing the project and minimizing the environmental impact during the execution of the work for construction in the project, the solutions for management of the risk and minimizing the environmental impact, safety and health has been constructed and presented in the report for assessment of the environmental impact/environmental management plan (ESMP) of the project. The contractor is responsible to observe and implement those solutions.

The supervision consultant for construction will supply the professional technical service in order to ensure the implementation effectively and the solutions for management of risk and minimization of the environmental impact, safety and health and ESMP of the project.

The scope of service:

On behalf of the investor as PMU, the supervision consultant implements the following missions:

- To perform for inspection of the site frequently.
- To assess the implementation of the solutions for environmental protection basing on the contents of ESMP and execution contract.
- To assess the effect of the solution for minimization of the environmental impact and the level for minimization of the environmental impact of the project.
- When having the demand, to implement the assessment of the ability that is possible to accept for the environmental aspect of the solution for execution (even the temporary work and the eternal work). When necessary, the supervisor for execution will seek and suggest the plans with the smallest environmental impact on the foundation for reference with the designer, contractor and PMU.
- To authenticate the survey result of the cases not to observe about the environmental aspect and the effect of the solutions for restriction; and
- To discuss frequently with the chief engineer of the contractor about the case with non-observation.
- To instruct the contractor to implement the solution for restriction in a frame of the limited period and to perform for supervision in supplementation if necessary, depending on the demands and processes in the contract to the case for non-observation.
- To instruct the contractor to implement the actions for minimization of the impact and observe the processes indicated in ESMP in case not to observe or there is the discrepancy with EMP.
- To instruct the contractor to cease the operation causing the greatly disadvantaged impact or when the contractor does not implement the solutions for minimizing or the solution for restriction.
- **For the contracts to request for establishment of the Environmental Management Plan concretely at the location for implementation of the project (SEMP)**, The supervision consultant for execution will check the final draft and suggestion for ratification of all plans for environmental protection at the locations for execution that the impacts may occur. Those locations may be the place for dredging, mine of materials, waste yard, camp for workers. The supervisor for execution will consider and ratify the SEMP copies presented by the contractor. If seeing SEMP does not observe the contents of ESMP report then the supervisor for execution will work with the investor and the contractor to indicate the suitable solutions.

- **Settlement of the claim/appeal:** The office at the site of the contractor will be the place to receive the appeals, claims for environment such as dust, noise, traffic safety… The Commander of the contractor or Deputy Commander will be responsible to settle, dissolve of indicate the solutions for settlement of the claim. The supervision consultant will be delivered a copy of the content for claim and authenticate that the appeal was settled amicably.
- **Authentication for payment monthly:** The consultant for execution will authenticate the payment monthly for the operations concerning the minimization of the environmental impact that the contractor implemented.
- **Report: The supervisor for execution will make the following reports:**
    - Report two week at once about the matters for non-observation.
    - Report in summary monthly and the findings from the operation for assessment and supervision.
    - In the end of the period for execution, the supervision consultant for execution makes the final report to indicate in summary the main findings during the implementation of work, the occurred mistakes, solution for correction… together with the suggestion and instruction about the way for settlement of the equivalent cases in the future

Annex 6 - Site specific issues, risks and mitigation measures during construction

Site	Issues /Potential impacts	Mitigation measures
The wastewater treatment plant 	Near rail way, Dong Hiep quarry and Dong An residential area. Vegetation cover, shrubs and trees will be removed Increased erosion potentials when the ground become barren	Traffic control, apply spe Avoid gathering materi corridor Minimise disturbed areas Avoid the whole choppe Levelling the ground as s
Discharge point at the WWTP Expansion, rehabilitation of T4 channel was proposed 	Some trees will be cut down Health and safety for the workers and the public Affect aquatic lives Interrupt drainage function	Avoid overcutting the tre Provide adequate protec workers Not allow the waste oil a Not allow materials, was Materials, wastes to be r soon as possible Slurry sump to be requir into the canal Divert flow
Cai Cau stream: Section where T4 joins Cai Cau stream 	Some trees will be cut down Health and safety for the workers and the public Interrupt drainage function Affect aquatic lives	Avoid overcutting the tre Provide adequate protec workers Divert but maintain envir Not allow the waste oil a Not allow materials, was Materials, wastes to be r soon as possible Slurry sump to be requir into the canal
743B provincial road(high traffic density)**:** access roads to WWTP; D500-1000 sewers will be installed. 	Hoa Quynh and Anh Sao kindergartens, Di An hospital are located along this road Dust, noise and traffic safety Safety for the patients, children and their families	Apply speed limit and hospital and kindergarten Arrange staff to direct tra Cover the trucks in case Place signs, fences ar excavation pits Avoid construction at nig Avoid loading materials, Put on the lid on the ex construction Return the road surface w Avoid construction acti

Site	Issues /Potential impacts	Mitigation measures
		cemetery a week ahead o
Access road to the WWTP 	Traffic disturbance, dust, noise and safety risks during construction phase	Inform the public constru Apply speed limit for the Limit the speed of vehicl Cover trucks in case of m Avoid the gathering of r routes Clear, collect the scatte construction day
East-West road: D500-1000 sewer pipes will be installed. Nhi Dong primary school, Bup Sen kindergarten are located on this road 	Dust, noise and traffic safety Safety for the children and their families	Apply speed limit and hospital and kindergarten Arrange staff to direct tra Cover trucks in case of m Place signs, fences, refle canals Put on the lid on the ex construction Return the road surface w
Road 21 (high traffic volume)**:** D500-1000 sewer pipes will be installed. Hoa Trang Nguyen kindergartens are located on this road 	Dust, noise and traffic safety Safety for the public their families	Apply speed limit and hospital and kindergarten Arrange staff to direct tra Cover the trucks Place signs and protectio Put on the lid on the o uncompleted constructio Return the road surface w
Le Hong Phong road (12 m wide, high traffic density): D300-500 sewer pipes will be installed. Dong Thanh and Hoa Hong kindergartens, Tan Dong Hiep primary school and a local market are located along this road	Dust, noise and traffic safety Safety for the public, particularly the children	Apply speed limit and hospital and kindergarten Arrange staff to direct tra Cover the trucks Protect open channels wi

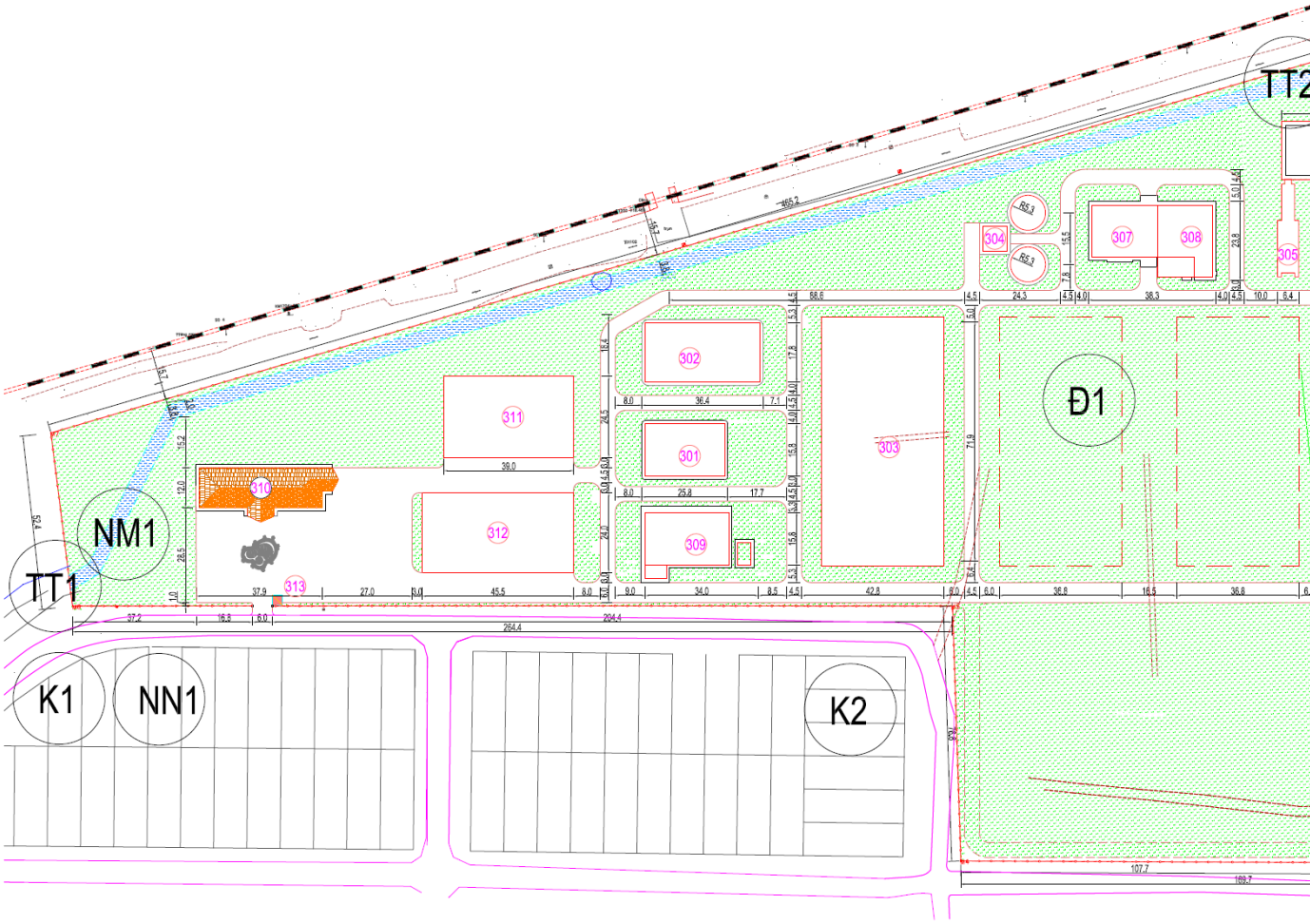
Site	Issues /Potential impacts	Mitigation measures
		Avoid loading/ unloading Put on the lid on the o uncompleted constructio Return the road surfac construction
Nguyen Tri Phuong road (6-8m wide, medium traffic volume). 	D300-D500 sewer pipes will be installed; Hoang Yen and Hoa Lu kindergartens, Van An Tinh Xa pagoda and railway are located along this road. Dust, noise and traffic safety (high traffic density) Safety for the public Disturb traffic, visual impacts, disturbance to religious activities at the pagoda during the first and full moon of lunar months	Apply speed limit and hospital and kindergarten Arrange staff to direct tra Cover the trucks Protect open channels wi Avoid loading/ unloading Avoid gathering materia pagodas Return the road surfac construction Put on the lid on the exca Schedule construction pagoda avoiding the first
Dong Tan road, 10 m wide, medium traffic volume. 	Di An market, Hong Ngoc clinic are located along this road Dust, noise and traffic safety Safety for the public	Apply speed limit and do Protect open channels wi night time Avoid loading/ unloading Put on the lid on the exca Avoid gathering material Return the road surfac construction
Truong Tre road, 12 m wide, medium traffic volume. Vo Truong Toan secondary school, An Linh, Phap An and Bui Buu are located along this road 	Dust, noise and safety for the children and public Disturb traffic, visual impacts, disturbance to religious activities at the pagodas during the first and full moon of lunar months	Apply speed limit and pagodas and school Avoid loading/ unloadi traffic at peak hours at th Cover the trucks Protect open channels wi Avoid gathering materia pagodas Return the road surfac construction Put on the lid on the exca Schedule construction pagoda avoiding the first
Tran Hung Dao road, 10m wide.	Di An ward's clinic and church, Choi	Apply speed limit and do

Site	Issues /Potential impacts	Mitigation measures
medium traffic volume. D300-500 sewers will be installed. 	Non, Hanh phuc, Hoa Ban Do and Anh Dao kindergartens are located on this road. Dust, noise and traffic safety Safety for the public, particularly the children Religious activities on Sunday and near Christmas time	church and kindergartens Avoid loading/ unloadi traffic at peak hours Cover the trucks Protect open channels wi Avoid gathering raw mat Return the road surfac construction Put on the lid on the exca Schedule construction disturbance to the sectio near Christmas time
Pumping station P1-1. 338 m2 Tan Dong Hiep ward. 	Some vegetation and trees will be removed Safety risks to the public Visual impacts	Minimise disturbed areas Provide adequate protec workers Covered tightly by iron meters Avoid construction at nig notified before at least 2 Fence at materials, exc from dust emission Not allow oil and grease Transport the residual so
Pumping station G1-1. 115 m2. Nguyen Thi Minh Khai road 	Entries narrow Closer to the household Visual impacts Safety risk to the public	Minimise disturbed area the surrounding commun Provide adequate protec workers Cover material, waste tru Fence the construction minimum height of 2 m Avoid the construction at Avoid gathering material Transport the wastes as s
Pumping station P1-2. Dong Hoa Ward. 338 m2. Opposite to Big C supermarket 	Visual impacts Removal of vegetation cover Safety risks and disturb power supply Safety risk to the public	Minimise disturbed area Fence the site and place s Provide adequate protec workers Fence the construction minimum height of 2 m Cover material, waste tru Ensure sufficiently lights Avoid crane trucks opera Contact power authority

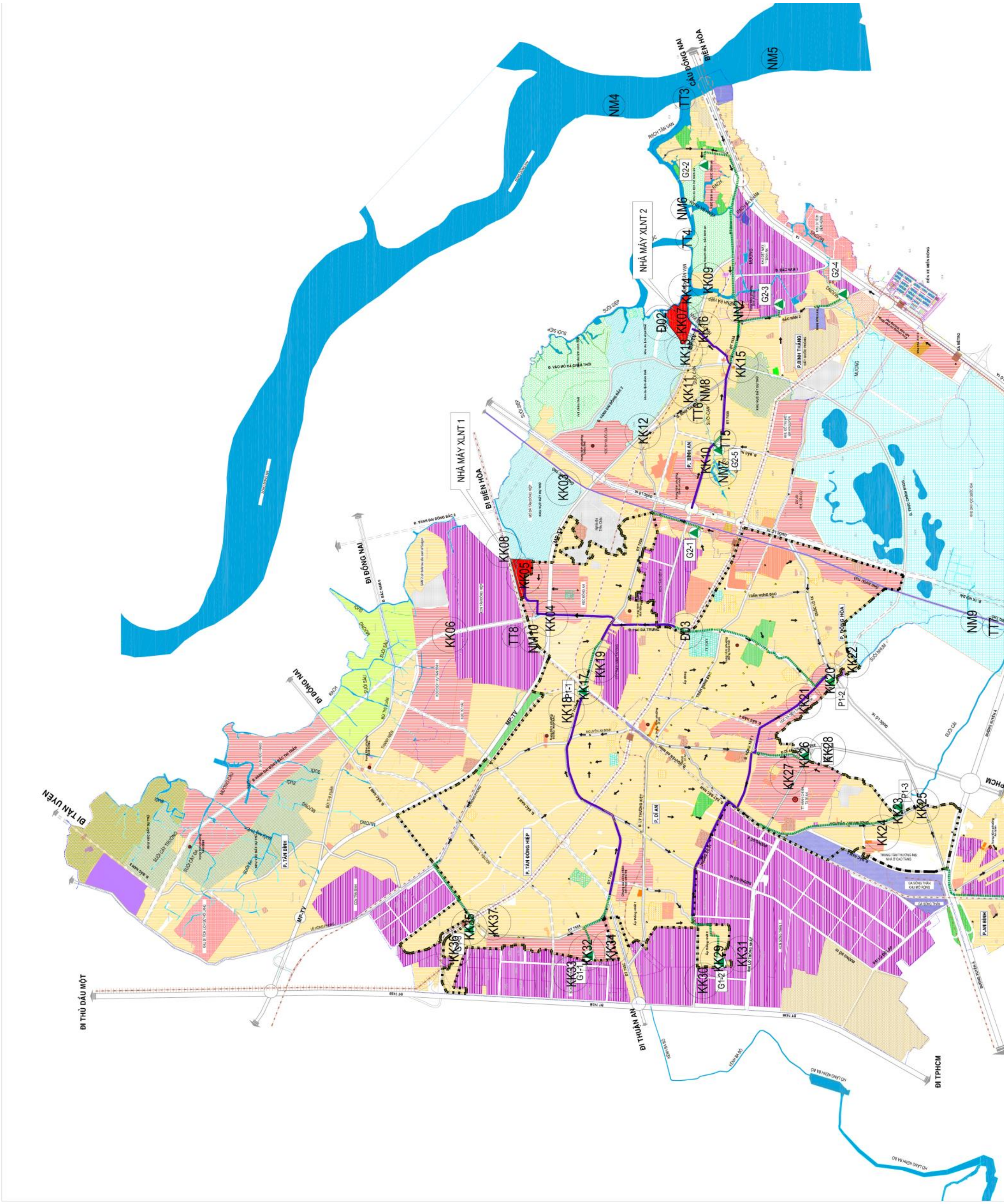
Site	Issues /Potential impacts	Mitigation measures
Pumping station G1-3. 213 m2. at roadside of 743 Provincial Road and in front of the commune administration center 	High traffic safety risks Visual impacts Safety risks to the public Safety risks and disturb power supply	Minimise disturbed area the surrounding commun Fence the site and place s Provide adequate protec workers Fence the construction minimum height of 2 m Ensure sufficiently lights Avoid crane trucks opera Contact power authority
Pumping station G1-4.95 m2. Dĩ An-Truông Tre road 	Currently is a park, planned to be wastewater transfer station in the future Safety risks to the public Interrupt public access to the park Visual impacts	Architectural design mus Inform the public about c Fence the site and place s Provide adequate protec workers Fence the construction minimum height of 2 m Cover material, waste tru Ensure sufficiently lights
Pumping station P1-3. 236 m2. Nguyen Tri Phuong road 	Small station. Currently public land managed by the ward Close to some residential houses	Fence the site Install barriers and sign b Provide adequate protec workers Fence the construction minimum height of 2 m Cover material, waste tru Cover the material, waste Ensure sufficiently lights
Pumping station G1-2. 77m^2 Thang Nhat 2 village, Di An town 	Entries narrow At roadside so construction will disturb traffic and increase traffic safety risks	Fence the site Arrange a traffic controll Cover material, waste tru Avoid gathering material Fence the construction minimum height of 2 m Transport the wastes as s
T4 Drainage channel. Dense vegetation cover and structures. Will be rehabilitated.	Will affect some residential houses Some vegetation will be removed Flow will be interrupted, water quality will be affected Health and safety risks for the workers and the public	Divert flow and maintain Provide adequate boots, workers Not allow the waste oil a Not allow wastes to be g Slurry sump to be requir

Site	Issues /Potential impacts	Mitigation measures
	Excavated mud may cause odor problems	into the canal Transport the excavated trucks as soon as possible
 Section where T5A joins T4 channel	Will affect some existing infrastructure Some vegetation will be removed Flow will be interrupted, water quality will be affected Health and safety risks for the workers and the public	Contact authority mana service is foreseen Divert flow and maintain Provide adequate boots, workers Not allow the waste oil a Not allow wastes to be g Slurry sump to be requi into the canal Transport the excavated trucks as soon as possible

Annex 7 –Baseline sampling locations



SƠ ĐỒ VỊ TRÍ LẤY MẪU HIỆN TRẠNG MÔI TRƯỜNG
DỰ ÁN THOÁT NƯỚC VÀ XỬ LÝ NƯỚC THẢI KHU VỰC THỊ XÃ DĨ AN, TỈNH
CÁC VỊ TRÍ K1, K2, NM1, NM2, NM3, NN1, Đ1, TT1, TT2


NHÀ MÁY XLNT 2
NHÀ MÁY XLNT 1
ĐI BIÊN HÒA
ĐI ĐỒNG NAI
ĐI TÂN UYÊN
ĐI THỦ DẦU MỘT
ĐI THUẬN AN
ĐI TPHCM
NM4
NM5
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KK37
G2-1
G2-2
G2-3
G2-4
G2-5
P1-2
P1-3
Đ02
Đ03

Annex 8 – Due Dilligence Review of existing borow pits and quarries

1. Rach Rat stone quarry

1.1 General information

Rach Rat Stone Quarry is located at An Binh Commune, Phu Giao District, Binh Duong Province. The Quarry has started operation since 2002, with Becamex Material Joint Stock Company as the Client. Total area of mining zone is 31.4ha, the mean capacity of mining is approximately 300,000 m^3/year with the exploitation depth of 28m.

Rach Rat Stone Quarry was licensed by agency of natural resources and environment management by means of following letters:

- Decision No. 1668/QĐ-BKHCNMT dated 23/08/2001 from Ministry of Science, Technology and Environment regarding approving the Environmental Impact Assessment (EIA) report of An Binh Stone Quarry building stone processing and exploitation project at An Binh Commune, Phu Giao District, Binh Duong Province.

- Decision No. 494/QĐ-BTNMT dated 18/03/2009 from Ministry of Natural Resources and Environment regarding approving the EIA report of An Binh Stone Quarry building stone processing and exploitation investment report (FS) with the capacity of 1,000,000 m3 monolith/year at An Binh Commune, Phu Giao District, Binh Duong Province.

- Decision No. 2172/QĐ-BTNMT dated 11/12/2008 from Ministry of Natural Resources and Environment regarding approving the environment reclamation, rehabilitation project for the building stone processing, exploitation investment project at Rach Rat Stone Quarry.

- License of material exploitation No. 117/GP-UBND dated 31/12/2009 issued by Binh Duong Provincial People's Committee with the area of 31.4ha, the capacity of 800,000 m3/year, the expiration up to 30/06/2014.

- License of material exploitation (reissuance) No. 15/GP-UBND dated 13/06/2014 issued by Binh Duong Provincial People's Committee with the area of 31.4ha, the capacity of 300,000 m3/ year, the expiration up to 01/07/2019.

- License of industrial explosive materials No. 06/GP-UBND dated 28/02/2014 issued by Binh Duong Provincial People's Committee.

1.2 Processing, exploitation process of the Stone Quarry

Exploitation technology process: summarized in Figure 1.1

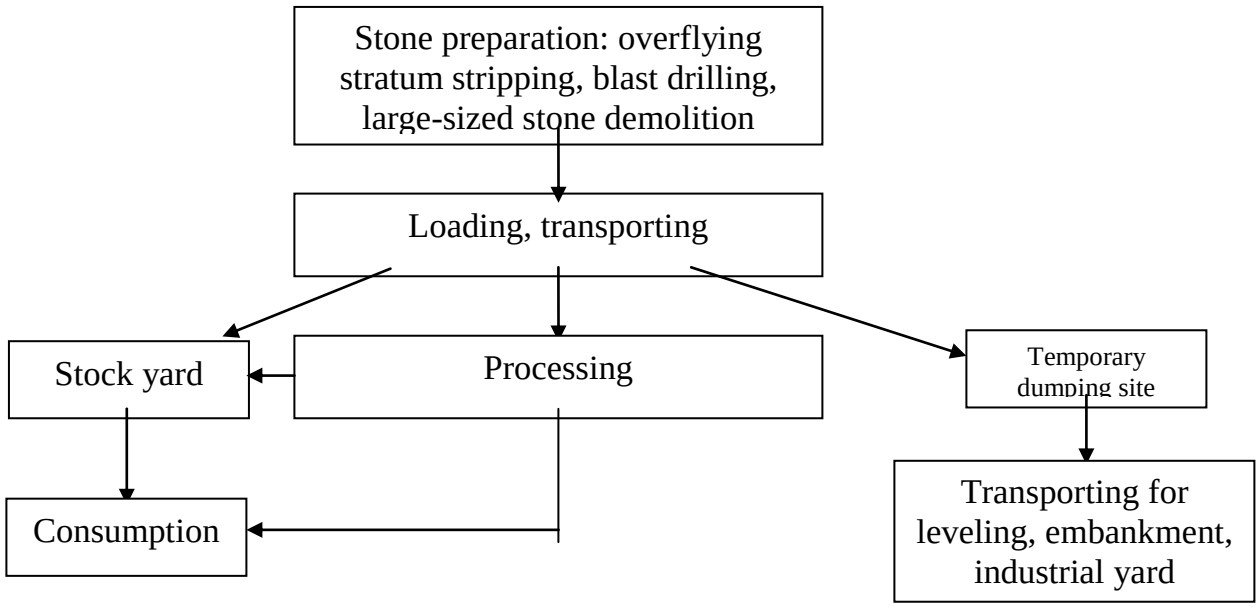

Figure 1.1: Quarrying technology process

Processing technology process: summarized in Figure 1.2

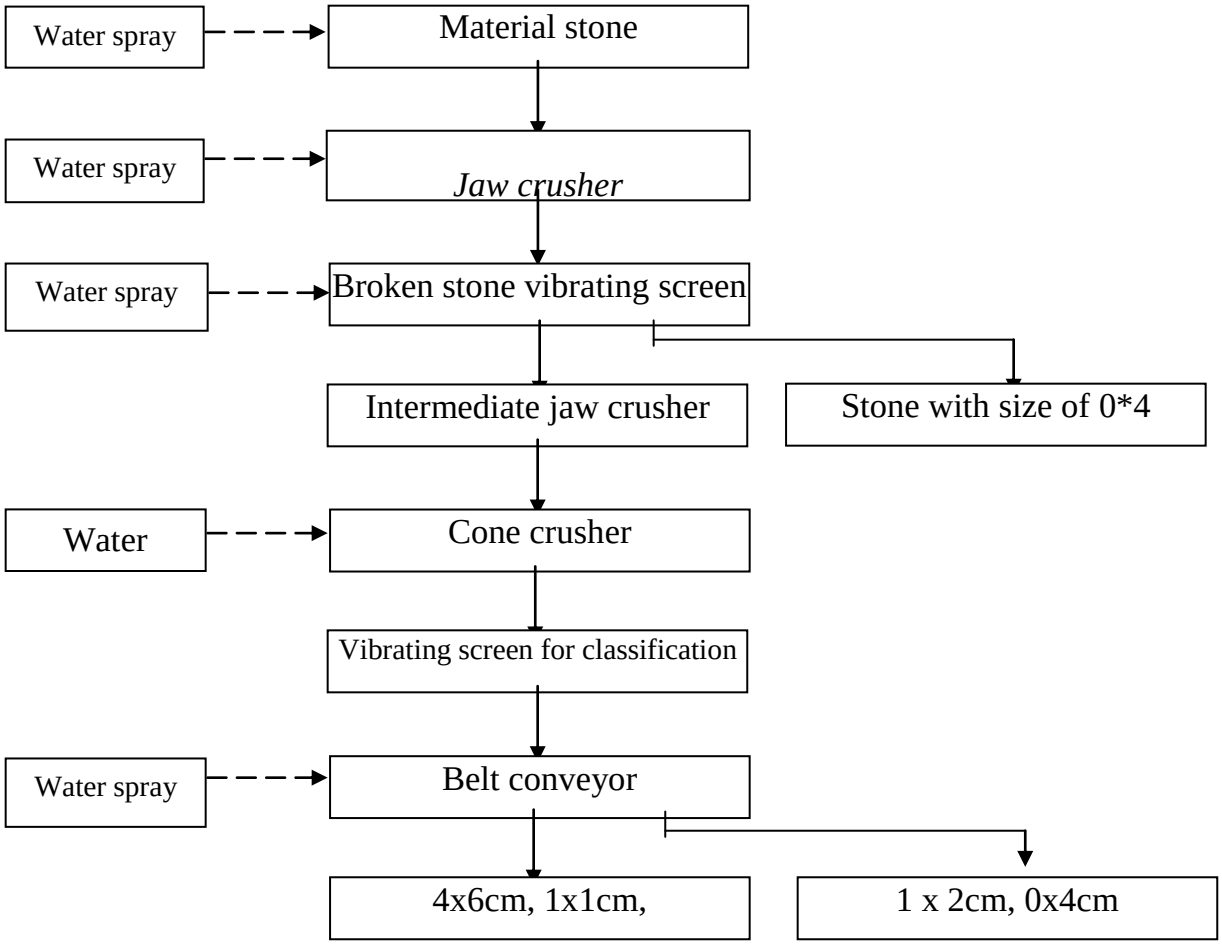

Figure 1.2: Stone processing technology process

1.3 Control, mitigation measures of environmental impacts for the Stone Quarry

The quarry area is fenced by a metal fence. The entrance of quarry is placed at the weighing station and the safeguard house to avoid the situation of overloaded trucks. The Stone Quarry is far away from the nearest household approximately 2km. The office of quarry is installed with a display to the quarry activities. Total number of staff at the quarry is about 76 persons, however, only the security guards and managers can stay at nigh. At the quarry, the cooking isn't organized but only serving for workers is provided by the Company.

1.3.1 Dust pollution mitigation measures

a. Dust control during blasting and drilling processes:

Almost all dril holes contain water so the amount of dust arisen from the hole drilling process for blast is insignificant.

The Company uses a differential blasting method to minimize the quantity of large-sized stone, the period of blast is very short so the amount of dust during the blasting process will be mitigated.

b. Dust control during stone loading, transporting processes

The amount of dust arisen during the stone loading, transportation processes discharges into the external environment at the processing, quarrying areas and along the transportation routes. In order to control the amount of dust, the Company applied the measures as follows:

Spraying water on the haul road surface from the quarrying site to the processing area.

The product stone will be wetted by spraying water for anti-dust at the processing area.

Scattered stone along the haul roads at the internal quarry area and the external quarry area to the domestic river port will be cleaned.

The green tress along two (02) haul roads will be grown to prevent dust from surrounding emission.

The product stone trucks for consumption are always covered by tarpaulins on the vehicle body, not overcharged in case of circulation on routes.

c. Dust control during building stone processing process

During the processing process, dust will be generated at impact crushers, jaw crushers and the head of belt conveyor. Therefore, the Company has applied the anti-dust spraying measures at dust generating locations, especially as follows:

- Spraying water to wet the material stone immediately after filling stone into the jaw crusher.

- Spraying water to wet the stone at the cone crusher.

- At the head of belt conveyor, spraying water to wet the product stone to prevent dust from surrounding emission.

- Spraying water along the route system in the processing area.

- The stone in the processing area is cleaned.

- Planting around the processing area to prevent dust from surrounding emission.

1.3.2 Exhaust air pollution prevention measures from means of transportation

In order to mitigate the exhaust air pollution, the Company has applied measures as follows:

- Limit vehicles without safety assurance on environmental sanitation.

- Frequently maintain vehicles, not transport stone with overloads in accordance with stipulations.

- The speed of vehicles isn't allowed over 15 km/h.

1.3.3 Noise, vibration control measures during the building stone exploitation, processing processes

In order to control noise and vibration from the processing machines, the Company has installed a foundation to place machines on a wide and solid plan. The Company frequently maintains these machines, lubricates at noise causing contact components for a combination of impact crusher – jaw crusher – vibrating screen.

Frequently maintain machines, equipment of exploitation, transportation and processing.

Only use loading, transporting devices which ensure the technical requirements.

The Company carries out the blast by the differential detonator method. By mean of this method, the vibration from the blast will reduce, it leads air impact wave and vibration when the blast reduces, the distance of thrown stone also reduces.

For regulations, operators and all persons in and out of the workshop shall wear thick masks with good aeration for breathing.

The period of blast agreed between the Company and An Binh Commune People's Committee is from 11h to 12h30' as it is a time causing the least influence to people's life around the quarry, to assure the daily habit of local people around the quarry.

1.3.4 Solid waste collection measures

a) Manufacturing solid wastes

Stone of overlying stratum is used for internal routes, industrial leveling. The remaining part will be sold for enterprises with the demand of leveling.

b) Domestic solid wastes

In the production area, six (06) domestic solid waste bins are arranged to temporarily store the domestic solid wastes from staff. The Company makes a contract with the competent unit to collect and treat the domestic solid wastes.

c) Hazardous solid wastes

At current, the Company collected, stored in accordance with regulations at separated storehouse with the area of $12m^2$. When the quantity of wastes are sufficiently generated, Binh Duong Water Supply, Sewerage, Environment Co., Ltd (BIWASE) will collect, transport to the South Binh Duong solid waste treatment complex for treatment.

1.3.5 Water source pollution control measures

a) Water control from exploitation and excavation pit

At each exploitation and excavation pit, there is a sump for sedimentation, thence to be pumped to the sedimentation tank, subsequently water will be pumped to Rat Stream.

Due to the groundwater extraction, the exploitation process shall always pump water out of the exploitation and excavation pit. In a rainy season, the rainwater will supplement in the exploitation and excavation pit. In order to prevent this phenomenon, the Company used the recovery measures as follows:

- The Company will use a large capacity with the head of H = 80m, the capacity of Q = $200m^3$/h.

- Frequently improve the channel around the quarry exploitation area to collect surface area of the quarry.

b) Alternative of domestic wastewater treatment

Domestic wastewater from staff is preliminarily treated by a septic tank, thence to be penetrated.

1.3.6 Erosion prevention measures at *the exploitation and excavation pit bank, environmental emergency treatment prevention measures*

a) Erosion issue at the exploitation and excavation pit bank

In order to prevent the erosion at the exploitation and excavation pit bank, the **environmental emergency** during the exploitation operation process, the Company always complies with the approved alternatives of exploitation.

In order to assure gradient of exploratory stratum slope, terminal stratum slope in compliance with the design documents of the quarry.

Frequently monitor the wall of excavation pit to find out large cracks, fissures to have sliding risk prevention measures for the wall of excavation pits.

b) Fire precaution issue

In the quarry, there is an oil storage to supply DO for the transportation means of the quarry. In order to prevent the fire, the Company has measures as follows:

To strictly comply with regulations of fire precaution in the material depot.

In the range of depot, there are fire precaution facilities to be frequently checked.

No smoking, no fire in the range of fuel output, there are stipulations of fire precaution for everyone to apply and learn.

c) Blast and exploitation emergency prevention

The Company will apply the following safety measures to prevent blast and stone exploitation emergencies:

To assure the safe distance in case of blasting to be 300m for human, 200m for equipment.

To strictly carry out calculation parameters and safety regulations for blasting.

To sufficiently equip working safety assurance equipment, devices for workers.

The Company has arranged four (04) underground shelters around the exploitation and excavation site as the workers' shelter in case of blasting.

The blasting shall be implemented in accordance with the period informed with An Binh Commune People's Committee to mitigate impacts to people's life, health in the area and minimize the industrial accidents for workers.

c) Soil erosion prevention

To localize the exploitation zone, to plant around the excavation pit. Among the exploitation strata, protective belt of excavation pit bank has the larger width than 1/3 height of stratum to minimize the motive force of water running into the excavation pit bank, stone rolling into the toe of excavation pit, erosion at the exploitation area.

1.3.7 The Company's other application measures

Periodically quarterly, the Company carries out the arisen air, wastewater environment quality measurement at the quarry and prepares a statement and pays the environmental protection charge for wastewater. Periodically at the end of year, the Company prepares the environmental quality monitoring report to send Binh Duong Provincial Department of Natural Sources and Environment (DONRE), Ministry of Natural Sources and Environment (MONRE).

The Company paid a deposit for the environmental rehabilitation, reclamation with total amount of VND 2,043,772,400 in accordance with Decision No. 2172/QĐ-BTNMT dated 11/12/2008 from MONRE.

Before cutting a new stratum for checking a stratum slope and a stratum surface, far away from the edge of stratum about 0.5m, it is not advised to have stones or any things to possibly fall into the lower stratum.

In case of levering up the upper stratum, it is recommended to arrange a guard for facilities not to be allowed to enter in the dangerous zone.

Persons who lever up stone at the same stratum shall be apart at least 6m. When the lever up stone at the upper stratum is completed, the lever up stone at the lower stratum will be implemented.

Workers who operate the drilling machine shall wear tidy cloths. In case of opening the drill holes, it is recommended to implement the rotating machines slowly and gradually increase the velocity until the stably operating machines.

Blasting workers at the height shall be equipped with the safe belt.

*** The implementation measures for blasting works:**

The blasting is performed in accordance with the stipulated period. During the period of blasting, it is absolutely forbidden to enter the dangerous areas of mine areas.

The approved blasting passport is strictly executed.

Explosive materials at any team, the team shall use and maintain these explosive materials.

It is not allowed to smoke in charging, blasting areas and to throw the explosive.

In year 2015, the Company repaired, maintained the inter-commune routes with the length of 15km. In addition, the Company contributed in the Fund for the Poor, built charity houses with support of VND 30,000,000 for the commune.

1.4 Results of natural resources, environment of the Government management agencies

a. Inspection works

Pursuant to the letter No. 1048/KL-STNMT dated 18/04/2014 from DONRE regarding the conclusion of inspection for execution of law regulations on natural resources and environmental protection for Becamex Material Joint Stock Company as follows:

- The Company is allowed to exploit in the approved area and the exploitation output isn't allowed to exceed the permitted capacity. The Company assigned the managing director in accordance with the stipulations and paid the tax of natural resources and environmental protection charges during the material exploitation and operations.

- The Company prepared the EIA report of the environmental rehabilitation, reclamation report and was approved by MONRE. The Company carried out the environmental mitigation measures such as dewatering on haul roads, on rock piles, jaw of crushers; construction of filtration sedimentation tanks and wastewater pumping system from the excavation pit to the canal; planting around the exploitation excavation pit, processing areas; construction of safe embankment for runoff mitigation; periodically preparing the environmental monitoring reports; enumerating and payment the environmental protection charge for wastewater; paying the deposit for the environmental rehabilitation and reclamation fund.

- In addition, the quarry area of the Company has still some shortcomings such as the Northern and the Northwestern walls of excavation pit I which were exploited to the stop bank but overlapping strata, slope angle from 70^0 to 80^0, the Company is requested to solve the overlapping strata of the Northern and the Northwestern walls of excavation pint I in the period of six (6) months; the existing condition of hazardous solid waste hasn't been reported in accordance with the regulations so the Company is requested to prepare the report of hazardous solid waste management periodically in compliance with the stipulations.

According to the PMU's supervision, the representative of Material Division under Binh Duong Provincial DONRE, EISA at the meeting dated 06/04/2016 with Mr. Vu Dinh Dang – a representative of the stone quarry: at current, the Company overcame the shortcomings for the inspection team mentioned at the letter No. 1048/KL-STNMT. The environmental protection works of the quarry were sufficiently implemented in accordance with the contents of approved EAI report.

b. Monitoring activities:

Operations of Rach Rat Stone Quarry are monitored by the local authorities including An Binh Commune People's Committee, Phu Giao District People's Committee, Binh Duong Provincial Department of Natural Sources and Environment (DONRE). In addition, there is the supervision from local people along the stone haul routes of the quarry.

In case of claims on the quarry activities in incompliance with the law, these claims will be sent to the supervision team. Accordingly, the head of commune will check and inform the quarry manager who is responsible for solving the public concerns. If the settlement of the manager is inappropriate, the community leaders will notify DONRE. When receiving the claims, DONRE will arrange and check to determine the issues and propose the measures to force the Client to implement with the period of performance, otherwise the Client shall stop their operation or close the quarry.

The deposit for the environmental rehabilitation will be monitored by Agency of Environmental Protection Fund under DONRE. The Client doesn't pay in the Fund in the due time, the Environmental Protection Fund will issue a letter for reminding the Client to execute the obligation. If the Client implements intentionally, the Environmental Protection Fund will issue a letter to request DONRE to carry out a penalty for the Client in accordance with stipulations.

 The area of exploitation and excavation pit	 The area of exploitation and excavation pit	 Stone processing area Air quality monitoring
	 Office area	 Hazardous solid waste storehouse

Conclusion:

Becamex Material Joint Stock Company exploits stone at Rach Rat Stone Quarry in compliance with regulations of Vietnam Law in material exploitation, preparation of environmental documents and

implementation of mitigation measures in accordance with proposed contents in the report. Concurrently, the Company carried out the deposit of environmental rehabilitation fund in accordance with stipulations.

2. Dau Tieng Reservoir stone quarry

2.1 General information

Dau Tieng Reservoir stone quarry is located at Dau Tieng District, Binh Duong Province and Tan Chau District, Tay Ninh Province. At current, two (2) enterprises receive the permit of sand extraction at Dau Tieng Reservoir area managed by Binh Duong Provincial Department of Natural Resources and Environment including Binh Duong Minerals and Construction Joint Stock Company and Hoa Binh Private Enterprise.

In addition, Dau Tieng Reservoir area is unmethodically extracted in incompliance with the procedure.

The area of sand extraction managed by Binh Duong Minerals and Construction Joint Stock Company put into operation since year 2010. The area of sand extraction is 820,560m^2 with the capacity of 98,000 m^3/year, the depth of extraction is from 0.8 to 1.8m. Binh Duong Minerals and Construction Joint Stock Company was permitted by the natural resources and environment management agency of Vietnam via the following letter:

- Decision No. 313/QĐ-BTNMT dated 08/02/2010 regarding approving the EIA report of the project on "Investment in the building sand quarry extraction in Dau Tieng Reservoir under Tan Chau District, Tay Ninh Province and Dau Tieng District, Binh Duong Province with the capacity of 98,000 m3/year" issued by Ministry of Natural Resources and Environment.

- Decision No. 242/QĐ-BTNMT dated 11/02/2011 from Ministry of Natural Resources and Environment regarding approving the environmental rehabilitation, reclamation project for the project on "Investment in the building sand quarry extraction in Dau Tieng Reservoir under Tan Chau District, Tay Ninh Province and Dau Tieng District, Binh Duong Province with the capacity of 98,000 m3/year".

- Confirmation No. 34/GXN-TCMT dated 14/01/2015 from Vietnam Environment Administration (VEA) regarding the implemented environmental protection measures, works serving for the operation stage of the on "Investment in the building sand quarry extraction in Dau Tieng Reservoir under Tan Chau District, Tay Ninh Province and Dau Tieng District, Binh Duong Province with the capacity of 98,000 m3/year".

- License of building sand material extraction No. 10/GP-UBND dated 10/02/2010, in period of ten (10) years issued by Binh Duong Provincial People's Committee.

2.2 Sand quarry extraction process

Extraction technology process: summarized in Figure 2.1

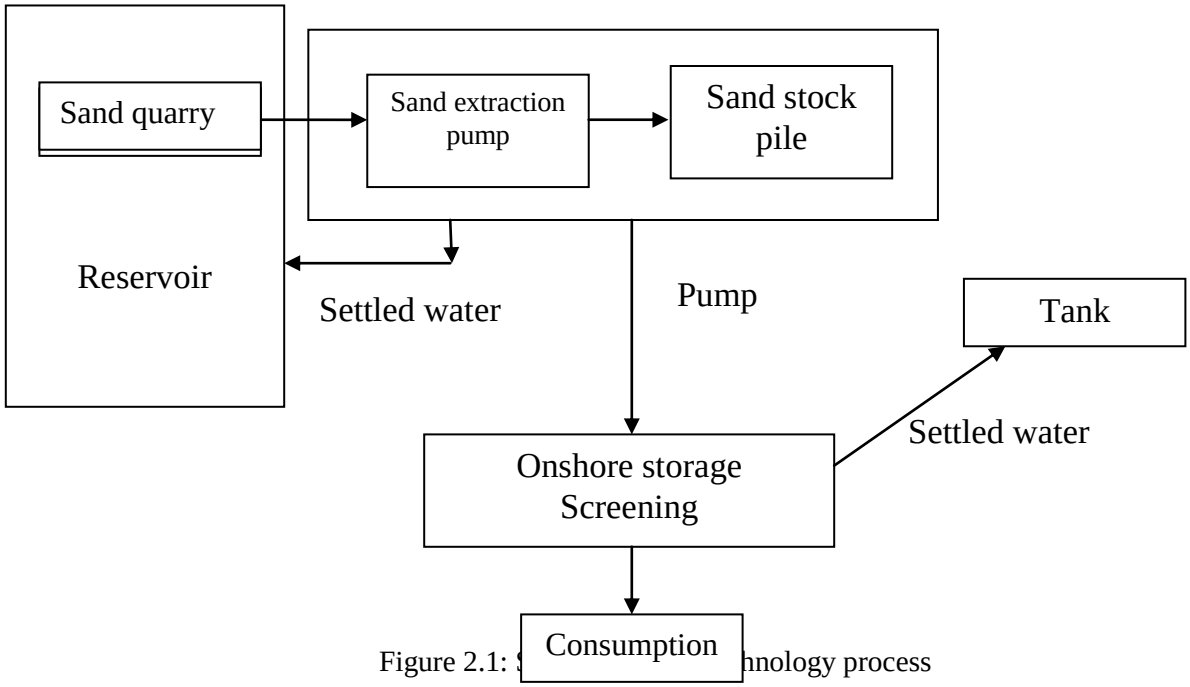

Figure 2.1: S hnology process

2.3 Environmental impact mitigation, control measures at the Sand Quarry

The quarry area is far away from households. The distance to the nearest household is approximately 3km. The office of the quarry is installed with the monitoring screen for the quarry activities. The green trees are grown around the office. At current, total staff of the quarry is about 11 persons. At the quarry, the cooking isn't organized but only serving for workers is provided by the Company.

2.3.1 Dust pollution mitigation measures

Dust will be generated during the transportation course and along the haul routes. In order to control the amount of dust, the Company has applied the measures as follows:

Tank trucks for watering along the haul routes have been applied; water is frequently sprayed along the haul route systems.

The trucks shall have the closed body or tarpaulins.

2.3.2 Exhaust gas pollution control measures from extraction and transportation means

In order to mitigate the exhaust air pollution, the Company has applied measures as follows:

- Machine system is frequently inspected and periodically maintained for these equipment to well operate.

- Dredgers and attached mechanical equipment are periodically maintained.

- Means of transportation are requested to run in accordance with the stipulated speed which isn't allowed over 20 km/h.

2.3.3 Noise control measures during the extraction process

In order to control noise machines, equipment, the Company has applied measures as follows:

- Machine, equipment for extraction and transportation are frequently maintained, lubricated.
- Silencers at chimneys are installed. Engines of extraction barge are installed under the pits.
- Each barge shall be in accordance with the stipulated location, not focus at the same place.

2.3.4 Solid waste collection measures

a) Domestic solid wastes

At each sand area, the Company arranged two (2) domestic solid waste bins to temporarily store the domestic solid wastes of staff. The public works team of Dau Tieng District will collect periodically 2 weeks/once.

b) Hazardous solid wastes

The hazardous solid wastes are mainly oil containing wipers and waste fluorescent lamps. It is estimated that the hazardous solid wastes were arisen about 67 kg/year in 2015.

The temporary hazardous solid waste storehouse was arranged for each sand area where hanged the signal of hazardous solid waste zone, built with a sheet metal wall, cement foundation, a surrounding high bank to avoid from rainwater, the internal area has a liquid waste sump in case of runoff emergency.

The Company makes a contract with Binh Duong Water Supply, Sewerage, Environment Co., Ltd (BIWASE) to collect, transport the hazardous solid wastes arisen at the quarry to the South Binh Duong solid waste treatment complex to treat periodically six (6) months/once.

2.3.5 Water source pollution control measures

a) Alternative of domestic wastewater treatment

Domestic wastewater from staff is preliminarily treated by a septic tank, thence to be penetrated.

b) Sewage control in case of pumping sand to the stock pile

The sewage arisen in case of pumping sand from the barge to the stock pie will be absolutely collected in the horizontal settlement tank, thence crossing the tank to reuse and serve for the subsequent pumping.

Around the sand area, a high embankment from 20 to 30cm is used to prevent from surrounding overflowing sand, sewage.

2.3.6 Deep erosion and bed load instability mitigation measures

In order to minimize the deep erosion and bed load instability mitigation measures, the Company has applied measures as follows:

- It is not recommended to exploit concentratively at the same location but the exploitation will follow the current, the exploitation section will follow the design and the location of pumping barge will be determined by GPS in combination with the map of exploitation area.
- The maximum depth of exploitation doesn't exceed 1.5 m.
- It is not advised to exploit concentratively at the same location for along time to prevent from the phenomenon of overddeeping bed.
- The buoy is used to position the exploited areas.
- Sand suckers are deeply punched through a mud layer to a sand layer and suck to reduce the scrambled top mud layer.

2.3.7 Traffic safety, working safety measures in case of the extraction

- At each extraction barge, there is a roof for workers to take a rest during the travelling period.
- The buoy is used to position the current, the exploitation route, to gather equipment.
- The safe distance to a screw propeller as well as fishing facilities in the reservoir shall be maintained.
- All pumping barges shall be fixed a pennant.
- A boundary of extraction areas shall be buoyed and signal buoys at two heads of extraction areas will be set up. The maintenance is periodically implemented with once/a year.
- The extraction will not be implemented at thunderstorm days as well as flood discharge days, water storage days from Dau Tieng Reservoir.

2.3.8 Environmental emergency prevention measures

The Company prepared the oil spillover countermeasures. In case of the oil spillover emergencies, the Company will implement works as follows:

- To determine the oil spillover areas.
- To inform the appropriate authorities to receive their supports.
- To equip the emergency handling, remedial devices such as buoy, vertical artificial drain, oriented buoy,…

2.3.9 The Company's other application measures

Periodically quarterly, the Company carries out the arisen air, wastewater environment quality measurement at the quarry. Periodically at the end of year, the Company prepares the environmental quality monitoring report to send Binh Duong Provincial Department of Natural Sources and Environment (DONRE), Ministry of Natural Sources and Environment (MONRE).

Until now, the Company paid a deposit for the environmental rehabilitation, reclamation with total amount of VND 329,479,000 (7 times for payment) in accordance with Decision No. 242/QĐ-BTNMT dated 11/02/2011 from MONRE.

In addition, in order to favorably assure the extraction process among the extraction units in the reservoir area, these extraction units shall carry out the measures as follows:

- The extraction points shall be arranged 1 km apart at least to minimize the resonant impacts.
- The buoys shall be used to determine the boundary of extraction; each unit shall self-manage its buoy.
- On the sand area, these units shall coordinate vehicles to convey sand for consumption with the suitable density.
- These unit shall contribute in the local support budget to repair the affected traffic routes.

2.4 Inspection results of natural resources, environment of the Government management agencies

a. Inspection works

Pursuant to the letter No. 4282/KL-STNMT dated 16/12/2015 from DONRE regarding the conclusion of inspection for execution of law regulations on natural resources and environmental protection for Binh Duong Minerals and Construction Joint Stock Company at Dau Tieng Reservoir building sand quarry as follows:

- The exploitation output isn't allowed to exceed the permitted capacity and used the buoys to setting out the extraction area. The Company assigned the managing director in accordance with the stipulations.

- The Company prepared the EIA report of the environmental rehabilitation, reclamation report and was approved by MONRE. During the operation course, The Company carried out the environmental mitigation measures such as construction of filtration sedimentation tanks for sand areas; investment in the tank trucks for watering along the haul roads; arrangement of temporary hazardous solid waste storehouses and contracts with appropriate units for collection, transportation and treatment; periodically preparing the environmental monitoring reports; paying the deposit for the environmental rehabilitation and reclamation fund.

- The Company is using the groundwater from two (2) bore wells with the diameter of 60mm, total used discharge of about 1.5 m^3/day, prepared the daily using logbook. As the using discharge of two wells is under 10 m^3/day, the Company doesn't need to ask the permit of groundwater extraction in accordance with stipulations of Law on Water Resources. However, at Minh Hoa Commune sand area, a bore well was spoiled and not used but it has been backfilled in accordance with regulations. Binh Duong Provincial Department of Natural Resources and Environment requests that the Company shall prepare the backfilling alternative for failed bore wells and send the alternative to Division of Natural Resources and Environment of Dau Tieng District for review, supervision and subsequent procedures.

At current, the Company prepared the backfilling alternative for failed bore wells at Minh Hoa Commune and sent Division of Natural Resources and Environment of Dau Tieng District for review in compliance with the requirements via the letter No. 4282/KL-STNMT dated 16/12/2015.

b. Monitoring activities:

Operations of Dau Tieng Reservoir sand quarry (the extraction area of Binh Duong Minerals and Construction Joint Stock Company) are monitored by the local authorities including Dau Tieng District People's Committee, Binh Duong Provincial Department of Natural Sources and Environment (DONRE). In addition, there is the supervision from local people near the quarry area, quarrying members at Dau Tieng Reservoir.

In case of claims on the quarry activities in incompliance with the law, these claims will be sent to the supervision team. Accordingly, the head of commune will check and inform the quarry manager who is responsible for solving the public concerns. If the settlement of the manager is inappropriate, the community leaders will notify DONRE. When receiving the claims, DONRE will arrange and check to determine the issues and propose the measures to force the Client to implement with the period of performance, otherwise the Client shall stop their operation or close the quarry.

The deposit for the environmental rehabilitation will be monitored by Agency of Environmental Protection Fund under DONRE. The Client doesn't pay in the Fund in the due time, the Environmental Protection Fund will issue a letter for reminding the Client to execute the obligation. If the Client implements intentionally, the Environmental Protection Fund will issue a letter to request DONRE to carry out a penalty for the Client in accordance with stipulations.

Conclusion:

Binh Duong Minerals and Construction Joint Stock Company exploits sand at Dau Tieng Reservoir sand quarry with regulations of Vietnam Law in material exploitation, preparation of environmental documents and implementation of mitigation measures in accordance with proposed contents in the report. Concurrently, the Company carried out the deposit of environmental rehabilitation fund in accordance with stipulations.

Sand extraction area

Pumping sand to stock pile

Office area

3. Tan Dong Hiep stone quarry complex

3.1 General information

Tan Dong Hiep stone quarry complex is located at Tan Dong Hiep Ward, Di An Town, Binh Duong Province. Tan Dong Hiep stone quarry complex has four (4) extraction units including Binh Duong Minerals and Construction Joint Stock Company, Binh Duong Construction Joint Stock Company, Construction Investment Corporation 3-2, Trung Thanh Joint Stock Company. These companies in the complex agreed with the contents of operation statutes of PMU of Tan Dong Hiep building stone quarry" (PMU of the quarry for short). The complex put into operation since year 1993.

Total area of use land of four (4) companies is 804,411.7 m^2, in which the area of quarry work is 1,488.5 m^2, the exploitation depth of the complex is 120m, the exploitation capacity is 3,503,642 m^3/year.

Table: The exploitation capacity of these units in the complex

No.	Name of unit	Exploitation output (m^3 monolith/year)
1	Binh Duong Minerals and Construction Joint Stock Company	2,111,056
2	Binh Duong Construction Joint Stock Company	233,075
3	Construction Investment Corporation 3-2	908,155
4	Trung Thanh Joint Stock Company	251,356
	Total	**3,503,642**

Tan Dong Hiep stone quarry complex was licensed by agency of natural resources and environment management by means of following letters:

- License of mineral exploration No. 214/GP-UBND issued by Binh Duong Provincial People's Committee dated 19/11/2015 regarding Binh Duong Minerals and Construction Joint Stock Company to be permitted the deep exploration to cote -120m at Tan Dong Hiep stone quarry complex, Di An Town.

- Decision No. 3250/QĐ-UBND issued by Binh Duong Provincial People's Committee dated 10/12/2015 regarding approving the building mineral reserve in "the report on cote-120m depth exploration results at Tan Dong Hiep stone quarry complex, Tan Dong Hiep Ward, Di An Town" with Binh Duong Minerals and Construction Joint Stock Company as the representative of the Client.

- Decision No. 155/QĐ-BTNMT from Ministry of Natural Resources and Environment dated 22/01/2016 regarding approving the EIA report of the project "cote-120m depth exploitation, processing investment at Tan Dong Hiep stone quarry complex, Tan Dong Hiep Ward, Di An Town, Binh Duong Province, the capacity of 3,503,642 m^3 monolith/year".

Legal documents of each exploitation unit in the complex:

Binh Duong Minerals and Construction Joint Stock

- License of mineral exploration No. 01/GP-UBND issued by Binh Duong Provincial People's Committee dated 06/01/2016 regarding Binh Duong Minerals and Construction Joint Stock Company to be permitted to extract the building stone at Tan Dong Hiep stone quarry, Tan Dong Hiep Ward, Di An Town, cote-120m depth exploration, the exploitation capacity of 2,111,056 m^3 monolith/year.

- Certificate of Fire Precaution No. 013/ĐK-PCCC dated 12/07/2012 issued by Binh Duong Provincial Division of Fire Precaution Police.

- License of industrial explosive material use No. 45/GP-UBND dated 04/12/2014 issued by Binh Duong Provincial People's Committee.

Binh Duong Construction Joint Stock Company

- License of mineral exploration No. 02/GP-UBND UBND issued by Binh Duong Provincial People's Committee dated 06/01/2016 regarding Binh Duong Construction Joint Stock Company to be permitted to extract the building stone at Tan Dong Hiep stone quarry, Tan Dong Hiep Ward, Di An Town, cote-120m depth exploration, the exploitation capacity of 233,075 m^3 monolith/year.

- Certificate of Fire Precaution No. 016/ĐK-PCCC dated 12/07/2012 issued by Binh Duong Provincial Division of Fire Precaution Police.

- License of industrial explosive material use No. 73/GP-UBND dated 02/12/2013 issued by Binh Duong Provincial People's Committee.

Construction Investment Corporation 3-2

- License of mineral exploration No. 23/GP-UBND issued by Binh Duong Provincial People's Committee dated 18/01/2016 regarding Construction Investment Corporation 3-2 to be permitted to extract the building stone at Tan Dong Hiep stone quarry, Tan Dong Hiep Ward, Di An Town, cote-120m depth exploration, the exploitation capacity of 908,155 m^3 monolith/year.

- Certificate of Fire Precaution No. 007/ĐK-PCCC dated 03/07/2012 issued by Binh Duong Provincial Division of Fire Precaution Police..

- License of industrial explosive material use No. 05/GP-UBND dated 27/01/2015 do issued by Binh Duong Provincial People's Committee.

Trung Thanh Joint Stock Company

- License of mineral exploration No. 47/GP-UBND issued by Binh Duong Provincial People's Committee dated 28/03/2016 regarding Trung Thanh Joint Stock Company to be permitted to extract the building stone at Tan Dong Hiep stone quarry, Tan Dong Hiep Ward, Di An Town, cote-120m depth exploration, the exploitation capacity of 693,224 m^3 monolith/year.

3.2 Processing, exploitation process of the Stone Quarry

Exploitation technology process: summarized in Figure 1.1

Tan Dong Hiep stone quarry is extracted in accordance with reinstatement after exploitation, directly transported by dump trucks without stock piles. The exploitation is from top to down and from outside to inside.

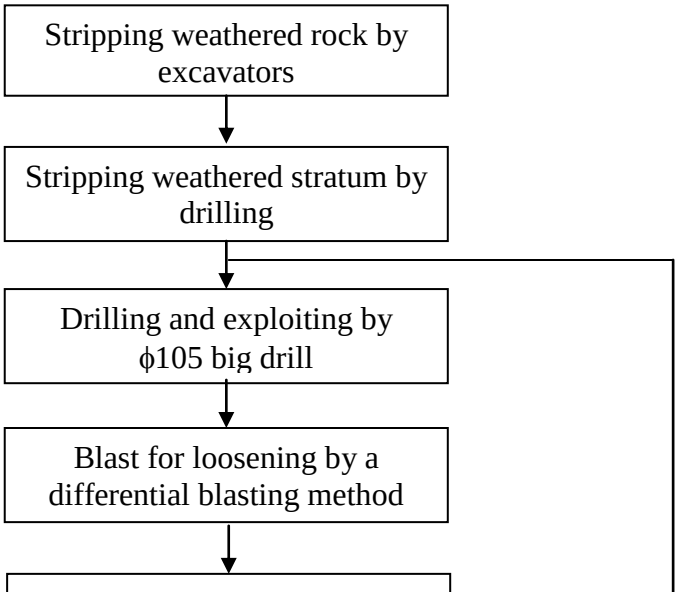

Figure 1.1: Stone extraction, processing technology process at Tan Dong Hiep quarry complex

Processing technology process: summarized in Figure 1.2

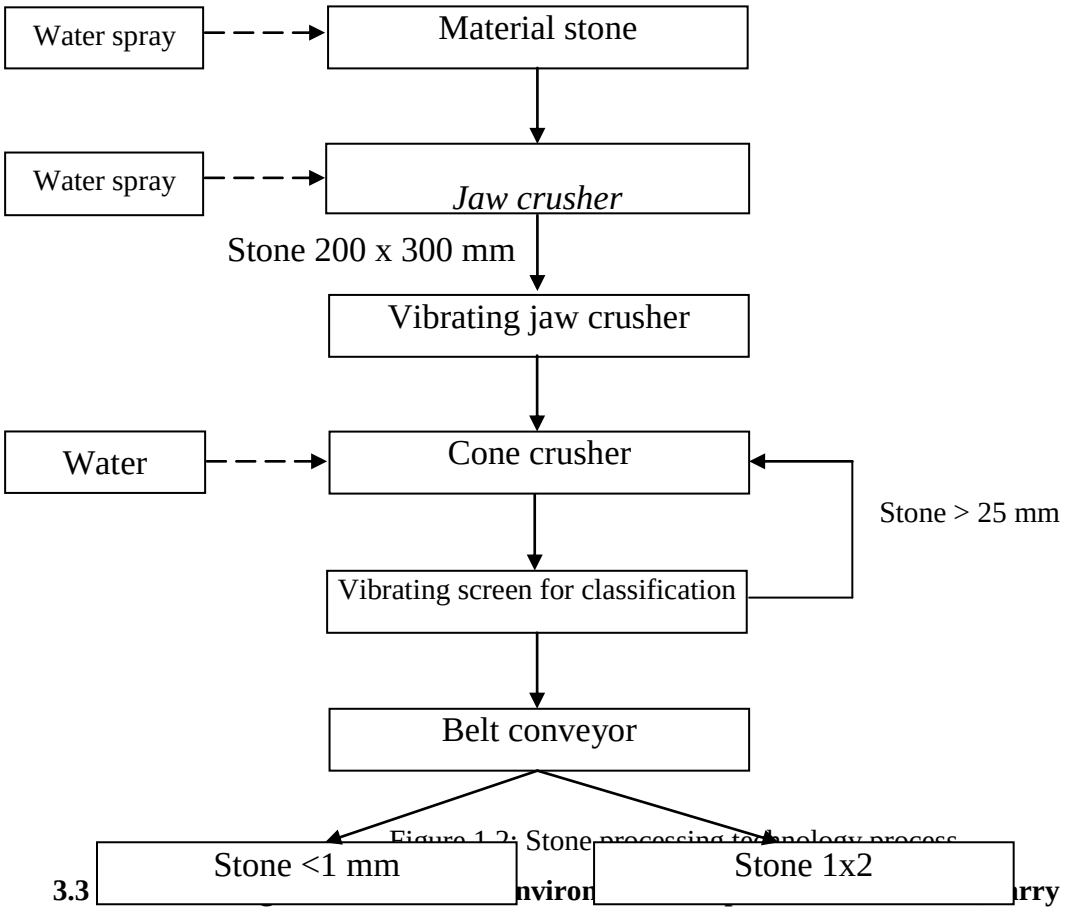

Figure 1.2: Stone processing technology process

3.3 Environ rry

The quarry area is fenced by a metal fence. The entrance of quarry is placed at the weighing station and the safeguard house to avoid from the situation of overloaded trucks. Tan Dong Hiep stone quarry complex is located at the residential area and has economic infrastructures distributed around the quarry. Industrial yards, processing equipment, workshops, a management office are adjacent to the exploitation sites. The nearest residential area is far away from the boundary of the quarry approximately 150m. The office of quarry is installed with a screen to monitor the quarry activities. Total number of staff at the entire quarry complex are about 674 persons however, only the security guards and managers can stay at nigh. At the quarry, the cooking isn't organized but these workers eat the lunch at restaurants along the haul roads.

3.3.1 Dust pollution mitigation measures

a. Dust control during blasting and drilling processes:

A wet drilling method is used to minimize at drill holes of BMK machine in case of drilling.

The Company uses a non-electric differential blasting method in combination with using Anfo explosive, emulsion to minimize vibration in case of detonation, to minimize the quantity of large-sized stone; the period of blast is very short so the amount of dust during the blasting process will be mitigated.

Water pockets on the surface of mines are used to minimize the amount of dust emission in case of detonation.

Verdure around the exploitation sites is planted.

b. Dust control during stone loading, transporting processes

The amount of dust arisen during the stone loading, transportation processes discharges into the external environment at the processing, quarrying areas and along the transportation routes. In order to control the amount of dust, the Company applied the measures as follows:

- The internal haul roads at the quarry are frequently sprayed by the tank trucks.

- The product stone will be wetted by spraying water for anti-dust at the processing area.

- Specialized tank trucks are used to frequently exhaust dust, wash the national highway No. 1K from the intersection of Tan Dong Hiep stone quarry to Chu Hoa sloping street.

- Scattered stone along the internal haul roads at the quarry area and the national highway No. 1K from the intersection of Tan Dong Hiep stone quarry to Chu Hoa sloping street will be cleaned.

- The green tress along two (02) haul roads will be grown to prevent dust from surrounding emission.

- The product trucks are covered by tarpaulins on the vehicle body, not overcharged in case of circulation on routes

- Machines, equipment are periodically maintained.

c. Dust control during building stone processing process

During the processing process, dust will be generated at impact crushers, jaw crushers and the head of belt conveyor. Therefore, the Company has applied the anti-dust spraying measures at dust generating locations, especially as follows:

- Water is sprayed on the stone surface on the rubble truck body from the extraction sites to the processing areas.

- Water is sprayed on the rubble receiving hoppers at the grinders.

- Water is sprayed on the stone at the cone crusher.

- At the head of belt conveyor, Water is sprayed on the product stone to prevent dust from surrounding emission.

- Water is sprayed along the route system in the processing area.

- The stone in the processing area is cleaned.

- Verdure around the processing area is planted to prevent dust from surrounding emission.

- Operators and all persons who enter into the extraction, processing areas shall wear thick masks with good aeration for breathing.

3.3.2 Exhaust air pollution prevention measures from means of transportation

In order to mitigate the exhaust air pollution, the Company has applied measures as follows:

- Limit vehicles without safety assurance on environmental sanitation.

- Frequently maintain vehicles, not transport stone with overloads in accordance with stipulations.

- The speed of vehicles isn't allowed over 30 km/h.

- Vehicles in and out of the quarry shall be coordinated logically to prevent from traffic jam.

3.3.3 Noise, vibration control measures during the building stone exploitation, processing processes

In order to control noise and vibration from the processing machines, the Company has installed a foundation to place machines on a wide and solid plan. The Company frequently maintains these machines, lubricates at noise causing contact components for a combination of impact crusher – jaw crusher – vibrating screen.

Frequently maintain machines, equipment of exploitation, transportation and processing. Only use loading, transporting devices which ensure the technical requirements.

The period of blast agreed between the Company and Tan Dong Hiep Ward People's Committee is from 11h to 12h30' as it is a time causing the least influence to people's life around the quarry, to assure the daily habit of local people around the quarry. Concurrently, before detonation, a warning signal shall be implemented to inform the local authorities and local people around the quarry to know this issue.

Exploitation units in the complex agreed the detonation period and coordinated together to prevent from detonation at the same time with the time interval among quarries of 15 minutes.

3.3.4 Solid waste collection measures

a) Manufacturing solid wastes

Stone of overlying stratum is used for internal routes, industrial leveling. The remaining part will be sold for enterprises with the demand of leveling.

b) Domestic solid wastes

At each exploitation area of each unit, domestic solid waste bins are arranged at shelters where workers take a rest. Exploitation units in the complex make a contract with the competent unit to collect and treat the domestic solid wastes.

c) Hazardous solid wastes

The hazardous solid wastes at each exploitation unit are collected and brought to a temporary storage area at a common hazardous solid wastes for the entire complex. Each exploitation unit will implement the register of arisen hazardous solid waste source owner of itself with Binh Duong Provincial Department of Natural Resources and Environment (DONRE). Binh Duong Water Supply, Sewerage, Environment Co., Ltd (BIWASE) will collect, transport to the South Binh Duong solid waste treatment complex for treatment periodically once/a month.

3.3.5 Water source pollution control measures

a) Water control from exploitation and excavation pit

The embankment around the extraction site is consolidated to prevent from surface water running into exploitation and excavation pit.

Sumps are arranged to collect the whole overflow into the extraction site, thence to be pumped to the sedimentation tank before pumping to the tank. The water will be used to water stone and spray the haul roads.

Sumps at the extraction site are periodically dredged 6 months/once.

A pump at each the extraction site of each unit is arranged to assure water to be pumped out of the extraction site in rainy season.

b) Alternative of domestic wastewater treatment

Domestic wastewater from staff is preliminarily treated by a septic tank, thence to be penetrated.

3.3.6 Erosion prevention measures at the exploitation and excavation pit bank, environmental emergency prevention measures

a) Erosion issue at the exploitation and excavation pit bank

In order to prevent the erosion at the exploitation and excavation pit bank, the **environmental emergency** during the exploitation operation process, the Company always complies with the approved alternatives of exploitation.

Protection bank is left to protect top-down stone strata; the edge of bank is driven by protective plates with the height of 15cm.

Excavated rock shall be backfilled far from the edge of pit at least 0.5m.

In order to assure gradient of exploratory stratum slope, terminal stratum slope in compliance with the design documents of the quarry.

Frequently monitor the wall of excavation pit to find out large cracks, fissures to have sliding risk prevention measures for the wall of excavation pits.

b) Fire precaution issue

To strictly comply with regulations of fire precaution in the area. No smoking, no fire in the range of fuel output, there are stipulations of fire precaution for everyone to apply and learn.

In the range of depot, there are fire precaution facilities to be frequently checked.

To frequently clean vegetation around the easily firing areas.

c) Work safety

To sufficiently equip the work safety assurance equipment, devices for workers.

To install the warning signs.

c) Lightning protection due to the rain

To build Franklin lightning arrester for lightning protection for shelters, safeguard houses, offices.

To build lightning arresters at high areas on the extraction sites for lightning protection.

3.3.8 Other applied measures of exploitation units at the complex

- **For blasting works:**

The blasting is performed in accordance with the stipulated period. During the period of blasting, it is absolutely forbidden to enter the dangerous areas of mine areas.

The approved blasting passport is strictly executed.

Explosive materials at any teams, the team shall use and maintain these explosive materials.

It is not allowed to smoke in charging, blasting areas and to throw the explosive.

Blasting workers at the height shall have safety belts.

Workers who operate the drilling machine shall wear tidy cloths. In case of opening the drill holes, it is recommended to implement the rotating machines slowly and gradually increase the velocity until the stably operating machines.

- **Preparation of periodic report:**

Periodically quarterly, Binh Duong Minerals and Construction Joint Stock Company (a representative of exploitation units in the complex) carried out the arisen air, wastewater environment quality measurement at the complex and each exploitation unit prepared a statement and paid the environmental protection charge for wastewater. Periodically at the end of year, the Company prepares the environmental quality monitoring report to send Binh Duong Provincial Department of Natural Sources and Environment (DONRE), Ministry of Natural Sources and Environment (MONRE).

In addition, these exploitation units in the complex paid a deposit for the environmental rehabilitation, reclamation fund in compliance with Decision No. 725/QĐ-BTNMT dated 14/05/2013 from MONRE

Table: The deposit for the environmental rehabilitation, reclamation fund of these units in the complex in year 2015 and year 2016

No.	**Unit**	**Amount (VND)**	**Note**
1	Binh Duong Minerals and Construction Joint Stock Company	5.719.934.501	Year 2016
2	Binh Duong Construction Joint Stock Company	1.218.970.288	Year 2015
3	Construction Investment Corporation 3-2	3.431.869.809	Year 2015
4	Trung Thanh Joint Stock Company	1.737.040.944	Year 2015

- **Support for pollution compensation for households near the quarry, support of local policy:**

Support, compensation for affected households near the quarry are a partial responsibility of the quarry owner. In year 2015, exploitation units implemented support for people as well as local authorities as follows:

Table: Support for pollution compensation for households and local authorities

Unit	**Support for people**	**Support for local authorities**
Construction Investment Corporation 3-2	Expand the grand aid for households from 98 households to 161 households with total quarterly amount of 198,600,000 VND/quarter. Support of house repairs for 3 affected households with fractured houses from detonation with total amount of 8,000,000 VND/2 households. A remaining household receives with one time in year 2018.	The companies in the complex and PMU of the complex coordinated and supported the local authorities for construction of traffic roads, electric lines for lighting and life activities and other social welfare works. Trung Thanh Joint Stock Company made a contract with Di An Water Supply Enterprise for investment in a clean water system for residential groups 18,
Binh Duong Minerals and Construction Joint	Increase the environmental support cost for households from 400,000 VND/month	

Stock Company	to 500,000 VND/month. Support for 26 households with total amount of 156,000,000 VND/year. Periodically organize the disease examination and treatment and provide the medicines with free of charge for more than 171 households at Dong An and Tan An quarters.	19, 26, 27, Dong An quarter with total cost of 187,107,133 VND.
Binh Duong Construction Joint Stock Company	Increase the environmental support cost for households from 400,000 VND/month to 500,000 VND/month. Support for 26 households with total amount of 156,000,000 VND/year.	
Trung Thanh Joint Stock Company	Support the environmental support cost for households with 400,000 VND/month.	

3.4 Inspection results of natural resources, environment of the Government management agencies

a. Inspection works

On 13 and 14/05/2015, People's Committee of Tan Dong Hiep Ward coordinated with the permanent People's Council, Standing Committee of Vietnamese Fatherland Front of the Ward to organize the public meeting at two (2) Dong An and Tan An quarters to listen the people's comments on the operation status of Tan Dong Hiep stone quarry; concurrently to receive the exploration comments on continuously asking the exploitation up to the depth of -120m. The results of public meeting are presented in the table as follows:

Participant	People's comments	Measures implemented by the Company
- Heads of Party Committee – People's Committee-Vietnamese Fatherland Front Committee of Tan Dong Hiep Ward. - Heads of Trung Thanh JSC, the head of PMU of Tan Dong Hiep stone quarry, Director of Stone Enterprise 3-2, Director of Tan Dong Hiep stone enterprise. - 120 peoples at Dong An and Tan An quarters	- Trung Thanh JSC is requested to stop the stone transportation crossing routes of Dong An residential area as vehicles run and scatter stone or transport with overloads, run with fast speed to cause unsafe. Concurrently, it is requested to mend, repair the damaged locations caused by the stone transportation. - It is necessary to survey, count affected households with fractured walls who are necessarily supported and compensated. - It is suggested to increase the toxic compensation support level as the amount of 400,000 VND/month is too low. - It is suggested to remind the drivers because high horns will affect the people's health.	- Trung Thanh JSC stopped the stone transportation crossing routes of Dong An residential area; The Company notified the customers and concurrently hanged a warning sign at the residential area. - Trung Thanh JSC implemented mend, repair the damaged locations at Dong An residential area caused by the stone transportation with total the amount of 462,900,000 VND. - Binh Duong Construction JSC installed a sewerage system with Φ 1500mm, the length of 12.5m crossing the flood control route of Siep Stream and consolidated routes to assure the traffic. - Trung Thanh JSC made a contract with Di An Water Supply Enterprise for investment in a clean water system for teams 18, 19, 26, 27, Dong An quarter with total cost of 187,107,133 VND.

In year 2015, Binh Duong Provincial Department of Natural Resource and Environment (DONRE) inspected the execution of stipulations for Law on Natural Resources and Environmental Protection for exploitation units in Tan Dong Hiep quarry complex, the conclusions of inspection are stated in the table as follows:

Exploitation unit	Letter regarding the conclusion of inspection	Results of inspection			Implementation of recovery measures
		Implemented	**Shortcoming**	**Recovery measures for consequence**	
Trung Thanh JSC	Letter No. 4283/KL-STNMT dated 16/12/2015	- The boundary benchmark of quarry exploitation was set out - Exploitation was implemented within the permitted area of mineral extraction, didn't exceed the permitted depth - The managing director of the quarry was assigned in accordance with regulations - The EIA report, the environmental rehabilitation, reclamation project were prepared and approved by MONRE. The environmental mitigation measures were implemented such as planting around the exploitation excavation pit and processing areas; watering the haul roads, on rock piles and on belt conveyor system of crushers; arrangement of sump; construction of embankment around the exploitation excavation pit; measurement of periodically environmental monitoring; statement of environmental protection charge for wastewater and deposit for environmental	- The Company leased an area of 21,517 m^2 of agricultural land of households to build a stone vehicle gathering and repairing area, shelters, a crushing area and a finished stone stock pile in case of no letter of acceptance from the Governmental management agencies. Breach of stipulations Item 1, Article 23, Decree No. 102/2014/NĐ-CP dated 10/11/2014 from the Government regarding regulations on penalty of administrative breaches in the field of land. - The wastewater quality, receiving body quality observation was implemented yet and the report on the wastewater discharging status into the water source in year	- The Company shall liquidate the contract of land lease with households - Wastewater quality, receiving body quality monitoring, the annually periodical report on the wastewater discharging status into the water source shall be implemented in compliance with regulations. - Deposit of environmental	- The Company is liquidating the contract of land lease with households - Wastewater quality, receiving body quality monitoring, the annually periodical report on the wastewater discharging status into the water source in year 2015 was implemented and sent to DONRE. - Deposit of environmental rehabilitation,

		rehabilitation, reclamation in year 2014.	2014 was prepared yet. - Deposit of environmental rehabilitation, reclamation fund for year 2015 hasn't been implemented yet.	rehabilitation, reclamation fund for year 2015 shall be implemented.	reclamation fund for year 2015 was implemented.
Construction Investment Corporation 3-2	Letter No. 2797/KL-STNMT dated 25/08/2015	- The boundary benchmark of quarry exploitation was set out - Exploitation was implemented within the permitted area of mineral extraction, didn't exceed the permitted depth - The managing director of the quarry was assigned in accordance with regulations - The EIA report, the environmental rehabilitation, reclamation project were prepared and approved by MONRE. The environmental mitigation measures were implemented such as planting around the exploitation excavation pit and processing areas; watering the haul roads, on rock piles and on belt conveyor system of crushers; arrangement of sump; construction of embankment around the exploitation excavation pit; measurement of periodically environmental monitoring; statement of environmental protection charge for wastewater	- The stone processing machine, equipment system which is being operated at My Phuoc – Tan Van gallery isn't relocated in the area of land which the Company leased from the provincial People's Committee to implement a stone processing area in compliance with the commitment via the Minutes on 17/01/2008.	- Machine, equipment on My Phuoc – Tan Van corridor shall be relocated	- The relocation was implemented.

		and deposit for environmental rehabilitation, reclamation in year 2015. The report on wastewater discharging status into water sources was prepared periodically annually in compliance with stipulations.			
Binh Duong Construction Joint Stock Company	Letter No. 2181/KL-STNMT dated 09/07/2015	- The boundary benchmark of quarry exploitation was set out - The exploitation didn't exceed the permitted capacity - The managing director of the quarry was assigned in accordance with regulations - The EIA report, the environmental rehabilitation, reclamation project were prepared and approved by MONRE. The environmental mitigation measures were implemented such as planting around the exploitation excavation pit and processing areas; watering the haul roads, on rock piles and on belt conveyor system of crushers; arrangement of sump; construction of embankment around the exploitation excavation pit; measurement of periodically environmental monitoring; statement of environmental protection charge for wastewater and deposit for environmental rehabilitation, reclamation in year 2015. The report on wastewater			

		discharging status into water sources was prepared periodically annually in compliance with stipulations. - The Company made a contract with the competent unit to collect, transport and treat the hazardous solid wastes and implemented the periodic report on the hazardous solid waste management status.			
Binh Duong Minerals and Construction Joint Stock Company	Letter No. 2182/KL-STNMT dated 09/07/2015	- The boundary benchmark of quarry exploitation was set out - The exploitation didn't exceed the permitted capacity - The managing director of the quarry was assigned in accordance with regulations - The EIA report, the environmental rehabilitation, reclamation project were prepared and approved by MONRE. The environmental mitigation measures were implemented such as planting around the exploitation excavation pit and processing areas; watering the haul roads, on rock piles and on belt conveyor system of crushers; arrangement of sump; construction of embankment around the exploitation excavation pit; measurement of periodically environmental monitoring; statement of environmental protection charge for wastewater			

		and deposit for environmental rehabilitation, reclamation in year 2015. The report on wastewater discharging status into water sources was prepared periodically annually in compliance with stipulations. - The Company made a contract with the competent unit to collect, transport and treat the hazardous solid wastes and implemented the periodic report on the hazardous solid waste management status.			

b. Supervision activities:

At Tan Dong Hiep stone quarry complex established a PMU. The PMU will point out the contents "operation statutes of PMU of Tan Dong Hiep building stone quarry" for the exploitation unit in the complex to comply with and to be responsible for monitoring the exploitation activities of the extraction units in the complex (including overburden, drilling and blasting, treatment of excavation pit wall, scope of exploitation, depth of exploitation), environmental monitoring and safety in the management and use of industrial explosive materials. The PMU - Binh Duong Minerals and Construction Joint Stock Company assigns a staff who shall be responsible for management, other units will assign from 1 to 2 staff as members. The PMU is authorized to suspend the extraction, processing activities if any units break the regulations.

For each extraction unit in the complex, an environment team was established to monitor implementation of watering on the haul roads, at crushers and on stone in case of transportation.

In addition, operations of Tan Dong Hiep stone quarry complex are monitored by the local authorities including Tan Dong Hiep Ward People's Committee, Di An Town People's Committee, Binh Duong Provincial Department of Natural Sources and Environment (DONRE). In addition, there is the supervision of local people at Dong An and Tan An quarters near the quarry area and along the haul roads, the supervision of exploitation units in the complex together.

In case of claims on the quarry activities in incompliance with the law, these claims will be sent to the supervision team. Accordingly, the head of ward will check and inform the quarry manager who is responsible for solving the public concerns. If the settlement of the manager is inappropriate, the community leaders will notify DONRE. When receiving the claims, DONRE will arrange and check to determine the issues and propose the measures to force the Client to implement with the period of performance, otherwise the Client shall stop their operation or close the quarry.

The deposit for the environmental rehabilitation will be monitored by Agency of Environmental Protection Fund under DONRE. The Client doesn't pay in the Fund in the due time, the Environmental Protection Fund will issue a letter for reminding the Client to execute the obligation. If the Client implements intentionally, the Environmental Protection Fund will issue a letter to request DONRE to carry out a penalty for the Client in accordance with stipulations.

		
The area of exploitation and excavation pit	Stone processing area	Shelters where workers take a rest
		
Fixing a warning sign	Reservoir for watering roads and stone	Watering on the haul roads

 Solid waste bins	 WC in the quarry	 Watering on the haul roads
 Watering on the haul roads	 Sweeper and street sprinkler	 Watering on the haul roads

Conclusion:

Binh Duong Minerals and Construction Joint Stock Company, Binh Duong Construction Joint Stock Company, Construction Investment Corporation 3-2, Trung Thanh Joint Stock Company are four (4) exploiting units at Tan Dong Hiep stone quarry complex. The actual survey results at the complex and working results with the representative of four (4) companies on 11/04/2016 showed that four (4) companies implemented relatively good regulations of Law on Natural Resources and Environmental Protection. During the operation course, four (4) companies complied with stipulations on natural resources and environmental protection as well as implemented well their responsibilities, obligations for the locality, especially as follows:

+ Stone transportation crossing routes of Tan Dong Hiep residential area (Dong An quarter) wasn't implemented and damages were repaired with supervision and confirmation of Tan Dong Hiep Ward, Di An town.

+ Stipulations on dust, noise and vibration pollution mitigation measures were complied during the production course to minimize the dust emission.

+ Regulations of Law on traffic were strictly executed; stone vehicles which scattered, used horns to affect the residential area were limited and stopped.

+ Responsibility for the locality (Tan Dong Hiep Ward, Di An town) was performed with the amount of 10 billion VND for the locality to build welfare works.

+ Regulations of Law on mineral, environment were strictly implemented and the EIA report was approved. Safety assurance items were built for small complexes.