Initial Environmental Examination Report (Draft)

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REG: Agricultural Value Chain Development Project

Prepared by Café Outspan Vietnam Limited

CAFÉ OUTSPAN VIETNAM LIMITED

DRAFT INITIAL ENVIRONMENTAL EXAMINATION (IEE) REPORT

Of the Café Outspan Viet Nam project Phase 3 to enhance the capacity of the coffee production plant 5.250 tons per year

PROJECT OWNER
CAFÉ OUTSPAN VIET NAM LIMITED

CONSULTING COMPANY
VITA CONSULTING AND CONSTRUCTION ENVIRONMENT COMPANY LIMITED

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LIST OF ABBREVIATION WORDS

BOD_5	Biochemical Oxygen Demand
BTNMT	Ministry of Natural Resources and Environment
BYT	Ministry of Health
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen)
EIA	Environment Impact Assessment
NĐ-CP	Decree - Government
TSS	Total suspended solids
TT	Circular
QCVN	National standard of VietNam
QĐ	Decisions
TCVN	Vietnam Standards
LTD	limited
UBND	People‘s Comittee
USEPA	The United States Environmental Protection Agency
WHO	World Health Organization

INTRODUCTION

1. THE ORIGIN OF THE PROJECT

1.1. Summary of the origin, background of the project

The coffee consumption in the world is more and more increasing, according to the statistics in 2015, coffee consumption was 8.5 million tons and it is forecasted to 2020 is 10.5 million tons and the largest consumer markets are in Europe, South America and Asia *(Source: The coffee market report of The International Coffee Organization - ICO).*

Vietnam is the second producer and exporter of coffee in the world. Vietnam coffee industry growth is at the high level within the past years. Currently, the coffee growing area of Vietnam is 653,000 hectares. The crop yield of each season is nearly 1.7 million tons, mainly Robusta coffee. The coffee growing provinces are mostly Dak Lak, Lam Dong and Dak Nong. Vietnam's coffee is exported mostly. The export quantity is about 1.1 million tons of various kinds of coffee (coffee beans, roasted, ground and instant coffee) with a turnover of about 2.2 billion dollars, and exports to 70 countries around the world.

Café Outspan Vietnam Ltd, a business owned by Olam International Group (Singapore), is a prestigious corporation around the globe for products made from agricultural products and it is available in 52 countries around the world with the revenue exceeding 4 billion dollars. Olam Group has been presented in Vietnam since 1996, developed in various provinces of Vietnam such as: Dak Lak, Pleiku, Đồng Nai, etc, and is one of the enterprises with the largest export reservation in Vietnam about coffee, cashew nuts and pepper. In 2008, Cafe Outspan Vietnam Ltd built a processing plant for instant coffee with capacity 4,000 tons / year in Nhựt Chánh Industrial Zone, Nhựt Chánh Commune, Bến Lức District and in March 2010, the factory came into operation officially. In 2012, the plant was upgraded Phase 2 expansion to enhance the total capacity from 4,000 to 12,000 tons of products per year.
Derived from practical demands along with the stable operation of the existing processing plant of instant coffee, Café Outspan Vietnam Ltd decided to build and expand the Phase 3 expansion of the plant on the available premises with the area of 27,134 m^2.

With the motto to comply with the Environmental Protection Law No. 55/2014 / QH13 passed by the National Assembly of the Socialist Republic of Vietnam on June 23, 2014 and according to Decree No. 19/2015 / ND-CP dated by February 14, 2015 of the Government stipulating in detail the implementation of a number of environmental protection laws, Café Outspan Vietnam Ltd combined with VITA consulting and construction environment company limited to build the report on environmental impact assessment (EIA) for Phase 3 investing and expanding project of the plant. EIA report is a technical and scientific tool to analyze and predict harmful effects and the influence of a project to the natural and socio-economic environment, from those, finding the optimal project to limit the adverse impact to the environment. The results of the making EIA report for enhancing capacity coffee processing projects of Café Outspan Vietnam Ltd will help the project investors to identify environmental issues

of the project, specifically quantify the impact, and the object is affected. Then, they can choose the best method of suitable pollution control for the project.

The EIA prepared for the project's regulatory approval has been used as the basis for the draft Initial Environmental Examination (IEE) as part of Asian Development Bank (ADB) requirements for its loan application since it's environmental impacts falls under Category B of ADB Safeguards Policy Statement (SPS) definition. The term EIA has been retained in this document, in reference to Vietnamese regulatory requirement.

1.2. The competent agency to approve the report

The IEE report for the project "*Café Outspan Vietnam Ltd processing plant, Phase 3 expansion with the capacity of 5,250 tons per year*" of Café Outspan Vietnam Ltd will be assessed and approved by Long An Industrial Zone Management Board.

1.3. Location of the project

Specific project location is shown in the following figure:

Figure 1 The project location in Nhựt Chánh Industrial Zone

The location for the project "***Café Outspan Vietnam Ltd processing plant, Phase 3 expansion with the capacity of 5,250 tons per year***" of Café Outspan Vietnam Ltd is in Nhựt Chánh Industrial Zone, Nhựt Chánh Commune, Bến Lức Town, Long An Province was approved by the planning industrial zones under the following decisions:

- Decision No. 1610/QĐ-UBND dated on June 19, 2007 on approving the EIA report of the infrastructure investing and building project of the industrial zones.
- Decision No. 22/GXN-STNMT dated on October 31, 2013 to confirm on conducting projects, the environmental protection methods to serve the operation phase of the infrastructure investing and building project.

(Documents are attached in the appendix)

2. Legal and technical basis of the implement of EIA

An EIA report for the project "Café Outspan Vietnam Ltd processing plant, Phase 3 expansion with the capacity of 5,250 tons per year" of Café Outspan Vietnam Ltd at Nhựt Chánh Industrial Zone, Nhựt Chánh Commune, Bến Lức Town, Long An Province has been approved by the regulatory agency in consideration of the following Vietnamese laws and reguations::

2.1. Law documents

- Law on Environmental Protection No. 55/2014 / QH13 passed by the National Assembly of the Socialist Republic of Vietnam adopted on June 23, 2014.
- Law on Chemicals 06/2007/QH12 was issued by the National Assembly of the Socialist Republic of Vietnam on November 21, 2007.
- Law on Food Safety No. 55/2010/QH12 passed by the National Assembly of the Socialist Republic of Vietnam adopted on June 17, 2010.
- Law on Water Resources No. 17/2012/QH13 passed by the National Assembly of the Socialist Republic of Vietnam adopted on June 21, 2012.
- Law on amending and supplementing some articles of the Law on Fire Prevention and Fire No. 40/2013/QH13 passed by the National Assembly of the Socialist Republic of Vietnam adopted on the date of November 22, 2013.
- Law on Construction No. 50/2014/QH13 passed by the National Assembly of the Socialist Republic of Vietnam adopted on June 18, 2014.
- Law on Environmental Protection Tax No. 57/2010/QH12 passed by the National Assembly of the Socialist Republic of Vietnam adopted on November 15, 2010.
- Law on Investment No. 67/2014/QH13 passed by the National Assembly of the Socialist Republic of Vietnam adopted on November 26, 2014.
- Decree No. 88/2007/NĐ-CP dated on May 28, 2007 of the Government on regulating the urban and industrial park drainage.
- Decree No. 99/2007/NĐ-CP dated on June 13, 2007 of the Government on the management of investment and construction costs of the project.
- Decree No. 108/2008/NĐ-CP dated on October 7, 2008 of the Government on providing detailed regulations and guidelines for implementation of some articles of Law on Chemicals.

- Decree No. 12/2009/NĐ-CP dated on February 12, 2009 of the Government on the management of investment and construction costs of the project.
- Decree No. 38/2012/NĐ-CP dated on April 25, 2012 of the Government on providing detailed regulations and guidelines for implementation of some articles of Law on Food Safety.
- Decree No. 69/2012/NĐ-CP dated on September 14, 2012 of the Government on the amendment and supplement Clause 3, Article 2 of Decree No. 67/2011/NĐ-CP of the Government dated on August 08, 2011 on detailed regulations and guidelines of the implementation of some articles of Law on Environmental Protection.
- Decree No. 25/2013/NĐ-CP dated on March 29, 2013 of the Government on the environmental protection charges for the waste water.
- Decree No. 179/2013/NĐ-CP dated on November 14, 2013 of the Government on sanctioning of administrative violations in the field of environmental protection.
- Decree No. 201/2013/NĐ-CP dated on November 27, 2013 of the Government on detailed provisions for the implementation of some articles of Law on Water Resources.
- Decree No. 35/2014 / NĐ-CP dated on April 29, 2014 of the Government on amending and supplementing a number of articles of Decree No. 29/2011/NĐ-CP dated on April 18, 2011 of Government regulations on the strategic environmental assessment, the environmental impact assessment and the environmental protection commitments.
- Decree No. 79/2014/NĐ-CP dated on July 31, 2014 of the Government on detailed provisions for the implementation of some articles of Law on Fire Protection.
- Decree No. 18/2015/NĐ-CP dated on February 14, 2015 of the Government on the environmental protection planning, the strategic environmental assessment, the environmental impact assessment and the environmental protection plan.
- Decree No. 19/2015/NĐ-CP dated on February 14, 2015 of the Government on stipulating in detail the implementation of a number of Law on Environmental Protection.
- Decree No. 38/2015/NĐ-CP dated on April 24, 2015 of the Government on the management of waste and scrap.
- Decree No. 59/2015 / NĐ-CP dated on June 18, 2015 of the Government on the management of investment and construction projects.
- Decree No. 118/2015/NĐ-CP dated on November 12, 2015 of the Government on detailed regulations and guidelines for implementation of some articles of Law on Investment.
- Circular No. 16/2009/TT-BTNMT dated on October 7, 2009 of the Ministry of Natural Resources and Environment on issued two national technical regulations on Environment QCVN 05: 2009/BTNMT and QCVN 06: 2009 / BTNMT.
- Circular No. 25/2009/TT-BTNMT dated on November 16, 2009 of the Ministry of Natural Resources and Environment on issued the national technical regulations on Environment icncluding QCVN 19: 2009/BTNMT.

- Circular No. 39/2010/TT-BTNMT dated on December 16, 2010 of the Ministry of Natural Resources and Environment about QCVN 26.27: 2010 / BTNMT on noise and vibration.
- Circular No. 47/2011/TT-BTNMT dated on December 28/, 2011 of the Ministry of Natural Resources and Environment about the national technical regulations on environment QCVN 40: 2011 / BTNMT of the industrial wastewater.
- Circular No. 32/2013/TT-BTNMT dated on October 25, 2013 of Ministry of Natural Resources and Environment on issuing the national technical regulations on environment including QCVN 05: 2013/BTNMT which replaced QCVN 05: 2009 / BTNMT.
- Parameter No. 27/2014/TT-BTNMT dated on May 30, 2014 of Ministry of Natural Resources and Environment on providing the registration of underground water exploitation.
- Parameter No. 27/2015/TT-BTNMT dated on May 29, 2015 of Ministry of Natural Resources and Environment on the regulations the strategic environmental assessment, the environmental impact assessment and the environmental protection plan.
- Circular 35/2015/TT-BTNMT dated on June 30, 2015 of Ministry of Natural Resources and Environment on the regulations on the environmental protection of the economic zones, industrial parks, export processing zones and hi-tech zones.
- Circular 36/2015/TT-BTNMT dated on June 30, 2015 of Ministry of Natural Resources and Environment on the regulations the management of hazardous waste.
- Decision No 3733/2002/QĐ-BYT dated on October 10, 2002 of the Minister of Health on issueing 21 labour hygiene standards, 5 principles and 7 parameters of the labour hygiene.
- QCVN 01:2009/BYT: National technical regulations for drinking water quality.
- QCVN 02:2009/BYT: National technical regulations for domestic water quality.
- QCVN 03:2008/BTNMT: National technical regulations on the permissible limits of heavy metals in the soil.
- QCVN 05:2013/BTNMT: National technical regulations on the ambient air quality.
- QCVN 06:2009/BTNMT: National technical regulations for hazardous substances in the ambient air.
- QCVN 07:2009/BTNMT: National technical regulations on the hazardous waste threshold.
- QCVN 08:2008/BTNMT: National technical regulations on the quality of surface water.
- QCVN 09:2008/BTNMT: National technical regulations on ground water quality.
- QCVN 14:2008/BTNMT: National technical regualtions on domestic waste water.
- QCVN 19:2009/BTNMT: National technical regulations on the industrial emissions for dust and inorganic substances.
- QCVN 20:2009/BTNMT: National technical regulations on the industrial emissions for some organic matter.
- QCVN 26:2010/BTNMT: National technical regulations on noise.

- QCVN 27:2010/BTNMT: National technical regulations on vibration
- QCVN 50:2013/BTNMT: National technical regulations on the hazardous threshold for sludge from the water treatment process.
- TCVN 6962:2001: Vibration and shock, Vibrations were caused by construction activity and industrial production.
- TCXDVN 33:2006: Water supply- Pipe networks and structures - Design standards.
- TCVN 6705:2009: Regular solid waste. Classification.
- TCVN 6706:2009: Hazardous waste. Classification.
- TCVN 6707:2009: Hazardous waste. Warning signs.
- TCVN 7957:2008: Drainage – External pipe networks and structures - Design standards.
- TCVS 3733:2002/QĐ-BYT: Labour hygiene standards of the Ministry of Health.
- Standards of waste water of Nhựt Chánh industrial Zone (QCVN 40:2011/BTNMT, column B).
- Safeguard Policy Statement of ADB
- International Finance Coporation, EHS guidelines

2.2. Legal documents of the project

- Investment Certificate No. 502043000046 of Management Board of Long An Industrial Zones licensed Café Outspan Vietnam Ltd first certificate on December 25, 2007 and certified 2nd the change on June 14, 2011.
- Investment Certificate (adjusted) No. 4336144325 of Management Board of Long An Industrial Zones licensed Café Outspan Vietnam Ltd first certificate on March 14, 2016.
- The lease of land No. 01-03/HDTLQSD-TY-08 dated on March 6, 2008 between Café Outspan Vietnam Ltd and Thanh Yến Joint Stock Company, and the contract addendum 01-COVL / CPTY-PL -13 on Febraury 27, 2013.
- The lease of land No. 18-07/HĐTLQSĐ-CPTY-11 dated on July 18, 2011 between Café Outspan Vietnam Ltd and Thanh Yến Joint Stock Company.
- Decision No. 43/1998/QĐ-TTg on February 23, 1998 of the Prime Minister on establishing the Management Board of Long An Industrial Zones;
- Decision No. 1610/QĐ-UBND dated on on June 19, 2007 on approving the report of environmental impact assessment for the construction investment project of Nhựt Chánh Industrial Zones.
- Decision No. 08/QĐ-BQLKCN dated on January 17, 2011 of the Management Board of Long An Industrial Zones on approving the report of environmental impact assessment of the project " Expanding the capacity of Café Outspan Vietnam Ltd coffee production plant from 4,000 tons to 12,000 tons products per year".

2.3. The documents, data for the project owner create and use in the process of the environmental impact assessment

- Interpreting report for the investment project Phase 3.

- The process and concerned design drawings (attached in appendix).

3. ORGANIZING AND IMPLEMENTING THE ENVIRONMENTAL IMPACT ASSESSMENT

To organize, implement and conduct the EIA report for "the project of the Café Outspan Viet Nam project Phase 3 to enhance the capacity of the coffee production plant 5.250 tons per year" at Lot L2, Nhựt Chánh Industrial Zone, Nhựt Chánh Commune, Bến Lức Town, Long An Province, the investment owner coordinated with Vita consulting and construction environment company limited and Center of Consulting of Safety hygiene and Environmental Consulting Technology (COSHET) and Quality Assurance and Testing Center 3 (QUATEST 3)

- Address of the consulting company: 210/4 Lê Văn Khương, Thới An Ward, District 12, HCM City.
- Tel: (08) 66805075 - Fax: (08) 62817355.

Table 1 Members directly take part in EIA report including:

No	Name	Position	Diploma	Years of Experience
Project owner: Café Outspan Vietnam Ltd				
1	Maharajula Jagannath Rao	Director of the Project	MA of Business Administration	20
2	Mr. Nataraj	Developing Director for the project of Phase 3	Engineer of Equipment and Machinery	7
3	Mr. Cao Tuấn Khôi	Head of HSE	Engineer of Safety and Environment	11
4	Mr. Hồ Đắc Hiền Hiển	HSE- Supervisor	Engineer of Safety and Environment	7
Consulting company: Vita consulting and construction environment company Ltd				
5	Ms. Trần Thị Thanh Thúy	Director	MA / Environment	07
6	Ms. Huỳnh Thị Tố Uyên	Vice Director	MA / Environment	07
7	Mr. Quách Văn Duy	Laboratory	MA / Chemicals	07

In doing the project, the investment owner also received the guidelines and help of the following agencies:

- Long An Management Board of Industrial Zones in Long An province;
- Service of Natural Resources and Environment of Long An Province.
- Department of Environment and Natural Resources and People's Committee, Bến Lức Town, Long An Province.
- Nhựt Chánh Management Board of Industrial Zones (Thanh Yến Joint Stock Company - Long An).

4. APPLICATION METHODS IN THE IMPLEMENTATION PROCESS OF EIA REPORT

In the EIA report for "the project of the Café Outspan Viet Nam project Phase 3 to enhance the capacity of the coffee production plant 5.250 tons per year", it is used by the following assessment methods:

Document collection methods and field survey and investigation

- Refer to the documentation of the natural environment and economic and social development of the area: the meteorological factors, hydrology (thermal regime, wind, rain, solar radiation, hydrology, water surface and underground water, etc) in the project area.
- The data on topography, soil, etc in the project area.
- Reports on the geological survey in the project area.
- Information collections about the infrastructure.
- Document collections and the actual survey of socio-economic conditions (population, administrative organization, land distribution, industry, agriculture, health, education, etc) in the project area.
- Surveying the environment status (soil, water, air, surface water) at the project area.

Identification methods

Identification methods are used as follows:

- Describe the environmental status.
- Identify all components of the project.

Forecasting methods, Prediction

Forecasting methods based on the documents used during the preparation of reports and projects with similar activities combined with the experience to anticipate the possible impact of the project on the environment, economy and society by the time.

Forecasting methods implement:

- Determine the environmental change.
- Forecast the volume and space of the change determined above.
- Assess the competence which will affect happening according to the time

Assessment methods

Assessment methods implement:

- Identify benefits and damage level that residents were affected by the project's activities.
- Identify levels and compare benefits between projects to reduce the environmental pollution.

- To implement the section, it can be used the method of comparison to compare the economic benefits and technical options and propose methods to minimize the impact.

Method of making checklist and matrix method

This making checklist method is used to establish the relationship between the activities of the project and the environmental impact. It is as follows:

- Listing simple: only list the environmental factors which need to considerate carefully corresponds to a developing activity.
- List with description: list along with environmental factors which have explanations about the choice of factors.
- List details with description of the level of each factor affects to the environment, next to the description, it is added the levels of to each activities for each factor.
- List with the weighted impacts, next to the description, there are the measure of the development of activities to each environmental factors.

Listing methods are built in different stages of the project, based on this basis, the researcher can orient the research contents of detailed impacts.

For example: list the environmental impacts caused by construction activities, list the environmental impacts when the project goes into operation, list the impact on the socio-economic environment.

In the matrix, factors which are affected are listed on the vertical axis and development activities are listed on the horizontal axis or vice versa. This approach can show us the relationship between the different impacts and environmental factors simultaneously.

Method of rapid assessment is set up by the World Health Organization

The rapid assessment method was composed by Economopolus prepared and the World Health Organization (WHO) issued in 1993.

The methods based on the statistics of load and environmental components of many projects around the world, thereby, determining the amount of load of pollution agents. Thanks to this method, the researcher can determine the load and the average concentration for each of the project activities without instrumentation or analysis.

Based on the rapid assessment method by the coefficient of pollution to estimate loads and concentrations of pollutants from construction activities and operations of the project according to the WHO pollution coefficient or models of Vietnam suggestions with similar characteristics, The researcher calculates the amount of waste arising from construction to set up a suitable pollution control.

EIA method is used in this report mainly based on "Implemeting Guidence the Report of Environmental Impact Assessment" by the Environmental Protection Agency - Ministry of Science, Technology and Environment (now Ministry of Natural Resources and Environment), issued on the basis in accordance with Vietnam situation, circumstances of the searching area and the survey data.

Applicable ADB Policies and Assessment Categories

ADB's Safeguard Policy Statement (SPS 2009) provides the basis for this Project IEE. All projects funded by ADB must comply with the SPS. The purpose of the SPS is to establish an environmental review process to ensure that projects undertaken as part of programs funded under ADB loans are environmentally sound, are designed to operate in line with applicable regulatory requirements, and are not likely to cause significant environment, health, or safety hazards.

This Project is classified as Environmental Category B under ADB SPS 2009, requiring an initial environmental examination (IEE), as the project environmental impacts are site-specific and mitigatable. The current regulatory EIA is the basis of this report, with consideration of additional requirements of ADB SPS.

CHAPTER 1
BRIEF DESCRIPTION OF PROJECT

1.1. NAME OF THE PROJECT

"Café Outspan Vietnam Ltd, Phase 3 Expansion, enhances the capacity of the coffee production plant 5.250 tons per year."

1.2. PROJECT OWNER

- Name of Investor : CAFÉ OUTSPAN VIETNAM IMITED
- Foreign Name: CAFÉ OUTSPAN VIETNAM LIMITED.
- Representative: Mr. Sunny George Verghese.
- Position: Chairman / General Manager.
- Plant Address: Lot L2, Nhựt Chánh Industrial Zone, Nhựt Chánh Commune, Bến Lức Town, Long An Province.
- Liaison Office: Lot L2, Nhựt Chánh Industrial Zone, Nhựt Chánh Commune, Bến Lức Town, Long An Province.
- Location of the project: Lot L2, Nhựt Chánh Industrial Zone, Nhựt Chánh Commune, Bến Lức Town, Long An province.
- Tel: 0723.655999.
  Fax : 0723.655998.

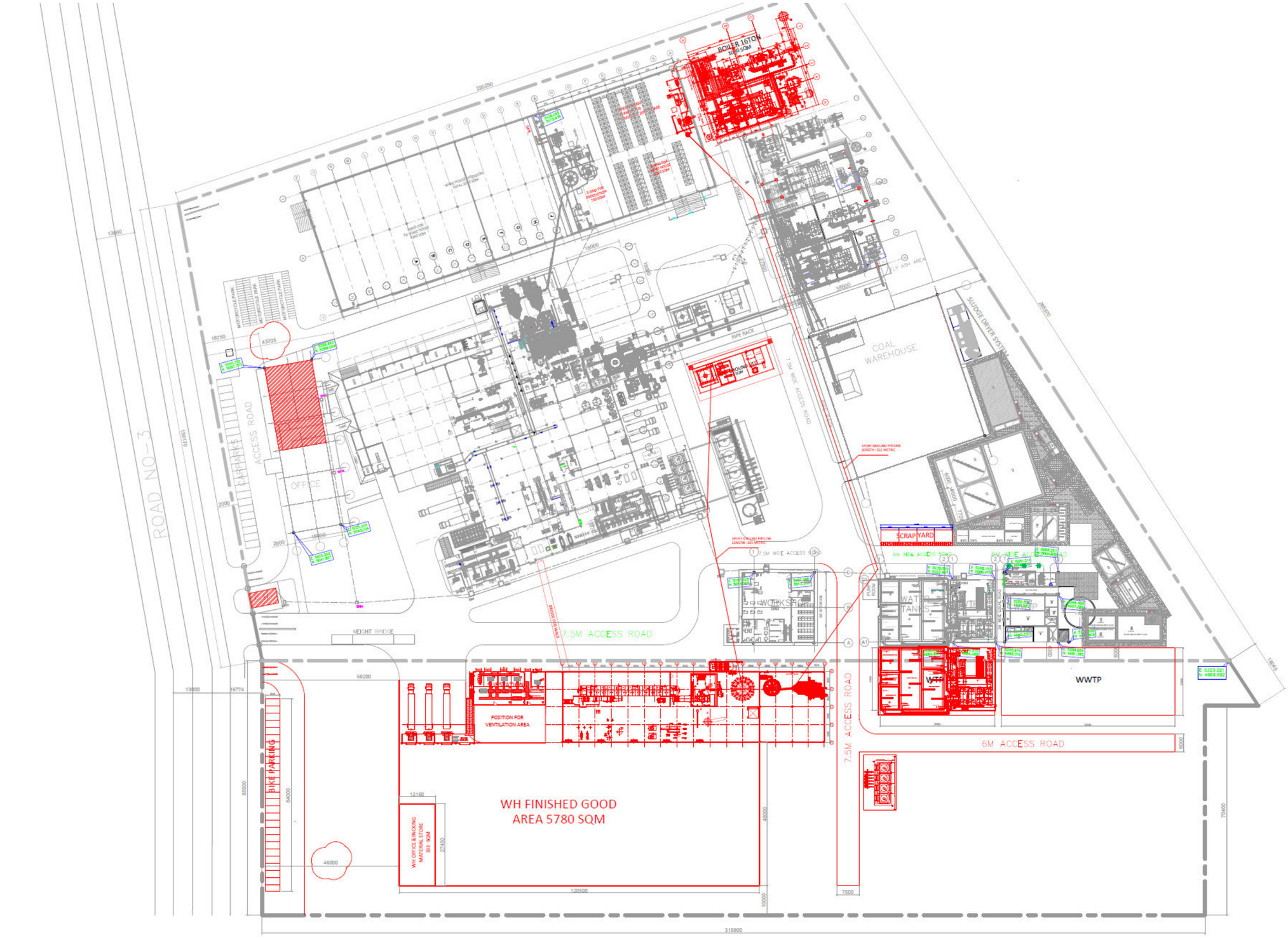
1.3. THE GEOGRAPHICAL POSITION OF THE PROJECT

Café Outspan Vietnam Ltd built the existing plant at Lot L1, Nhựt Chánh Industrial Zone, Nhựt Chánh Commune, Bến Lức Town, Long An Province. At the present, the company continues to invest *"Investing and expanding the instant coffee plant Phase 3 with the capacity of 5.250 tons per year."* The project of enhancing capacity was done right on the company space, expanding lease land in Nhựt Chánh Industrial Zone (27,134m^2).

The factory is located at Lot L2, Nhựt Chánh Industrial Zone, Nhựt Chánh Commune, Bến Lức Town, Long An Province with total area 27,134 m^2. Boundary of the company borders the following areas:

- East : Bordering on Vam Co Dong River
- West : Bordering internal road of Industrial Zone (road 3)
- South : Bordering Southern Joint Stock Company
- North : Bordering the existing company and Greenfeed Thailand Factory

Figure 2 Project Scheme of Nhựt Chánh Industrial Zone



The geographical location boundary of the project "*Café Outspan Vietnam Ltd, Phase 3 expansion, the capacity of 5,250 tonnes / year*" as follows:

Table 2 The geographical location boundary of the project

No	Location	48P		UTM	
1.	Northwest	10.623463	106.477636	10º37'24,5''N	106º28'39,5''E
2.	Northeast	10.623835	106.480616	10º37'25,8''N	106º28'50,2''E
3.	Southwest	10.622799	106.477784	10º37'22,1''N	106º28'40,4''E
4.	Southeast	10.623199	106.481153	10º37'23,5''N	106º28'52.1''E

(Resources:It is measured at the land of the project)

The area of expanding project is 27,134 m^2.

Nhựt Chánh Industrial Zone aims to attract the investments in less polluting production such as food processing, textiles, mechanics, etc, so the project location as well as investment purposes completely accord with the regional status. Surrounding areas are not affected or major impacted on other manufacturing plants.

The status of existing factories around the land of the project

At the present, Nhựt Chánh Industrial Zone has many enterprises which have been granted investment licenses to be in operation officially as follows:

Table 3 List of enterprises in Nhựt Chánh Industrial Zone

No	Name of company	Field of action	State quo
1.	An Hòa one member– BCC Ltd	Concrete component, industry and civil industrial mechanic products	Active
2.	BMT Construction and Transportation Ltd	Producing hot asphalt and concrete	Active
3.	Southern Concrete Joint-Stock Company	Concrete component, industry and civil industrial mechanic products	Active
4.	Gannon Beer Vietnam Ltd (US)	Produce and process, label, bottle and can of beer	Active
5.	Café Outspan Vietnam Ltd (Singapore)	Producing frozen coffee with high quality, dry instant coffee with normal quality and other relevant products	Active
6.	Long An Food Aquiculture Seafood Processing Ltd	Food Processing	Active
7.	Đồng Bằng Xanh Ltd	Produce leaf fertilizers, micro fertilizers, process and package plant protection products; produce and packaging of seeds	Active
8.	FULL-LONG Vietnam Ltd	Producing shell of gas tank LPG, LNG, pressure vessel, spherical basin	Active
9.	GREENFEED Vietnam Joint-Stock Company	Food production for breeding, livestock, poultry, seafood	Active
10.	One member Industrial Steam Soldering Stick Ltd	Producing welding rod	Active

Around the existing factory, premises are quite broad, with the adjacent position as stated. Expanding investment is to expand its processing plant located at this location is suitable for the specific characteristics of the sector the company's business.

In addition, the plant expansion project in Nhut Chanh Industrial Zone borders 832 provincial road connecting, separated Highway 1A about 1.2 km, Nguyen Van Linh Boulevard 15km and the center of Ho Chi Minh City 33km.

In summary, with the area has been reserved previously plus the above convenience, the project "Enhancing capacity of instant coffee processing plant of Cafe Outspan Vietnam Ltd at Lot L2, Nhựt Chánh Industrial Zone, Bến Lức Town is feasible and entirely consistent with economic development purpose of the company in particular and contribute to economic growth of the local in general. In addition, the nature of the production of project is entirely consistent with nature of manufacturing career which has been planned in the Industrial Zone.

1.4. MAIN CONTENTS OF THE PROJECT

1.4.1 The description of the project's objectives

The processing capacity of instant coffee of existing plant is 12,000 tons per year. The scale of production line of expansion project Phase 3 has the capacity of 5,250 tons per year of the company was planned from the beginning (2013), so the current premises can fully meet the open the company's wide.

The project aims to implement given goals and will bring the following benefits when going into operation:

- Expand the production to meet the export demand for instant coffee in Europe, Asia and Middle East markerts, filter coffee products for the domestic market.
- Contribute to ensure the output of fresh coffee market in Vietnam.
- Settle jobs for local workers and contribute to promote the local economy
- Contribute to increase paying taxes on local budgets in particular and the state taxes in general.

1.4.2 Quantity and scale of construction items of the project

The scale of using land

The project was carried out on the land of the company at Nhựt Chánh Industrial Zone, Bến Lức Town, Long An Province with the total area 27,134 m^2. The scale of using land is presented as follows.

Main construction items

Production Plants

- Structural foundation, steady beam: Reinforced concrete;
- Frame, beam: Steel;
- Roofs: Colorful tole;
- Brick walls up to the roof.

Inventory

- Structural foundation, steady beam: Reinforced concrete;
- Frame, beam: Steel;
- Walls, roof:Colorful tole.

The electricity Supply

- Structural stations: Type of room for outdoor station studio campus;
- Use LBFCO cut right into the medium route on the connection point with medium voltage electricity grid of the city;
- Measures: Use 1 power design 3-phase 4-wire E-100 / 5A to measue the medium voltage metering through 3 TI and TU (current and voltage signals);
- The low-voltage cable: Use copper wires Cu / XLPE / PVC 3Cx95 mm^2 + PEN 1×1C×95mm^2 from the station to the electrical cabinet (MSB), the power cable in the electrical cabinet uPVC Ø168 pipes then go into the cable tray power cabinets and consumption areas;
- Protection of low voltage side: Use 3-phase MCCB – 2,500A - 65kA.
- Water supply system: The water supply for the plant is taken from the throat of the zone of water supply and water tank levels leading into living and fire protection (underground V=180m^3) STK 50ϕ steel tube in the underground. From underground water tanks, domestic water supply for the whole factory pumped up 2 stainless steel sinks (V=5m^3/tub) with pump Q=12m^3/h (1 active and 1 reserve);
- From 2 stainless steel sinks, the water supply system for the consumption sector in uPVC 76ϕ pipe plant in the underground.

The water drainage system

- The rainwater collection system and waste water are separated.
- The rainwater drainage system is made of reinforced concrete 500mm wide.
- The wastewater collection system by ∅300 reinforced concrete.
- The waste water connected to the wastewater collection system of the industrial zone by ϕ300 reinforced concrete pipe.

Project Layout

Basically, the entire project developed independently from the existing plant and locatetd on the land of 27,134 m^2. Location of items are arranged suitablely, conveniently to ensure the production from the stage of receiving and processing of raw materials to finished products and also ensure the aesthetics of the whole project, etc. With the determined plan, Phase 3 development project has a number of associated projects connected to existing plants as boiler (position 2 is existing), maintenance workshops (the detailed layout plan works detailed in the annex).

The area of construction item is shown as the following table:

Table 4. The existing and expanding construction item

No	Main items	Existing factory *(m^2)*	Expanding factory Phase 3 *(m^2)*	Total *(m^2)*	Percentage *(%)*
1.	Office	896	-	896	1.1
2.	Canteen	299	-	299	0.4
3.	Roasted area	492	264	756	0.9
4.	The production area	8.152	1.564	9.716	12.1
5.	Finished products Inventory	5.924	5.780	11.704	14.5
6.	Repair workshop	480	-	480	0.6
7.	Boiler area	4.300	-	4.300	5.3
8.	Inventory of fresh coffee bean	3.250	-	3.250	4
9.	Coal Storage	2.250	-	2.250	2.8
10.	Security house	48	-	48	0.06
11.	Bridge Scale	264	-	264	0.3
12.	Motorcycle Parking	378	320	698	0.9
13.	Car Parking	470	-	470	0.6
14.	Fuel tank	112	100	212	0.3
15.	Water treatment area	2.670	2.130	4.800	6
16.	Lean-to walkway	210	200	410	0.5
17.	Walkway without lean-to	3.262	2.000	5.262	6.5
18.	Gate and fence	966	400	1.366	1.7
Total of building items		**34.423**	**12.758**	**47.181**	**58.7**
Greenery area (garden area)		**18.837**	**14.376**	**33.213**	**41.3**
Total area of land area		**53.260**	**27.134**	**80.394**	**100**

Source: Investment project "Investing and expanding the instant coffee plant Phase 3 with the capacity of 5.250 tons per year", in March, 2016

1.4.3. Construction organization methods, construction technology of construction items of the project

The infrastructure of the project

The boiler

The Boiler technology is Combipac which is a hybrid of smoke and water tube design, with the combustor based on the principle of fluidised bed combustion (FBC). The fuel bed is fluidised by the injection of air from the bottom of the bed, through a set of air nozzles using FD fan. This produces a fuel bed resembling a boiling fluid, which helps achieve uniform mixing and efficient combustion.

In this Combipac-FBC range of boilers, the higher turbulence levels, better residence time, low excess air and uniform distribution of air and fuel improves overall combustion efficiency. Combipac boilers also offer the flexibility of firing a wide variety of agro-waste and other low grade solid fuels efficiently.

The boiler at COVL is designed for multiple fuels such as 100% Coal, 100% rice husk, 70% coal + 30% spent coffee.

The boilers is equipped with electrostatic precipitator (ESP) which is a filtration device that removes fine particles, like dust and smoke, from a flowing gas using the

force of an induced electrostatic charge minimally impeding the flow of gases through the unit. ESP ensures the suspended particulate matter (SPM) levels in the flue gas meets the international air emission norms.

The electricity system

Use the electric distribution system which is distributed from the substation Nhựt Chánh Industrial Zone, from the national grid of the medium voltage power connection with 22 kV to connect to of 110 KV Bến Lức substation (dual circuit), is provided to the fence of each factory or enterprise by cables.

The water supply system

Use the water for production and domestic use from the supply of Long An Company Limited supply.

Water supply requirement: 1900 m3

treatment done before use in the process: 650 m3

The water drainage system and wastewater processing system

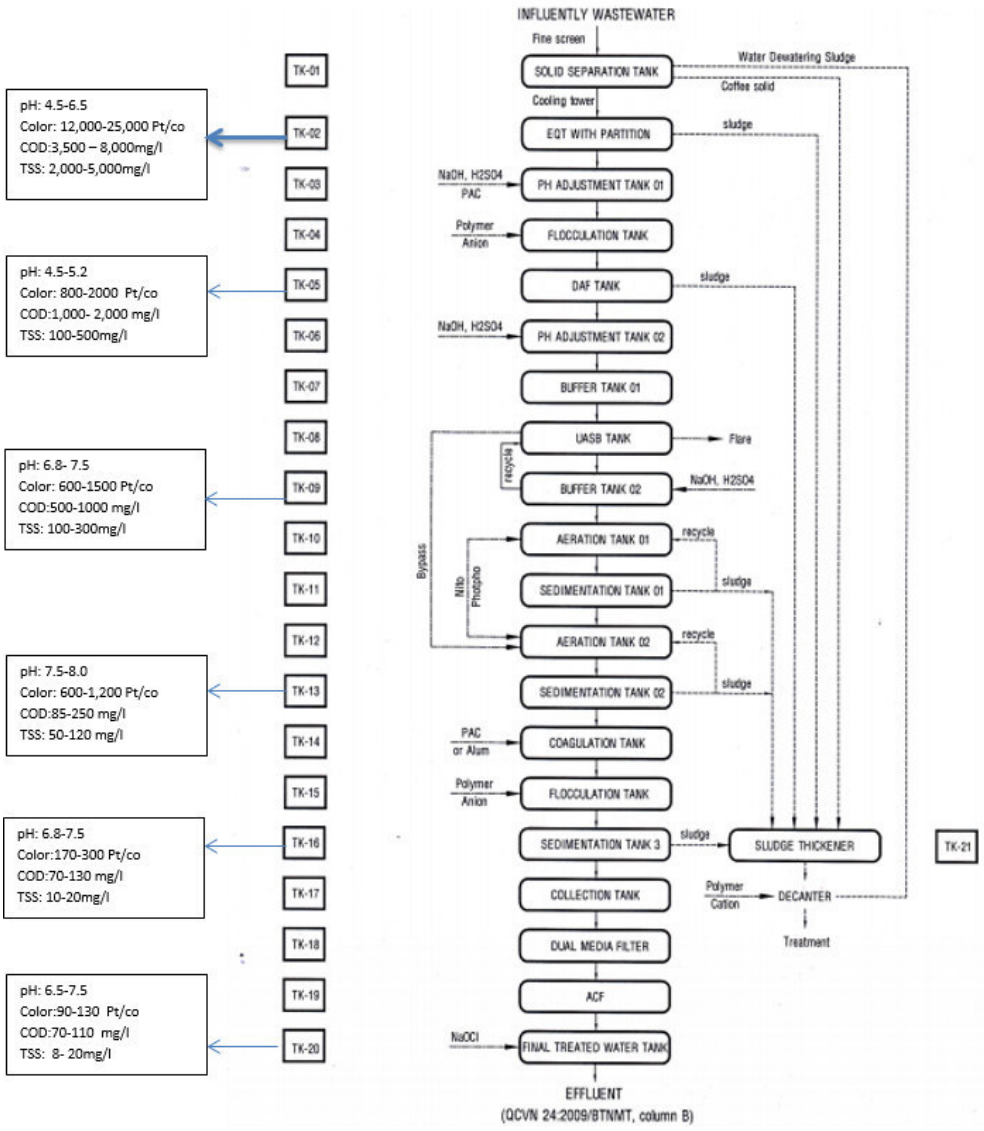
The waste water system of the company is built as follows:

The wastewater system and domestic wastewater use of the existing plant which is taken the wastewater treatment system of the company with the capacity of 1,750 m3 per day and night reception gets the standards of the wastewater treatment system which is concentrated in Nhựt Chánh Industrial Zone.

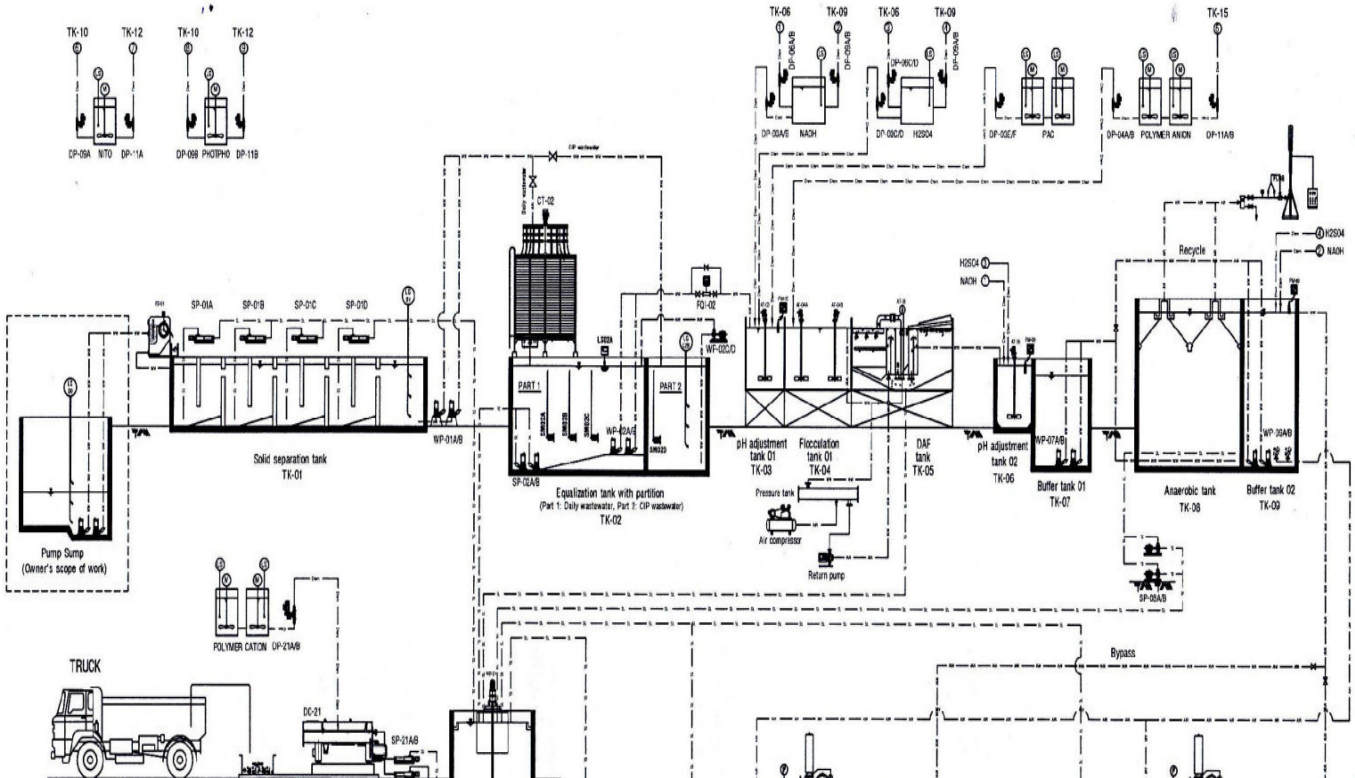
In phase 3, Café Outspan Vietnam Ltd will also build a wastewater treatment system with the capacity of 750m3/day and night to process the wastewater of the expanding coffee processing line.

The rainwater on the roof will be collected to gutters and through pipes to manholes and into the collecting pipe system. The rainwater flowing on the surface will be collected through the hole on the manhole cover knit to flow into the rainwater collection system. The system is designed to take advantage of gravity so it needs the natural slope of the land to put the rainwater collection system. The water drainage system separates from the wastewater treatment system.

The rainwater drainage system of the project Phase 3 is connected with the drainage system of the existing plant. This source will be connected to the general drainage system of Nhựt Chánh Industrial Zone (the drawing of the drainage system of the project Phase 3, see details in the appendix).



The waste water treatment system with the techology below



Moreover, the company also monitoring by internal and extenal (authorized center) waste water paramaters:

- Internal: + COD, TSS, color, pH - every shift
  + BOD – weekly
- External: Monthly, company sent the sample to authorized center for test wastewater
- Beside that, IP aslo take sample random to check every 3 month.

Due to control strictly, so waste water always meet category B follow the vietnamese standard.

Follow this technology, the waste water treatment system can treat to category A but due to company located in Industrial Park, so company not yet plan to treat wastwater to category A.

Fire Proctection System

The fire protection System was approved by Fire protection Department for all archive regulation.

The water supply system for fire extinguishing system according to the wall with duct combined fire hydrants to get water. At the appropriate locations, they are installed the fire alarm systems. The water to supply for fire protection were taken from fire water tank with 400m3. The fire pump system includes 1 main fire pumps powered by the electric motors, one secondary powered by diesel. The control cabinet is located in the pump.

Moreover, the company also arranged the additional powder jars, the bottle CO2, the sand drums which fight for other areas such as the set of generators, office, material warehouse and some other ancillary works.

Lightning Protection System

Lightning protection system focused on the highest place of the construction. It is equipped with the active lightning protection system in the classical style (meaning that: the lightning collecting needle mounted 5 meters high base for workshops, lightning is transmitted through copper wires down to the ground poles).It is expected to use INGESCO lightning collecting needles with the radius protection 50 meters to sufficiently cover the scope of the lightning protection of the station works. The lightning conductor cable cores PVC with the 200 kV insulated cable and anti-interference for transmission lines and communications equipment. The earthing system used 4 16 x 2.4 m plated copper stake which there is one 10 Ω resistor apart grounding for each 4 meters.

Ground stakes are buried at a depth of 0.8 meters from the ground, from a minimum of 1.5 m foundations. The connecting cables and ground stakes using thermal chemical welds Cadweld to ensure contact points in the weld is still effective conduct lightning and sustainable over time. They are annually to check the grounding resistance of the lightning protection system before the rainy seasons.

1.4.4. Production and operation technology process

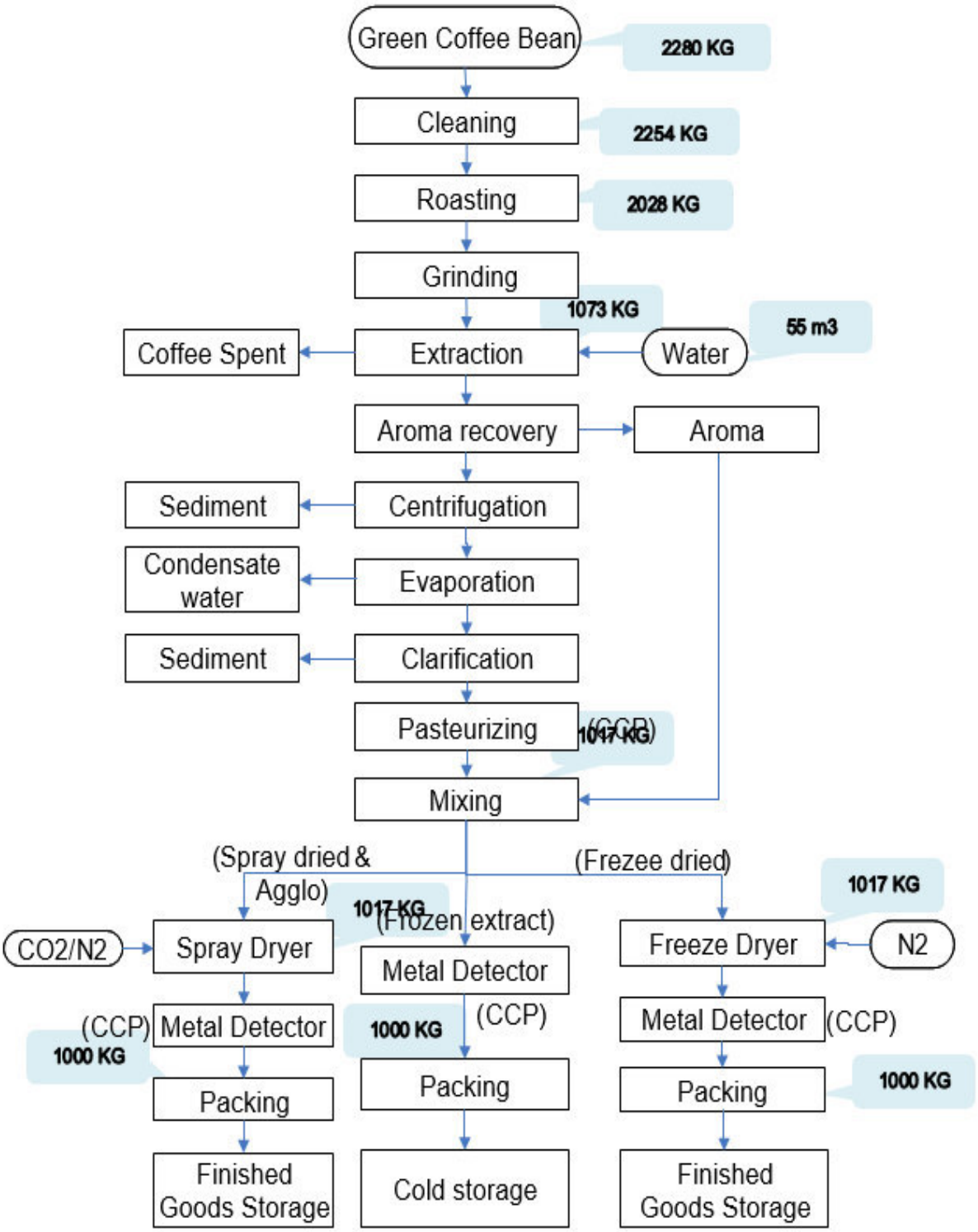


Figure 3. *Flowchart of Instant coffee processing process*

Interpretation and explanation of instant coffee processing process:

Roasting
Green coffee beans themselves have no good taste. It must be roasted to create a good taste. To roast coffee beans is similar to normal coffee processing process.
The rotation axes contain green coffee beans. When the temperature reaches and exceeds 165 ° C, roasting process will begin with the crack as well as when you make popcorn. Each phase will last about 8-15 minutes to complete the roasting and grinding process with efficiency about 25-75%.
The roast associated with continouos liquefaction only takes 30 seconds to 4 minutes and was run at a lower temperature to retain the flavor of the bean.

Grinding
The next step is that to create the bean with the size of 0.5 to 1.1 mm for coffee can be dissolved in water for dried periods. A set of roller is specially designed to cut the beans which are used.

Extracting
After roasting and grinding instant coffee with water. This phase is called extraction. Water is poured into 5-10 filtration column at temperatures from 310 to 360 ^{o}F (155-180 ^{o}C), this solution will be shifted to be condensed

Recovering flavour
To avoid loss of flavor components which are volatile in the extract process. During this process, the coffee is kept hot. A small part in condensed coffee is separated from the volatile part to entering a recovered flavor component. After being separated and condensed into a device in seconds, the coffee flavor will be restored in a two-stage condensing system. This reccoverable flavor will be restored coffee before drying process.

Condensedness
The coffee extract with soluble solids is produced in the extract process by filtering and cleaning through a centrifuge, then bringing to concentrate solution before drying. Condensation process is usually done through the evaporation of hot gas.
This project of the plant performed well under 2 ways: thermal drying and frozen drying. Contrary to thermal drying, frozen drying is to preserve volatile flavor by processing at very low temperatures during the condensedness.

Drying
This stage is extremely important. Today, there are two different methods used in plants around the world: frozen drying and spray drying. Each method has advantages and disadvantages:

Spray drying
This method is preferred to dry and freeze in some cases because of cost effectiveness, short drying time and its usefulness when dealing with products easily damaged by heat, in the form round bean, small and pure.

The spray drying provides spherical particles with equivalent size 300 μg with density 0.22 g/ cm^3 (reference 2). To achieve this result, they used small distribution valve. The small distribution has its own advantages and disadvantages. The wheel turns with high-speed and operates at a speed of 20,000 rpm that can process 60,000 pounds (27t) solution for one hour. The use of spray wheel requires drying towers which have wide radius to avoid droplets are distributed which are bunched into dry walls.

The disadvantage of the spray drying is very smooth processed particles. They cannot be used effectively by the customer; Firstly, , they first off steam in tower as well as spray drying or belt agglomeration to produce small particles with appropriate sizes. This process produces the condensed instant coffee.

Frozen drying

The basic principle of the process in the instant coffee production process is to evaporate the water.

Since instant coffee was produced, frozen drying has developed into a common method popularly. This method is often used despite the costs is higher other freeeze drying methods, because it also makes products with higher quality.

Frozen drying process

- Wet small beans agglomerate and they are frozen. For instant coffee, this is a very important stage. If freeze process is too quickly, it will lead to large ice crystals and the porous product. Moreover, it can affect the color of coffee beans.
- Frozen coffee is placed in the dry space, usually on a metal tray.
- Space is a vacuum. Vacuum is a key factor in the drying rate so it decides the quality of product.
- Drying room is kept moist, most common radiation but heat conducting is used in some plants and convection is used in some small pilot plants.
- The condensedness of frozen water before in small coffee beans expand to 10^7 size, the separation of steam from the drying room is extremely important factor, making condensedness into the expensive and key components in freeze drying equipment.
- The freeze dried granules are removed from the drying room and packed.

Frozen coffee extracting

- The nature of condensed coffee is mainly used in Japan for the preparation,canning coffee and dispensing other beverages.

1.4.5. Equipment, machinery

List of equipment and machinery for the construction project Phase 3

Table 5 List of equipment and machinery for the construction project

No	Name of Machinery	Unit	Quantity	Characteristic
1.	Dump truck	vehicle	02	Loading capacity 10 tons
2.	Loader	vehicle	01	Bucket capcity 0,8m^3
3.	Steel-cyclinder rooler	vehicle	01	Loading capacity 12 tons
4.	Bulldozer	vehicle	01	Capacity 110CV
5.	Clamshell	vehicle	01	Lifting capacity 30 tons
6.	Vibrator	piece	01	Capacity 1,1KW
7.	Concrete mixer	piece	02	Capacity 250L, C/s 3 - 5m^3/h
8.	Piling equipment	set	01	Loading capacity 240 tons

(Source: Explanation of the project "Investing and expanding the instant coffee plant Phase 3 with the capacity of 5.250 tons per year" ,0 3.2016)

List of machinery and equipment for the operation stage

All equipment and machinery are new 100%, mass of model in 2015, 2016 imported from Europe, South Asia, Brazil. Requirement for equipment is ensuring standard about environment, quality of product and bringing high economic effect. The list of machinery and equipment of company are presented in the following table.

Table 6 List of machinery and equipment for the operation stage

No	Machinery	Quantity	Origin	Purpose	Characteristics
1.	Machine to process and clean coffee beans	1	EU /Brazin	Cleaning raw materials	4800 kg/h
2.	Machine to roast coffee	1	EU /Brazin	Roasting coffee	3500 kg/h
3.	Equipment to grind and extract	1	EU	Production process	750 kg/h
4.	Equipment to process and extract and system of recovering fragrance	1	EU /Australia		
5.	Equipment for process system (eg centrifuges …)	1	EU		
6.	System of extracting and condensedness	1	EU		
7.	System of frozen drying	1	EU		700 kg/h
8.	Insulator for cold rooms - for frozen drying	1	EU	Insulator for cold rooms	(-50°C)
9.	Equipment for Lab	1	EU	Quality experiment	
10.	CIP System	1	EU	Periodic cleaning system	
11.	Equipments to store (stand)	1	South Asia	Storage arrangement	Capacity: 1707 MT
12.	Sludge treatment system	1	Vietnam/EU	System to extract coffee grounds	5 tons/h
13.	Boiler fuel package *(coal + coffee grounds)*	1	Asia	Making steam for production	25 tons/h
14.	System of raw water process	1	Asia	Using for production	110 m^3/h
15.	Generator	1	EU / Asia	Providing against main power is cut	2 x 2250 KVA
16.	Wastewater treatment	1	EU / Asia	Processing waste	750 m^3/day

No	Machinery	Quantity	Origin	Purpose	Characteristics
	plant			water	
17.	Air compressor	1	EU / Asia	Controlling survey equipment	2×20m³/minute
18.	Water cooling system	1	EU / Asia	Cold extraction process	400 m³/h
19.	Coolong system	1	EU / Asia	For machine to make cold and evaporate	1500 m³/h
20.	Special equipments and measures *(cables for cold rooms (-50°) and for supply equipment, transformer,MSB,ACB,UPS, neon lights…)*	1	EU / Asia	Hang all production systems	Serve for production system with 700 kg/h
21.	Packing equipment	1	EU / Asia	Pack the finished products	1 tons/h
22.	Equipment for arranging materials (forklift truck, hand lift tool, …)	1	EU / Asia	Arrange materials and finished products	
23.	Other utilities *(pump, unlockingvalve, operating system, MV, dehumidification...)*	1	EU / Asia	For the production process	

(Source: Explanation of the project "Investing and expanding the instant coffee plant Phase 3 with the capacity of 5.250 tons per year" ,0 3.2016)

1.4.6. Raw materials, fuel, materials, chemical inputs and outputs

1.4.6.1. List of products of the project

Demands of raw materials, fuel, materials are shown in the following table:

Table 7 List of products of the project

No	List of products	Unit	Capacity
1.	Forzen coffee essence	tons/year	5,250
2.	High quality dried instant coffee		
3.	Common dried coffee powder		
4.	High quality dried coffee		
5.	High quality dried filter coffee powder		
6.	Other related products		

(Source: Investment License No 4336144325)

1.4.6.2. Demands of raw materials and chemicals

Demands of raw materials and chemicals for constructing the project are listed as follows:

No	Materials	Unit	Quantity
1.	Overflowing soil	m^3	500
2.	Fill soil	m^3	300
3.	Yellow sand	m^3	800
4.	Rock 4x6mm	m^3	1.000

No	Materials	Unit	Quantity
5.	Rock 1x2mm	m^3	1.200
6.	Cement	Tons	525
7.	Iron	Tons	364,8
8.	Bricks	Tons	10
9.	Mastic putty	Tons	3
10.	Paint	Tons	3

(Source: Interpretation of the project "Investing and expanding the instant coffee plant Phase 3 with the capacity of 5.250 tons per year" ,0 3.2016)

Demands for raw materials, materials in the operation stage of the project

Demands for production materials are sunthesized in Table 8 as follows:

Table 8 Demands for using materials and chemicals for the existing plant and the expanding plant

For raw material (green coffee bean) storage, company put them on pallet, height level three pallet (4.35m) and with distance 5m with wall.

For the chemical storage, the company has built the storage for keeping chemical and only authorized person can enter inside the storage. In the storage company separate area for keeping every kind of chemical.

For the manufactures that produce chemical, company have plan to audit yearly follow the regulation guidline.

We have three types to buy material and with chemical base on DDP

Ex Works (EXW) is an international trade term that describes an agreement in which the seller is required to make goods ready for pickup at his or her own place of business. All other transportation costs and risks are assumed by the buyer.

Cost and freight (CFR) is a legal term used in international trade. In a contract specifying that a sale is made CFR, the seller is required to arrange for the carriage of goods by sea to a port of destination and provide the buyer with the documents necessary to obtain the goods from the carrier. Under CFR, the seller does not have to procure marine insurance against the risk of loss or damage to the goods during transit.

Delivered duty paid (DDP) is a transaction where the seller pays for the total costs associated with transporting goods and is fully responsible for the goods until they are received and transferred to the buyer. This includes paying for shipping costs, export and import duties, insurance and any other expenses incurred during shipping of the goods. DDP is a type of delivery agreement that puts all of the risks and charges with the seller of the goods until delivery is made in the buyer's country at an agreed-upon location.

We have contractors to handling raw material and chemical from truck or container. Sometime we transfer chemical (H2SO4, NaOH) into tank by pupm into truck.

No	Materials	Voulume/month		Total	Purpose for usage
		Existing*	Phase 3		
1.	Coffee bean	2.500 tấn	1.083 tấn	3.583 tons	processing process
2.	Liquid nitrogen	1.488 kg	748 kg	2,236	processing process
3.	Carbon dioxide	1.920 kg	900 kg	2,820	processing process
4.	Plate Count Agar	500g	300g	800	Quality Lab
5.	Potato Dextrose Agar	100g	60g	160	Quality Lab
6.	Violet Red Bile Agar	500g	300g	800	Quality Lab
7.	Dichloran Glycerol agar	500g	300g	800	Quality Lab
8.	Salicylic acid	60g	30g	90	Quality Lab
9.	KCl 3M	500ml	150ml	650	Quality Lab
10.	Standard HCl 0.1N solution	1 liter	0,6 liter	1,6	Quality Lab
11.	Phenolphtalein	1g	1g	2	Quality Lab
12.	Thioglycolate Medium without Indicator USP	50g	50g	100	Quality Lab
13.	Sodium Hydrogen Carbonate ($NaHCO_3$)	80g	80g	160	Quality Lab
14.	Magiesium oxide (MgO)	35g	35g	70	Quality Lab
15.	Sodium Chloride (NaCl)	80g	80g	160	Quality Lab
16.	Tween 20	120 ml	65 ml	185	Quality Lab
17.	Methanol (CH_3OH)	3000 ml	1500 ml	4,500	Quality Lab
18.	Acetonitrile (CH_3CN)	500 ml	200 ml	700	Quality Lab
19.	Natriumhydroxide (NaOH khan)	10g	10g	20	Quality Lab
20.	Succrose(saccharose)	1g	1g	2	Quality Lab
21.	Conductivity 84 µs/ cm	200ml	200ml	400	Quality Lab
22.	Electrolyte 3 mol/L KCl (250 mL) Trong	250ml	250ml	500	Quality Lab
23.	Electrolyte 3 mol/L KCl (250 mL)	250ml	250ml	500	Quality Lab
24.	Dextrose Tryptone Agar	500g	500g	1,000	Quality Lab
25.	Agar Powder	100g	100g	200	Quality Lab
26.	KCl 3M	500ml	300ml	800	Quality Lab
27.	Hardness kit test	2 set	2 set	4	Quality Lab
28.	DPD free chlorine reagent	1 Bag	1 Bag	2	Quality Lab
29.	Conductivity 1413 µS/cm	1 lít	1 lít	2	Quality Lab
30.	NaOH 32%	400kg	200kg	600	
31.	Glycerine	0.2kg	0.2kg	0	
32.	NaCl	1000kg	400kg	1,400	Waste water system
33.	pH solution (NaOH)	0.5kg	0.5kg	1	Waste water system
34.	Polymer C300	300kg	300kg	600	Waste water system
35.	NaOH 98%	1000kg	700kg	1,700	Waste water system
36.	COD LR reagent 0-150 mg/L	12 Box	12 Box	24	Waste water system
37.	NaClO (sodium hydro cloric)	1000kg	700kg	1,700	Waste water system
38.	H2SO4 30%	280kg	280kg	560	Cooling Tower
39.	H2SO4 98%	9000 kg	4800 kg	13,800	Waste water system
40.	NaLCO 3DT129	44kg	24kg	68	Cooling Tower
41.	NaLCO 3DT104	60kg	40kg	100	Cooling Tower
42.	NaLCO 3430	276kg	156kg	432	Cooling Tower

No	Materials	Voulume/month		Total	Purpose for usage
		Existing*	Phase 3		
43.	NaLCO 7330	80kg	50kg	130	Cooling Tower
44.	MSI 300	100 kg	70 kg	170	Waste water system
45.	PAC (Poly Aluminium Chloride)	26,000 kg	16,000 kg	42,000	Waste water system
46.	MCT -103	50 kg/ 6 tháng	32 kg/ 6 tháng	82	Waste water system
47.	MCT-511				Waste water system
48.	NaLCO	200 kg	120 kg	320	Waste water system
49.	NaLCO 22310	61kg	61kg	122	Boiler
50.	NaLCO 19PULV	26kg	26kg	52	Boiler
51.	NaLCO 8507	76kg	76kg	152	Boiler
52.	NaLCO 356	20 kg	20 kg	40	Boiler
53.	Coal		50MT/d		Boiler
54.	Ure Fertilizer	130 kg	130 kg	260	WWTP
55.	Phophoric	100 kg	100 kg	200	WWTP
56.	Oxofoam	35-40 L	35-40 L	70 – 80 L	Production
57.	Peroxide (oxonia active)	25 L	25 L	50	Production
58.	Caustic soda	15.000 kg	15.000 kg	30,000	Production
59.	Carbon dioxide	960 kg	960 Kg	1,920	Production
60.	Nitrogen	744 kg	744 kg	1,488	Production
61.	Ethanol	45 liter	45 liter	90	Production
62.	SU 319	30 kg	30 kg	60	Production
63.	SX 207A	10 kg	10 kg	20	Production
64.					

(Source: Interpretation of the project "Investing and expanding the instant coffee plant Phase 3 with the capacity of 5.250 tons per year" ,0 3.2016)

1.4.6.3. Demands for the electricity and water and fuel

Water for production and dosmetic activities

Total water supplies for the operation of the existing plant 2,964 m^3/ day and night. In Phase 3 of the project, the demand of using water will be estimated about 1,286 m^3/ day and night, specificly as follows.

Table 9 The water used for the operation of the company

No	Purpose for usage	**Usage** (m^3/day&night)	
		Existing plant (*)	Phase 3 plant (Estimated)
1	Water for production	1668	1.004
2	Water for daily life	70	28 – 31
3	Water for boiler	247	127 – 131
4	Other purposes	20	175
Total		**2.005**	**1.286**

*(Source: *Extract the information, Page 37, the environment supervision report Quarter 6.2017)*

Table 10 The generated waste water quantity

No	Tháng	**Usage**	
		Existing plant	Phase 3 plant

		m^3/month(*)	*(m^3/day.night)*	(Estimated)
1.	Jun 2017	34.105	1.211	-
2.	Jul 2017	35.622	731	-
3.	Aug 2017	34.721	1.114	-
4.	Average		**1.019**	**446**

*Source: * Bill of the waste water charges in the month of 6,7 & 8/2017*

Demands for using the electricity

Electricity is the main source of energy for all activities of the project: providing the electricity for the operation of coffee processing line, lighting the plant, security house and workers' life. Power supply must be continuous and stable to ensure that all operations of the company is continuous.

Based on the technology, the selected equipment and machinery are estimated the total electricity used by the company in one month (for years of stability operation and the working time is 3 shifts per day) of about 85,000 kilowatts per day. Level of electricity consumption for the Phase 3 is about 45,000 kilowatts per day.

Demands for using the fuel

During the operation, to ensure the production process is not interrupted, the company will invest 2 standby generators with the capacity of each generator is 2,250 KV. The generator uses DO oil which has sulfur <0.25% to create the alternative power sources in case of incidents.

In addition, DO oil is also used for production purposes, providing for steam oven which has 3.5 tons/h of the project. The coal and coffee grounds is also used the steam oven with the capacity of 16 tons/h.

Table 11 Demands of using the fuel of the existing plant and the expanding plant Phase 3

No	Purpose for usage	Existing plant		Expanding plant Phase 3	
		Capacity	Consumption	Capacity	Consumption
1	DO oil for roasted oven	Capacity 3 tons/h	170 litres/h	capacity 3 tons/h	80 litres/h
2	DO oil for generator	Capacity 3,750 KVA	10,000 litres/month	capacity 2,250 KVA	6,000 litres/month
3	Coal	Capacity 41 tons/h	2.4 tons/h	capacity 25 tons/h	1 tons/h
4	Coffee grounds		30 tons/day		20 tons/day

(Source: Interpretation of the project "Investing and expanding the instant coffee plant Phase 3 with the capacity of 5.250 tons per year" , 3.2016)

1.4.7. The implementation schedule of the project

The project *"Café Outspan Vietnam Ltd, Expanding Phase 3 with the capacity of 5,250 tons products per year"* of Café Outspan Vietnam Ltd is built in the design documents.

The work of constructing plant and infrastructure will be assigned to a unit that has full experience in the industrial construction and having sufficient financial capacity to implement the project. The investor has the staff of experienced building engineers who supervise progress to inspect and supervise the quality of

progressing work. The project is expected to complete construction within 20 months with the implementation schedule which is presented in the following table**.**

Table 12 The schedule of the project

CAFE OUTSPAN VIETNAM

IMOLA3 PROJECT- MASTER SCHEDULE

REV 07
SEP 06, 2017

ID	Task Name	Duration	Start	Finish	% Complete
1	**COVL- IMOLA3 PROJECT PROGRAM**	**594 days**	**Fri 4/1/16**	**Thu 11/30/17**	**86%**
2	Investment Committee Approval	30 days	Fri 4/1/16	Sat 4/30/16	100%
3	**Licenses/ Approval**	**30 days**	**Sun 5/1/16**	**Mon 5/30/16**	**100%**
4	EIA- Environmental Impact Assessment	30 days	Sun 5/1/16	Mon 5/30/16	100%
5	**Main Suppliers/ Contractor Selection**	**134 days**	**Fri 4/1/16**	**Fri 8/12/16**	**100%**
43	**Design works and Pre Engineering**	**449 days**	**Fri 4/1/16**	**Sat 7/8/17**	**99%**
44	Master plan layout design	30 days	Sun 5/1/16	Mon 5/30/16	100%
45	Geology& Topo survey	15 days	Tue 5/31/16	Tue 6/14/16	100%
46	**Civil design_CK&A**	**449 days**	**Fri 4/1/16**	**Sat 7/8/17**	**99%**
68	**Permit and Approval**	**323 days**	**Tue 6/28/16**	**Wed 5/31/17**	**100%**
74	**Utility design_Seas**	**133 days**	**Tue 6/28/16**	**Mon 11/7/16**	**100%**
75	**Checking information**	**21 days**	**Tue 6/28/16**	**Mon 7/18/16**	**100%**
80	**Design**	**70 days**	**Tue 7/19/16**	**Mon 9/26/16**	**100%**
144	BoQ and Tender document	14 days	Tue 9/27/16	Mon 10/10/16	100%
145	Bidding	28 days	Tue 10/11/16	Mon 11/7/16	100%
146	**Civil Contractor& Utilities Supplier selection**	**159 days**	**Tue 6/7/16**	**Sat 11/12/16**	**100%**
147	**Civil works: Tender& Contract**	**114 days**	**Tue 6/7/16**	**Wed 9/28/16**	**100%**
176	**Panel works- Coldstorage: Tender& Contract**	**12 days**	**Tue 11/1/16**	**Sat 11/12/16**	**100%**
179	**Fire Fighting works: Tender& Contract**	**15 days**	**Sat 8/6/16**	**Sat 8/20/16**	**100%**
182	**Freight Elevators: Tender& Contract**	**25 days**	**Mon 8/8/16**	**Thu 9/1/16**	**100%**
185	**Coal conveyor: Tender& Contract**	**25 days**	**Fri 9/2/16**	**Mon 9/26/16**	**100%**
188	**Civil Construction**	**399 days**	**Fri 5/20/16**	**Sat 7/8/17**	**98%**
189	**Payment process-FRC**	**399 days**	**Fri 5/20/16**	**Sat 7/8/17**	**100%**
203	**Preliminary civil works**	25 days	Thu 6/23/16	Sun 7/17/16	100%
204	**Piling works**	**134 days**	**Thu 6/23/16**	**Thu 11/3/16**	**100%**
239	**FGW, Substation civil works**	**123 days**	**Wed 8/10/16**	**Sat 12/10/16**	**99%**
286	**Main process building, roaster civil works**	**223 days**	**Wed 9/14/16**	**Tue 5/9/17**	**99%**
411	**Coffee feed system, silo: Foundation works**	**29 days**	**Thu 11/17/16**	**Thu 12/15/16**	**100%**
420	**WWTP Civil works**	**150 days**	**Mon 11/14/16**	**Thu 4/27/17**	**100%**
469	**WTP Civil works**	**134 days**	**Mon 11/14/16**	**Tue 4/11/17**	**100%**
505	**Pipe rack Civil work**	**44 days**	**Mon 12/19/16**	**Wed 2/15/17**	**100%**
515	**Boiler: Civil works**	**72 days**	**Fri 11/25/16**	**Sun 2/19/17**	**99%**
582	**Rubbish house: Civil works**	30 days	Thu 2/16/17	Fri 3/17/17	70%
583	**Spend grout silo: Civil works**	**34 days**	**Thu 2/16/17**	**Tue 3/21/17**	**100%**
588	**Defect list of all civil works**	60 days	Wed 5/10/17	Sat 7/8/17	60%
589	**Procurement Process (By Outspan)**	**367 days**	**Sat 8/6/16**	**Tue 8/22/17**	**22%**
610	**Utilities works-Seas**	**514 days**	**Fri 5/20/16**	**Wed 11/1/17**	**75%**
611	**Payment process**	**514 days**	**Fri 5/20/16**	**Wed 11/1/17**	**0%**
625	**Utility installation activities**	**323 days**	**Tue 11/1/16**	**Wed 10/4/17**	**75%**
851	**Fire Fighting Installation**	**279 days**	**Sat 8/20/16**	**Sat 6/10/17**	**90%**
889	**Freight Elevators**	**254 days**	**Thu 9/1/16**	**Sun 5/28/17**	**99%**
902	**Coal conveyor**	**298 days**	**Fri 4/1/16**	**Tue 2/7/17**	**98%**
915	**Spent ground conveyor**	**109 days**	**Wed 4/26/17**	**Sat 8/12/17**	**77%**
942	**Main Equipments Delivery& Installation**	**584 days**	**Mon 4/11/17**	**Thu 11/30/17**	**97%**
943	**Niro-FD& Extraction**	**583 days**	**Mon 4/11/17**	**Wed 11/29/17**	**95%**
944	**Payment process**	**559 days**	**Thu 5/5/16**	**Wed 11/29/17**	**0%**
955	**General Engineering**	**68 days**	**Mon 4/11/17**	**Fri 6/17/16**	**100%**
971	**Detailed Engineering**	**235 days**	**Mon 5/23/17**	**Fri 1/13/17**	**100%**
972	Detailed Lay-out	82 days	Mon 6/20/17	Fri 9/9/16	100%
973	Detailed Hole- & Foundation Drawings	40 days	Mon 8/15/17	Fri 9/23/16	100%
974	**Extraction**	**222 days**	**Mon 5/23/17**	**Fri 12/30/16**	**100%**
978	**Evaporation**	**180 days**	**Mon 5/23/17**	**Fri 11/18/16**	**100%**
982	**Freeze Drying**	**222 days**	**Mon 5/23/17**	**Fri 12/30/16**	**100%**
985	Specifications & Drawings for Olam supply	0 days	Tue 11/1/16	Tue 11/1/16	100%
986	Documentation for Installation	0 days	Fri 1/13/17	Fri 1/13/17	100%
987	**Procurement**	**383 days**	**Fri 4/29/16**	**Wed 5/31/17**	**100%**
999	**Shipping**	**133 days**	**Thu 3/16/17**	**Wed 7/26/17**	**100%**
1003	**Installation**	**188 days**	**Thu 3/30/17**	**Tue 10/3/17**	**88%**
1004	Verification of building	7 days	Thu 3/30/17	Wed 4/5/17	100%
1005	Building ready for Installation	0 days	Wed 4/5/17	Wed 4/5/17	100%
1006	Mechanical installation -Extraction &	105	Thu	Wed 8/23/17	96%
1007	Electrical installation -Extraction &	42 days	Thu 8/3/17	Wed 9/13/17	95%
1008	Completion of Mech. & Elect. Installation	0 days	Wed	Wed 9/13/17	0%
1009	Cold room floors; Insulation and Top	35 days	Thu 4/6/17	Wed 5/10/17	100%
1010	Cold room floors ready for Mechanical	0 days	Wed	Wed 5/10/17	100%
1011	Installation Cold room panels - one side	14 days	Thu	Wed 5/24/17	100%
1012	Mechanical installation - Freeze Dryer	119 days	Thu 5/11/17	Wed 9/6/17	95%
1013	Electrical installation - Freeze Dryer	42 days	Thu 8/10/17	Wed 9/20/17	80%
1014	Completion of Mech. & Elect. Installation	0 days	Wed	Wed 9/20/17	0%
1015	Granulation frame	42 days	Thu 5/11/17	Wed 6/21/17	100%
1016	Granulation equipment	49 days	Thu 5/18/17	Wed 7/5/17	100%
1017	CAB	69 days	Thu 6/22/17	Tue 8/29/17	100%
1018	SBS	61 days	Thu 6/22/17	Mon 8/21/17	100%
1019	SBS svejsning af bånd	9 days	Mon 9/25/17	Tue 10/3/17	0%
1020	Unpacking shipment 1	12 days	Thu 5/11/17	Mon 5/22/17	100%
1021	Utility systems level 13	30 days	Tue 5/23/17	Wed 6/21/17	100%
1022	Transport system Cold room	31 days	Mon 5/29/17	Wed 6/28/17	90%
1023	2 shipment on site	0 days	Wed 6/14/17	Wed 6/14/17	100%
1024	Unpacking shipment 2	12 days	Thu 6/15/17	Mon 6/26/17	100%
1025	Foaming level 18.5	18 days	Fri 7/21/17	Mon 8/7/17	90%
1026	Conrad on site	0 days	Thu 7/27/17	Thu 7/27/17	100%
1027	samle conrad	11 days	Fri 7/28/17	Mon 8/7/17	0%
1028	Sluser og platform	9 days	Tue 8/8/17	Wed 8/16/17	0%
1029	Transportsystem level 7	16 days	Thu 8/17/17	Fri 9/1/17	50%
1030	Utility level 7 og 13	30 days	Tue 8/8/17	Wed 9/6/17	0%
1031	**Commissioning**	**105 days**	**Thu 8/17/17**	**Wed 11/29/17**	**16%**
1032	Utility ready for use: Steam, Condensate,	0 days	Thu	Thu 8/17/17	0%
1033	Mechanical & Electrical testing,	42 days	Thu	Wed	20%
1034	Mechanical & Electrical testing, Freeze	70 days	Thu	Wed 11/1/17	20%
1035	Roasted beans available for Extraction	0 days	Thu	Thu 10/26/17	0%
1036	First product	0 days	Wed 11/1/17	Wed 11/1/17	0%
1037	Product Testing	28 days	Thu 11/2/17	Wed 11/29/17	0%
1038	**Final Plant take over**	0 days	Wed 11/29/17	Wed 11/29/17	0%
1039	**Flavourtech-Aroma recovery**	**529 days**	**Mon 5/16/17**	**Fri 11/10/17**	**98%**
1088	**LILLA-Roaster& Silo**	**461 days**	**Wed 6/1/16**	**Tue 9/19/17**	**100%**
1114	**Thermax-Boiler 25ton/h**	**392 days**	**Fri 5/20/16**	**Fri 6/30/17**	**100%**
1310	**VinaNT-Green coffee feed system**	**332 days**	**Tue 6/21/16**	**Fri 6/2/17**	**99%**
1338	**WWTP-Asiatech**	**474 days**	**Fri 7/29/16**	**Thu 11/30/17**	**73%**
1364	**WTP-Envitech**	**324 days**	**Mon 10/10/16**	**Wed 9/13/17**	**89%**

1.4.8. The capital of the project

Based on detailed cost calculations of the construction and installation of machinery and equipment of the project "Investing and expanding the instant coffee plant Phase 3 with the capacity of 5.250 tons per year" of Café Outspan Vietnam Ltd, the total capacity of Phase 3 is estimated about 1,275 billion dongs, equivalent to 60 million dollars

- The total of investment capital: 1,275 billion dongs.
- Construct basic plant and secondary work: 200 billion dongs.
- Equipment and machinery: 1,000 million dongs.
- Construct environmental treatment work (waste water, emissions): 74.1 billion dongs.
- Costs for periodic environment protection activities: 0.9 billion dongs.

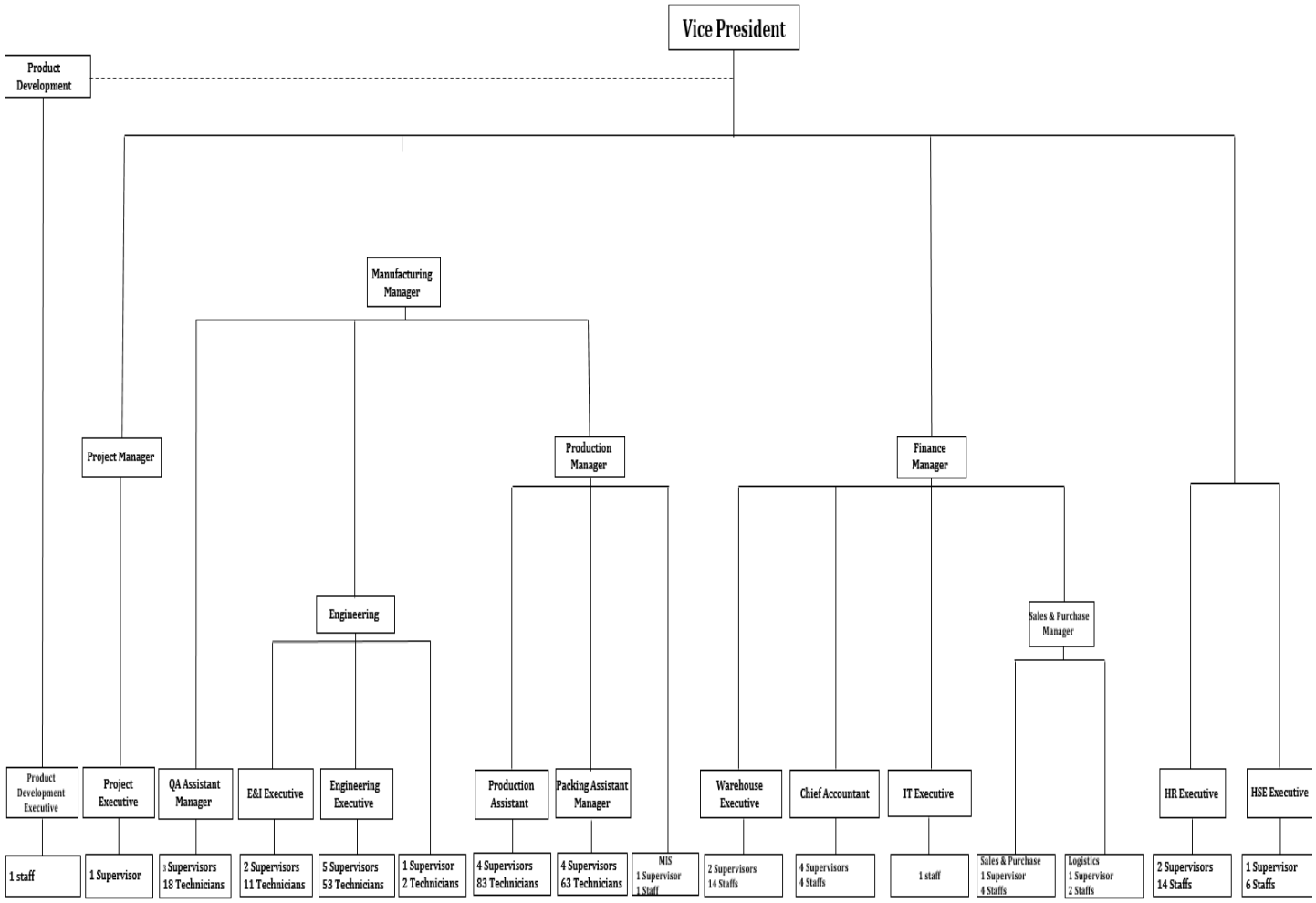
1.4.9. Organization, management and implementation of the project

Table 13 Demands for labour resources

No	Type of labor	Labor needs *(person)*	
		Existing plant	**Needs for Phase 3** *(estimated)*
1.	Operators	137	42
2.	Engineering	68	28
3.	HSE	6	2
4.	Indirect labor	79	8
TOTAL		**290**	**80**

(Source: From HR 2017)

The administrative organization chart of Café Outspan Vietnam Ltd as follows:



CHAPTER 2

THE CONDITIONS OF NATURAL ENVIRONMENT, ECONOMY AND SOCIETY OF THE AREA OF THE PROJECT

2.1.THE CONDITIONS OF NATURAL ENVIRONMENT

2.1.1. Terrain and geology conditions

2.1.1.1. Topography

At the present, Café Outspan Vietnam Ltd has invested a instant coffee processing factory with the capacity of 12,000 tons per year. The project "Investing and expanding the instant coffee plant Phase 3 with the capacity of 5.250 tons per year" is located at the land of the existing factory. The terrain project sector is relatively even and flat. The location of construction gets through the road of Nhựt Chánh Industrial Zone, 1.2 kilometers away from the National Highway 1A, bordering on Vàm Cỏ Đông river, so it is very convenient for the road and river traffic in the transportation of raw materials and products.

The project is located in Nhựt Chánh Commune, Bến Lức Town is a region with relatively flat terrain, if considering the small terrain, it is high in the southern communes (0.5 - 1.5m) and low in the northern communes (0.4 - 0.76 m). The low terrain combined with heavy rain (1886.2 mm / year) and high tide (tide peak average: 0.66 - 0.95m tall) can cause local flooding in widespread. The flooding and the water withdrawal leads to the downstream pollution sources because of domestic, agricultural and industrial production.

2.1.1.2. Geology

At Nhựt Chánh Commune, there are 2 groups of main soils: the alluvial soil (25.20% of the town) and the alkaline soil groups (72.26% of the town). The alum land is large, together with hydrological conditions may have a certain impact on the quality of the water environment in general and on the surface water environment Nhựt Chánh Commune, Bến Lức Town in particular.

According to the survey geology report of Tân Thủy Hoàng Geological Survey of Service and Geologic Technical Development Ltd., the geology of project sector had had features as:

The soil was from the existing topography surface to the depth of 40m, the results of analysis was from laboratory with 20 raw samples, 1 cylindrical hole had been established from the ground to the depth of exploration, the survey area included the main layer of rocks which was distributed and described as following layers:

Layer 1:

The layer of soil includes fine-grained, gray, green, yellow sand and spongy state which are distributed from the ground to the depth of 0.6 mm and the thickness of 0.6 m.

The mechanical physical characteristics of this layer as follows:
- Volumetric mass: $\gamma = 1.85$ g/cm^3
- Angle of interal friction: $\rho = 29^o50'$
- Cohesion: C = 0.040 kG/cm^2

Layer 2:
The layer of organic clay mud is brownish gray, dark gray, highly flexible, which is distributed immediately below the depth of 5.0 m. The value of SPT is minor 1. The thickness is 4.4 m.

The mechanical physical characteristics of this layer as follows:

- Volumetric mass: $\gamma = 1.55$ g/cm^3
- Angle of interal friction: $\rho = 2^o30'$
- Cohesion: C = 0.118 kG/cm^2

Layer 3:

The layer of dusty clay mixes into litle laretit grit at the top of the layer. It is reddish brown, greyish gold and the state from semi-hard to hard which is distributed under the layer 2 to the depth of 17.2 m. The value of SPT changes in the width from approximately 18 to 31 hammers. At the depth from 7.6 to 8.4 m, this layer consists of both loam and sandy yellow clay alternately. . The thickness is 12.2 m.

The mechanical physical characteristics of this layer as follows:

- Volumetric mass: $\gamma = 2.44$ g/cm^3
- Angle of interal friction: $\rho = 15^o51'$
- Cohesion: C = 0.542 kG/cm^2

Layer 4:

The main component is sandy yellow clay which is reddish brown, greyish gold and flexible hard state, is distributed below the layer 3 to the depth of 38.2 m. The value of SPT changes from 17 to 28 hammers. The thickness is 21m. The mechanical physical characteristics of this layer as follows:
- Volumetric mass: $\gamma = 1.92$ g/cm^3
- Angle of interal friction: $\rho = 14^o30'$
- Cohesion: C = 0.322 kG/cm^2

Layer 5:

The layer 5 consists of dusty clay which is dark gray, the state from semi-hard to hard, is distributed under the following layer 4 to 41m. The value of SPT

changes from 19 to 23 hammers. Holes is drilled at the end of 40 meters, the thickness of the layer is 2.8 m. T
he mechanical physical characteristics of this layer as follows:

- Volumetric mass: $\gamma = 1.89$ g/cm^3
- Angle of interal friction: $\rho = 21^o10'$
- Cohesion: $C = 0.647$ kG/cm^2

2.1.2. Climatic and meteorological conditions

Because the project is under construction in Nhựt Chánh Commune, Bến Lức Town, the climate project area has the characteristics of climate of Bến Lức Town. The project area is affected by two climatic zones with different characteristic elements: Southeastern and Mekong Delta, is divided into two seasons: the rainy season from May to October and November and the dry season from November, December to April of next year.

- Yearly average temperature 27,7^{o}C
- Yearly average moisture 80.5% per year
- Total of sunshine hours 2,700 hours during the year, an average of 7.4 hours of sunshine per day.
- Prevailing wind direction in accordance with the West, Southwest and South. The average wind speed of 2.8 m / s.
- Average annual rainfall is 1,886.2 mm; the annual evaporation of 1,054 mm.

According to the statistics of Long An Centre for Hydrometeorological Forecasting, the project area has the hydrometeorological characteristics as follows:

2.1.2.1. The air temperature

The statistical data from the year 2011 to 2015 at the measuring stations are shown as follows:

- Yearly average temperature (2011 - 2015) at Tân An station: 26,34^{0}C.
- Yearly average temperature changes from 23,94 to 28,84^{0}C.
- The difference in temperature between the highest month and the lowest month about from 3,58 to 4,9^{0}C.
- The lowest temperature is often in December and January. The highest temperature is often in April and May.

Table 14 The statistical table of daily average temperature from 2011 to 2015

The average temperature (^{o}C)												
Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Temperature	24,4	25,0	26,4	28,0	27,5	27,3	26,4	25,5	26,4	26,5	26,1	25,1

(Source: Synthesis Statistical Yearbook 2015 of Long An Province)

The air temperature directly influences the spread of pollutants in the atmosphere. The higher the temperature is, the faster speed of chemical reactions occur in the

atmosphere and the smaller time in the atmosphere save. At the same time, the temperature ia a factor that changed the course of evaporation of organic solvent, odor-causing substances are important factors that directly impact the health of workers in the labor process. So when calculating and forecasting of air pollution and proposing the control solutions, it is necessary to analyze the element t^{o}C.

2.1.2.2. Sun and evaporation

The average daily number of sunshine hours is from 6 to 8 hours. The largest number of sunny hours during the day can reach up to 10-11 hours per day. Sunny hours observation over the years achieved from 2117-2717 hours.

Table 15 The statistical table of the average days of sunshine hours in 2011-2015

	The average number of monthly hours of sunshine (hour)											
Month	1	2	3	4	5	6	7	8	9	10	11	12
Hours of sunshine	204,7	219,1	259,6	228,1	197,1	182,5	142,3	171,7	146,9	169,5	188,2	182,1

(Source: Synthesized Long An Statistical Yearbook 2015)

The biggest evaporation appears in the dry months. In March and April, it can reach 40 - 50 mm in one day.

The smalles evaporation appears in the rainy seasons. In September and October from 20 to 25mm in only one day.

The difference of evaporation between the months in a year is less than the difference of rainfall.

The evaporation is also distributed fairly obviously by the seasons and less volatility in space.

The average evaporation in the province is from 65 to 70% of annual rainfall. The evaporation during the dry season is quite large, in contrast to the rainy season evaporation is quite small, averaging 4 -5mm per day. The evaporation alters the atmospheric moisture.

Table 16 The statistical table of the daily average evaporation in 2011-2015

Month	The daily average evaporation for each month (mm)											
	1	2	3	4	5	6	7	8	9	10	11	12
Evaporation rate	27	34	42	42	31	26	25	24	22	20	22	22

(Source: Synthesized Long An Statistical Yearbook 2015)

2.1.2.3. Rainy levels

The rain has the effect to clean the air environment and liquid the waste dilution. The greater rainfall, the more decreased pollution level. The rainwater quality also depends on the atmospheric quality of each area.

- The rainy season usually starts from May to November with the rainfall of about 1,400-1,453 mm, making up 88 to 90.5% of annual rainfall.
- The dry season starts from December to April with the rainfall about 153-184,3mm approximately 9.5 to 12% of annual rainfall. It is decreased markedly in the dry seasons. The rivers are usually the smallest flow, the ground water deeper and the sea levels from entering the mainland under the

river reaching max value.

Table 17 The statistical table of the daily average rainfall in 2011-2015

	The monthly average rainfall (mm)											
Month	1	2	3	4	5	6	7	8	9	10	11	12
L/rainwater	16,8	17,9	12,9	59,5	223,8	162,3	255,7	188,5	264,9	273,4	114,5	45,9

(Source: Synthesized Long An Statistical Yearbook 2015)

The rainfall regimes affect the air quality, rain followed and washed the entrained dust and pollutants in the atmosphere to reduce the concentration of these substances. It also bring water and dilute the substances on the ground (especially washing the alum) to reduce the level of environmental pollution in the soil. So when reviewing, evaluating and forecasting the environmental quality and proposing solutions to reduce environmental pollution, the analysis and calculation of natural rainfall is needed.

2.1.2.4. Humidity

The air humidity depends on the rainfall in all seasons. The average humidity in the monitoring station in Long An from 77.8 to 91.2%, the highest in the rainy season and the lowest 92% in the dry months to 75%.

- Yearly average humidity (2011 -2015) at Tân An station: 88,01%;
- Yearly average humidity (2011 -2015) at Mộc Hóa station: 81,6%;
- Yearly average humidity from 2011 to 2015

Table 18 The statistical table of monthly average humidity in 2011-2015

	Monthly average humidity (%)											
Month	1	2	3	4	5	6	7	8	9	10	11	12
Humidity	86	87	84,8	82,8	87,8	89,8	90,2	90,8	91,2	90,6	88	87,2

(Source: Synthesized Long An Satistical Yearbook 2015)

The air humidity as well as the temperature is one of the natural factors to affect the process of dilution and conversion of pollutants and to the heat exchanger of the body and human health. So, with these factors, we need to consider in evaluating the humidity and forecasting the environmental impact.

2.1.2.5. Wind levels

In the rainy season, the prevailing wind is the South West with the frequency of 70% (from May to October). The wind direction from the ocean carries water vapor and causing rain in the months of the rainy season.

In the dry season, the prevailing wind is the South East wind with the frequency from 60-70% (from December to the April).

In the rainy seasons, the average wind speed is greater than the dry season but the difference of months is not much. The monthly average wind speed is 1.5 - 2.5 m / s, the maximum wind speed monitoring can be achieved in about 30 - 40 m / s and the occurrence of thunderstorms, mostly in the season with West or South West wind direction.

Table 19 The statistical table of average and strongest wind speed

Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Year**
V_{bq}	1,8	2,6	2,8	2,2	1,7	2,3	2,3	2,6	1,8	2,1	2,2	1,7	2,2
V_{max}	12	19	16	20	40	18	20	30	18	16	19	12	20
Common direction	SE NE	SE NE	SE	SE	W SW	SW	SW	SW	SW	SW	N NE	N NE	

Source: Long An Hydrometeorology Forecast Center, 2015,

Notes: - NE: North East- SE: South East - W: West
- SW: South West - S: North - NW: North West - N: North

2.1.3. Hydrological conditions

The surface of water in the project sector is the Vàm Cỏ Đông river which is affected by the irregular semi-daily tide regime of the East Sea through the Soài Rạp River. The timing of daily tide is 24 hours and 50 minutes, the cycle of tide is 13-14 days. The areas meet the most effect on the tide such as the southern districts of Highway 1A, these are the places where are influenced saline water from 4-6 months in a year.

The tide of sea has the amplitude form 3.5 to 3.9 m on the Vàm Cỏ Đông river and Soài Rạp estuary, infiltrated inland deeply with the strongest intensity of the tide in dry season when the supplement of water into 2 Vàm Cỏ riverheads is very little. The maximum amplitude of tide in a month is from 217-235 cm in Tân An, and from 60-85 cm in Mộc Hóa. Due to large amplitude of the tide, crest of the tide in northeast wind season is threatened of infiltrating saline water into the southern region.

There are 2 periods of high tide in March and September per year, the low tide is in April and August. The rainfall is little in dry season, river water is very low that cause salt-marsh in the areas which are outer dikes in the upper sections and most of lower sections. The timing of acquiring salinity from 4-6 months had not influenced well on production and daily life of inhabitants.

After having Dầu Tiếng reservoir, the dry season water flows of Vàm Cỏ Đông River was added 1.8 times to improve the water quality and salinity for regional institutions of Đức Hòa, Đức Huệ and Bến Lức.

Vàm Cỏ Đông River is one of two major tributaries of Vàm Cỏ river. It originates from the mountains which flows into the territory of Cambodia Vietnam Border Commune, Châu Thành Town (Long An), to make the natural boundary between Châu Thành and Tân Trụ (Long An), then through Bến Cầu District, Hòa Thành, Gò Dầu, Trảng Bàng (Tây Ninh). Vàm Cỏ Đông has several tributaries including Nhật Tảo River. The river is 186 km length, flows through 24 km long Bến Lức Town. The wide area of river is 6,000 km^2 basin with the depth from 17 to 21 meters and the flow of 17- 96 m^3/s. With many small tributaries, it is convenient for waterway freight from the places to Tây Ninh.
The annual dry season in December, January, February, March, April and May, the discharge flow from Dầu Tiếng Reservoir to Vàm Cỏ Đông river with the average 5-13 m3 / s so from Bến Lức Town to the upstream, the salinity is reduced. In Bến

Lức, before having the salt lake is more than 4 g/l, after the salt lake is less than 4 g/l; from Bến Lức to Soài Rạp, because the estuary salinity is too high to cause a little effect. During the flood season, due to the volume of water pool coastal salinity increases, Vàm Cỏ Đông river water is acid, the pH of May, June and July is less than 5.

(Source: Long An overall planning of socio-economic development of Long An Province Research (LAPIDES) to the year of 2020 and the vision to the year of 2030)

2.1.4. The current status of the natural environtal components of the project sector

To assess the quality of the project sector's environment and existing plants, on March 12th 2016, consulting agencies, investors had combined with Center of Consulting of Safety hygiene and Environmental Consulting Technology (COSHET), which has the certificate of VIMCERTS 26, to take the samples of environmental quality in the project area.

The process to take, maintain and analyze the samples is based on the current Vietnamese standards ISO / IEC 17025:2005, which are certified VILAS and VIMCERST 26 by Ministry of Natural Resources and Environment.

Time of taking the samples: From December 18, 2015 to March 10, 2016

Characteristics of sampling time: It was sunny with the temperature range from 30-32ºC. The wind speed is from 0.8 to 1.5 m/s, the Phase 3 expanding project and the existing plant are in Nhut Chanh Industrial Zone. Therfore, they were directly affected by activities of the factories and transport activities in the area. *(Sampling positions are annotated in the map which is attached in the appendix 4)*

The methods and the analysis equipment for environmental quality are presented specifically in the following table:

Table 20 The analysis method for the parameters of the environmental components

No	**Parameters**	**Analysis method**	**Executed devices**
A. The quality of ambient air			
1	Microclimate (tºC, φ, ν)	TCVN 6491:2011	Testo 410-2 (German)
2	Noise levels		Quest Soundpro (America)
3	Dust	TCVN 5067:1995	Sibata HVS (Japan)
4	SO_2	TCVN 5971:1995	Desaga GS (German) SKC (America) Spectrophomete (Japan)
5	NO_2	TCVN 6137:2009	
6	CO	SOP - K01	
B. The quality of soil			
1	As	TCVN 6496:1999 SMEWW 3125:2012	XRS machine ICP
2	Cu		
3	Pb		

No	**Parameters**	**Analysis method**	**Executed devices**
4	Zn		
C .The quality of surface water, waste water			
-	pH	TCVN 6492:2011	
-	Temperature	SMEWW 2550B:2012	
-	Color rate	SMEWW 2120C:2012	
-	TSS	SMEWW 2540B:2012	
-	BOD5	TCVN 6001-1:2008	
-	COD	SMEWW 5220C:2012	
-	Total Nitrogen	TCVN 6624-1:2000	
-	Total Phosphorus	TCVN 6202:2008	
-	Residual chlorine	SMEWW 4500Cl-G:2012	
-	Mineral oil	TCVN 5070:1995	
-	Total Coliform	TCVN 6187-2:2009	
D. The quality of waste air			
1.	Dust	US EPA Method 5	C 5000
2.	SO_2	CTM 30 & 34	Testo 350 XL
3.	NO_2	CTM 30 & 34	Testo 350 XL
4.	CO	CTM 30 & 34	Testo 350 XL

Table 21 Location and measured parameters, sampling for environmental quality

Sign	Location of measured samples	Time of sampling	Parameters
The quality of ambient air			
KK1	Security entrance areas	25/12/2015	Microclimate (t^oC, φ, ν); Noise level; Dust, SO_2, NO_2, CO.
KK2	The areas of emission at the end way of wind		
KK3	The areas of vacant land for th expanding project		
The quality of the industrial waste air			
KT1	The waste air of roasted oven 1	10/03/2016	Temperature, Dust, SO_2, NO_x, CO
KT2	The waste air of roasted oven 2		
KT3	The waste air of boiler 1		
KT4	The waste air of boiler 2		
The quality of waste water			
NT	Waste water after the treatment system (existing)	13/01/2016	pH, TSS, Color, temperature, BOD_5, COD, Nitrogen, Phosphorus, Residual chlorine, Oil, Coliform
The quality of soil at ground surface			
Đ	The surface soil samples of expanding project area	03/2016	As, Cu, Zn, Pb
The qualilty of surface water			
NM1	Surface water samples of Vàm Cỏ Đông River, far from Bến Lức Bridge 200 (downstream).	Quarter 1-2016	pH, DO, conductivity, temperature, salinity, TDS, TSS, Opaque level, BOD, COD, Amoni, Nitrate, Nitrite, Phosphate, Cl-, Fe, Pb, Cd, Cu, Zn, Cr, Ni, As, Hg, total oil, Coliform
NM1	Combination of Đôi Ma and Vàm Cỏ Đông River		
NM1	Downstream of Bourbon Prt 500m, Combination of Rạch Chanh and Vàm Cỏ Đông River.		

2.1.4.1 The quality of the air environment

Results of the environmental quality was expressed specifically in the following tables. Sampling time is in the morning with quite medium winds, high humidity and the comfortable weather from 8:30 to 11:00, on December 25, 2015.

Table 22 ***The measurement results of the microclimate components and noise levels***

N_0	Parameter	Unit	Result			QCVN 05:2013/ BTNMT[1]	IFC standard
			KK1	KK2	KK3		
1.	Temperature	^oC	31,5	-	-	-	-
2.	Humidity	%	71,3	-	-	-	-
3.	Wind speed	m/s	0,4	-	-	-	-
4.	Noise	dBA	54	67	65	**75**	**70**
5.	Dust	mg/m^3	0,21	0,19	0,16	**0,30**[2]	-
6.	SO_2	mg/m^3	0,063	0,051	0,074	**0,35**	-
7.	NO_2	mg/m^3	0,041	0,036	0,059	**0,20**	-
8.	CO	mg/m^3	5,27	5,16	5,74	**30**	-

[1] *QCVN 05:2009/BTNMT: National Standard on the quality of ambient air (the average of an hour).*

[2] *QCVN 26:2010/BTNMT: National Standard on Noise.*

(Source: Center of Consulting of Safety hygiene and Environmental Consulting Technology COSHET, 12/2015)

Comments:The above analysis result showed the environmental quality of ambient air that is quite good. The concentrations of pollutant didn't exceed the allowed standards. The noise level was low, even though the sampling time of the plant was still producing normally.

2.1.4.2. Quality of surface soil

Table 23 The analysis results of the quality of surface soil

No	Parameter	Unit	Result	QCVN 03:2008 / BTNMT[3]
1.	Asen (As)	mg/kg dry subtance	KPH	**12**
2.	Cadimi (Cd)	mg/kg dry subtance	KPH	**10**
3.	Đồng (Cu)	mg/kg dry subtance	0,73	**100**
4.	Chì (Pb)	mg/kg dry subtance	0,54	**300**
5.	Kẽm(Zn)	mg/kg dry subtance	3,49	**300**

Comments:The surface soil in constructed area of the project had the concentration of heavy metals in soil lower than the allowed standards.

2.1.4.3. The quality of surface water

Vàm Cỏ Đông River is a source which receive waste water of Nhựt Chánh Industrial Zone after the treatment reached the allowed standards (QCVN 40:2011/BTNMT, column A). The analysis results of surface water quality are shown in the following table (*refer to the results of monitoring water quality of the Vàm Cỏ Đông River by Center of monitoring and environmental technology services of Long An)*.

Table 24 The analysis results of Vàm Cỏ Đông River's surface water

No	Parameter	Unit	Result			QCVN 8:2008/ BTNMT, B1[(4)]
			NM_1	NM_2	NM_3	
1.	pH	-	7,99	8,37	8,49	**5,5-9**
2.	DO	mg/l	4,01	2,97	3,76	**≥4**
3.	Conductance	µS/cm	9,10	11,8	9,44	
4.	Temperature	^oC	29,54	30,46	31,45	
5.	Salinity	%	0,51	0,67	0,53	
6.	TDS	mg/l	5.730	7.330	5.995	
7.	Opaque level	NTU	24,7	37,6	20,4	
8.	BOD_5	mg/l	7	13	13	**15**
9.	COD	mg/l	18	36	34	**30**
10.	SS	mg/l	12	24	7,1	**50**
11.	$N\text{-}NH_4^+$	mg/l	0,23	0,24	0,42	**-**
12.	$N\text{-}NO_3^-$	mg/l	0,61	0,68	0,67	**-**
13.	$N\text{-}NO_2^-$	mg/l	0,25	0,11	0,17	**-**
14.	$P\text{-}PO_4^{3-}$	mg/l	0,036	0,017	0,006	**-**

[3] *QCVN 05:2009/BTNMT: National Standard on the permissible limits of heavy metals in the soil, soil column for industrial properties*

[4] *QCVN 08: 2008/BTNMT – National Standard on the surface water. –Level B1will apply for the surface water used for irrigation purposes or or for the purposes with low water quality requirements*

15.	Clorua	mg/l	2.330	3.434	2.778	**600**
16.	Iron (Fe)	mg/l	KPH	0,008	0,019	**-**
17.	Lead (Pb)	mg/l	-	-	KPH	**-**
18.	Cadimi (Cd)	mg/l	-	-	KPH	**-**
19.	Copper (Cu)	mg/l	-	-	0,013	**0,5**
20.	Zinc (Zn)	mg/l	-	-	0,020	**1,5**
21.	Cr^{6+}	mg/l	-	-	KPH	**0,04**
22.	Niken (Ni)	mg/l	-	-	0,010	**0,1**
23.	Total oil	mg/l	-	-	0,080	**-**
24.	Asen (As)	mg/l	-	-	KPH	**0,05**
25.	Quicksilver (Hg)	mg/l	-	-	KPH	**-**
26.	Coliform	MPN/100ml	$2,4x10^3$	$2,4x10^3$	$2,4x10^3$	**-**

(Source: Center of monitoring and environmental technology services of Long An)

Comments

From the above result showed that the water quality of Vàm Cỏ River in the project area within the permissible limits of the standard of Vietnam.

2.1.4.2. The status of existing plant's exhausted fumes quality and treatment methods

The existing plant was using 2 boilers (the capacity of 20 tons/h and 25 tons/h, using coal and coffee grounds) and 2 roasting ovens (the capacity of 3.5 tons/h and 2.5 tons/h, serving coffee-processing activities). The boiler used imported coal fuel with the content of substances tested by SGS Company in the certificate number 1004120016. The exhausted fumes were from the boiler to the system and process of emissions through the chimney of 36m high.

The interpretaion of technological processes of the treatment from the boiler:

The exhausted fumes emited from boiler which used coal and coffee grounds and were treated by thea cleaning equipment ESP filter. This treatment process was by electrostatic method to reject small speck of dust from the air stream as they passed through large magnetic areas. Electrostatic filter chambers were structured as rectangular parallelepiped and internal parallel electrical electrodes panels. By this air cleaning equipment ESP filter, the exhausted fumes was cleand out over the whole cross-section of the device when entering the filter chamber which were put the pole plates. On the pole plates, it is supplied DC high voltage from several dozen to 100kV to form electric current with large intensity. When the speck of dust pass through the strength electric field, will be ionized negative charge ion molecules (-) after that they will move towards the positive charge plate (+) and cling to this pole plate. Dust was rejected the plate by vibrating and rinsing the plates so that dust fall down collected dust funnel below.

Table 25 The analysis result of the sample of the exhausted fumes of the boiler after the treatment

No	Parameter	Unit	Result		QCVN 19:2009/ BTNMT, Column B	IFC standard for boiler
			Boiler 1	Boilder 2		
1.	Temperature	^oC	100	120	**-**	**N/A**
2.	SO_2	mg/Nm^3	20,8	25,3	**500**	**2000**
3.	NO_x	mg/Nm^3	496,5	333,5	**850**	**650**
4.	CO	mg/Nm^3	446,6	453,9	**1.000**	**N/A**
5.	Dust	mg/Nm^3	199	165	**200**	**50-150**
6.	O_2 (%)	%	9.8	7.2	**N/A**	**6**

(Source: Center of Consulting of Safety hygiene and Environmental Consulting Technology COSHET, 3/2016)

Figure 4 The air cleaning equipment ESP filter

The explanation of the exhausted fumes treatment processing from the roasting ovens:

Coffee roasting oven used the fuel of diesel oil. Exhausted fumes arising from the roaster is treated with cyclone & heat (fire nozzles) and then discharged through the two 15 meter - chimneys.

During the drying phase, the flow of hot air will come out of the combustion chamber and a hot air will go to the drums dunh beans, part of the gas directly into pipelines and self-cleaning the rest of the hot air will come out of the combustion chamber and spread through the chimney.

The roasting coffee process was done by the hot air (750^{o}C), supplied heat by valve burner (DO fuel).

The exhaust fumes from the roasting oven (Roster) were taken to the Cyclon in order to reject dust and air stream after separating dust into cyclon and

continuing into the combustion chamber, where the organic solvents evaporated during roasting process and combusted completely(at a temperature of 750^{o}C), after combusting volatile organic compounds completely, at this time pollutants generated in the process of drying roasting coffee (dust and volatile organic compounds) had been rejected the air stream.

The exhaust fumes after rejecting pollutants were emitted by high chemney, a part of this air stream this would take periodically into roasting oven and continued the uninterrupted process of roasting coffee.

Fumes is generated along the drying process are removed when it entered the combustion chamber. The combustion chamber is at the temperature of 750 ° C air or higher within 5 seconds. It's time to save the gas flow in the combustion chamber. These conditions will catalyze organic components of fuel oil to create steam line H_2O and CO^2 gases are inert gases which do not pollute the environment.

Table 26 The analysis results of roaster's exhaust fume samples after the treatment

N_o	Parameter	Unit	Result		QCVN 19:2009/ BTNMT, B	IFC Standard for engine
			Roster 1	Roaster 2		
1.	Temperature	*^oC*	200	270	**-**	**N/A**
2.	SO_2	*mg/Nm^3*	47,8	42,5	**500**	**N/A**
3.	NO_x	*mg/Nm^3*	61,7	65,9	**850**	**1850**
4.	CO	*mg/Nm^3*	657,4	575,9	**1.000**	**N/A**
5.	Dust	*mg/Nm^3*	64	60	**200**	**50-100**
6.	O_2 (%)	*%*	10	11	**N/A**	**15**

(Source: Center of Consulting of Safety hygiene and Environmental Consulting Technology COSHET, 3/2016)

Comments: By the analysis result of the roaster's exhaust fumes after treatment system, the parameters were low, meeting with allowed regulations standard QCVN 19:2009 / BTNMT, column B, $K_v = 1$, $K_q = 1$.

2.1.4.3. The waste water quality after treatment of the existing plant

The waste water treatment process: With the current scale operation of the plant, there were the sources of the generated waste water: the domestic waste water and the production waste water. The flow of generated production waste water and domestic waste water were total of 1,000 m^3 / day and night, the two types shared a common wastewater treatment system with a design capacity of 1,250 m^3/ day and night.

- **The domestic waste water**

The domestic waste water was pretreates preliminarily through septic tank system. septic tank consisted of three compartment was simultaneously a project which consisted of two functions such as depositing sediment and disintegrating sediment. Sediment was left in the tank from 6-8 months, under the influence of the anaerobic microorganism, the organic compounds were

broken up, a part formed gas and a part formed dissolved inorganic compounds. Waste water after preliminary treatment by a septic tank was taken through the treatment system with production waste water.

- **Production waste water**

Production waste water was collected into the regulated tank to regulate the flow as well as quality and temperature.

From wastewater regulated tank was pumped into the reaction tank and made coagulation, in the process of pumping the wastewater, pH was regulated automatically and extracted flocculation chemical , polymer was the chemical which facilitated the process of creating coagulation and occured optimally. The process results of coagulation and flocculation was a majority of the suspended substances, chemicals, heavy metals were removed from waste water.

From the waste water coagulation tanks, the waste water were conducted to the deposited tank so that coagulation pollutants were deposited, the pure water behind the tank into drain system collected the wast water of the Industrial Zone to conduct into concentrated waste water treatment syste of the Industrial Zone. QCVN 40:2011/BTNMT the source of type B.

In waste water existing treatment processes, Café Outspan Vietnam Ltd have installed equipment of sediment separation and sludge squeezer from wastewater treatment systems. The waster sludge from this process was brought into analysis and had heavy metals which is lower than the allowed standards. Therefore sludge from wastewater existing treatment systems was allowed to treat waste water normally by the management board of Industrial Zones (not listed as dangerous wastes), sludge was collected to provide biological fertilizers.

Table 27 The results of waste water after the treatment

No	Parameter	Unit	Result	QCVN 40:2011/ BTNMT, B	IFC EHS Guidelines
1.	pH	-	7,7	**5,5 – 9**	**5,5 – 9**
2.	Color	Pt-Co	38	**150**	**NA**
3.	SS	mg/L	5,0	**100**	**50**
4.	BOD_5	mgO_2/L	15,7	**50**	**30**
5.	COD	mgO_2/L	70	**150**	**125**
6.	Total Nitrogen	mg/L	19,1	**40**	**10**
7.	Total Phoporus	mg/L	KPH	**6**	**2**
8.	Oil	mg/L	KPH	**10**	**10**
9.	Coliform	MPN/10 0mL	KPH	**5.000**	**400**

(Source:Quality Assurance and Testing Center 3-Quatest 3- The experimental result on January 25, 2016)

***Comments*:** Through the analysis result of the water quality after treatment, we may find that the parameters are met with QCVN 40:2011/BTNMT.

- **Rain water**

Rain-water is sewage which was mild nature pollution (clean convention) was held directly to collect into the rain-water drainage system of areas and discharged directly into the source without treatment.

General assessment for the environmental quality of the project area

With the measued results of the environmental quality was as well as a survey of components of the existing plant and the existing land project sector, it can be assessed:

- Environmental air quality: well, the analysis parameters were allowed to reach the standard.
- Quality of surface water (Vàm Cỏ Đông river): well, the analysis parameters were allowed to reach the standard QCVN 8:2008/ BTNMT, B1.
- In the project sector and the contiguous areas does not exist various kinds of animals, plants in the Red book.
- The quality of the exhaust fumes source (2 roasting ovens, 2 boilers) after treatment system will meet the allowed standard. *(it has certified to complete all)*
- The solid waste arising sources are also good at control, each wates matter of company had appropriate collection and treatment measures (having relevant papers in the attached appendix).
- The company has executed for environmental overseeing program periodically four times per year. The report was sent to the management and monitoring agency.
- The quality of the output of waste water after the treatment met the limit of the waste water receiving input of Nhựt Chánh Industrial Zone. Buildings were confirmed to complete by Long An Natural Resources and Environment Department.

2.1.5. Current status of biological resources and ecosystems

Plant resources: the project is belonged to Nhựt Chánh Industrial Zone so the ground is leveled. Therefore, there are many plant resources. The main plant components are shrubs and herbaceous plants (sedge, reeds, etc) with no significant economic value as well as on biodiversity.

Animal resources: Animal resources in the project area is almost not there, only some reptiles (lizards, snakes, etc), small animals (birds, rats, etc) and insects, worms, so on with no value on biodiversity.

2.1 THE ECONOMIC AND SOCIAL CONDITIONS OF THE PROJECT AREA

2.2.1 Current status of Nhựt Chánh Industrial Zone

Location

Nhựt Chánh Industrial Zone is located at Hamlet 5, Nhựt Chánh Commune, Bến Lức Town, Long An province. Eastward borders to Vàm Cỏ Đông River; Westward borders to provincial road 832; Northwar borders to the drain and Bắc Tan canal; Southward borders to the second phase Nhựt Chánh Industrial Zone which are planned expansion Stage 2.

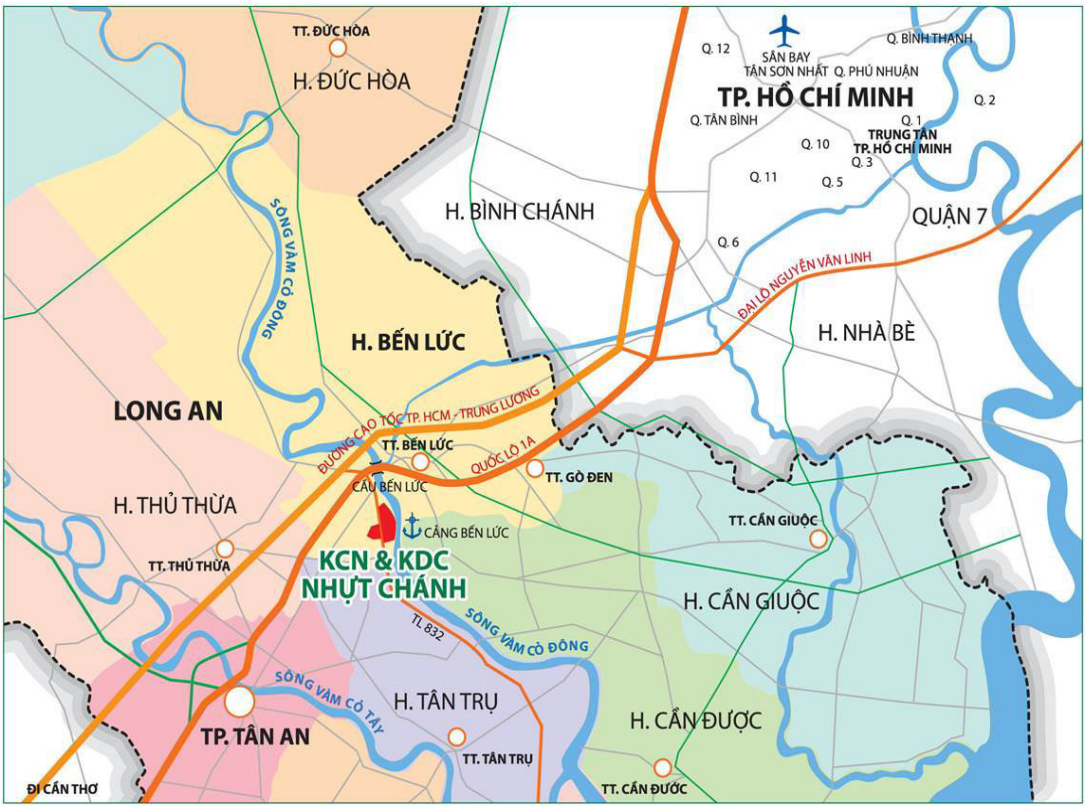


Figure 5 The map of Nhựt Chánh Industrial Zone

Giáp đường tỉnh 832 nối liền và cách Quốc lộ 1A khoảng 1,2 km, cách đại lộ Nguyễn Văn Linh khoảng 15 km và cách nút giao thông Bến Lức của đường cao tốc Tp. HCM- Trung Lương khoảng 3 km.

The provincial road 832 connects and away from National Highway 1A about 1.2 km, away form the Nguyen Van Linh Boulevard about 15 km and the Ben Luc road traffic stopper of motorway from HCM City to Trung Luong about 3 km.

- The distance of the HCM City center is about 33 km, the city of Tan An (Long An province) is around 15 km, about 28km from Tan Son Nhat airport.

- Bordering to Vam Co Dong river on the inland waterways we can go through the Mekong delta and South Eastern provinces.
- The distance of the Bourbon ports is around 1km by waterways and about 18km from Sai Gon port.
- Located between two large residential areas, the Tan An City (away form around 15 km) and Ben Luc town (about 1 km).
- Area: The area of the Industrial Zone is 105.9728 ha .
- Area of the industrial building land release: 73.12 ha.
- Technical infrastructure includes transportation systems, electrical systems, water supply systems, wastewater treatment systems, telecommunication services, public utilities.

Traffic

Outbound traffic:

Road: provincial road 832 has the width of 46.5 m, comprising a main route in the middle of the road surface which is 15 m and 7.5 m are two parallel roads, with the seperated range widen 8,5 m and 1, 7m is sidewalk.

Waterways: Vam Co Dong river system is one of the important waterways of the southern key economic, wharves and warehouses planned industrial park adjacent to the Vam Co Dong river wharf length of 500m.

Inbound traffic:

Inbound traffic system in the Industrial Zone is delineated with 02 main road of the Industrial Zone which have the width of 25.25 m, 30 m and the internal road network with 19.5 m width, are arranged to ensure the requirements of the service such as fire, ambulance, cargo transportation, transportation of plants, factories are safe and handy.

Electricial system

The medium-voltage electrical system of the national electricity network from 22 kV medium-voltage power is connected from Ben Luc transformers of 110 kV (double circuit), the fence is provided to each plant, each factory by using cable line.

Water supply

The water used for production and daily life in long-term that is oriented at the Industrial Zone providing by Long An supplied water factory. At the present, ther is no immediate no water from Long An supplied water factory, it can exploit the underground water from 8 wells at a depth of 100 - 150m (Q = 40m^3 - 50m^3 / h / a well) are arranged along Vàm Cỏ Đông River, Bắc Tân canal, the provincial Road 832. The raw water is focused on the water supply station Q = 5,000m^3 / day to process and distribute. When there is the water source taken from Long An supplied water factory based on Long An project, the underground water reserves would be the water for The Industrial Zone, to ensure the adequate supply of water standards for demand of life and production.

Drainage system

The water drainage system is set separately from the wastewater drainage system.
The rainwater drainage direction: North exits through Bắc Tân canal, 5 others exit through Vàm Cỏ Đông River.

The drainage system of centrifugal sewer is set along sidewalk of roads to ensure the rainwater harvesting from roads, sidewalks and buildings. The total length of the rainwater sewers is 11,008m.

The wastewater collection and treatment system

The waste water of projects in the Industrial Zone must be treated up to the limit concentrations of pollutants prescribed receiving the wastewater treatment system input (details outlined in Appendix) before connecting to the system wastewater collection of the Industrial Zones. Then the wastewater is further treated at the concentrated wastewater treatment of the Industrial Zone (design with the capacity of 4,000 m^3/day) achieved to QCVN 40: 2011 / BTNMT, column A before being discharged into canals and Vàm Cỏ Đông River.

Post and telecom services

It is established a network of modern postal and telecommunications to obtain the national standard such as equipping MDF, telephone systems and high-speed internet access by the installations of post and telecom field.

Public Utilities

The specific drainage system of rainwater and the width drainage systems are built perfectly.

The tree systems are scattered throughout the region that work well for the handling of environmental hygiene and combat pollution (noise, dust, smoke ...) and create landscapes for all nice and clean area, make comfortable working environment for employees.

The services of tax, customs, banking, etc is done at the Industrial Zone.

Professions to attract the investment

It is optimal developing of clean industrial professions, less polluting *(Extracted from certified IEA report)*, as follows:

- Agricultural processing, food processing, food, products from milk, cattle and poultry.
- Manufacturing careers of plastics, electronics, high-grade aluminum appliances, consumed goods serve for domestic and export demands such as household goods, soaps, cosmetics, technological products, garments, leather products, imitation leather, papers, toys for children.
- Manufacturing professions of pharmaceutical materials, veterinary drugs, fertilizers pesticides and chemical careers serve for industry and agriculture.
- Manufacturing professions of building materials, interior decoration, frames, components, cover panels, roofing, cement, clinker grinding and

manufacturing professions of equipment, replaced equipment information, equipments and machineries serve for agriculture and industry.

- Manufacturing professions electric assemblage, electronics, neutral (cold) electronics, assemblage of specific machines, mechanical machineries.
- Warehouses, storages of the Industrial Zone to serve the demands of production.

2.2.2 The social and economic conditions of Nhựt Chánh Commune

Geographical location

Nhựt Chánh Commune is main economic area of the district, is located southwest of Ben Luc Town, has an natural area of 1356.56 hectares, including 8 hamlets.

- Northward borders to Thạnh Đức Commune, Bến Lức Town.
- Southward borders to An Nhựt Tân Commune, Tan Tru Town.
- Eastward borders to Bến Lức Town
- Westward borders to Nhị Thành Commune, Thủ Thừa Town and Mỹ Bình Commune, Tân Trụ Town.

Climate

Nhut Chanh commune is located in the tropical monsoon climate, with high temperatures all the year round, rainfall is high and on seasonal differentiation. Moderate temperature regime, high solar radiation and abundant light are advantageous conditions for the production of agriculture, forestry and aquaculture throughout the year.

Water Resources

The water resources of Nhut Chanh Commune has three main sources of water. They are rainfall, surface water and groundwater.

Population

The average population of Nhựt Chánh Commune in 2015 is 21, 053 people with the population density of 520 people / km^2

Traffic

Outbound communication: Nhựt Chánh Commune, the largest circulation routes through the National Highway 1A; provincial road 832 is the southern gateway of Bến Lức Town, HCM City to the western provinces.

Inbound communication: In addition to the major thoroughfare, the domestic routes in Nhựt Chánh Commune has not been fully constructed, mostly filled by small rock temporarily..

The water transport: Mainly by Vàm Cỏ Đông River

Electrical Resources

The supply of the electricity is based for the region's national power grid, specifically from the 110 / 22KV of Bến Lức.

Water Resources

The water resources of Nhựt Chánh Commune is from Go Đen water supplied factory, Hoàng Long water factory, An Thạnh water supplied station

The status of drainage

- Northern through Bắc Tân canal.
- Southern through Vàm Cỏ Đông River

Agriculture production

Planting: Because 80% of the land area of Nhựt Chánh Commune serve for the industrial activities and house so the planting lands are not many. In 2014, the commune had the area of 825/ 870 hectares planted rice with the reach of 94.82% of the plan. In 2012-2013 crop year, the area of sugarcane in the commune was 684 hectares with the average yield of 52 quintals / ha. In 2013-2014 sugarcane crop year, the commune had 840 ha / 900 ha to reach 93.33%.
Breeding: the whole population of pigs of the commune is less than 30,000, and tend to decrease due to disease and economic restructuring.

Industry

The entire commune has Nhựt Chánh Industrial Zone with 91% filled land

Field of commerce and services

The emulation movement has focused on improving the service quality of production development and people's lives. In recent years, in despite of the being under the influence of the global economic crisis, commercial activities - social services in the area have prospered and developed a variety of sizes and quality, step by step to make local economic developed firmly in a comprehensive way, rapid growth in both participants and types of commodities, diversified services, goods circulation and continue advantageously on business market and development services, thereby contributing to the diversity and abundance of products and meet better and better needs of society.

Health

Nhựt Chánh Commune has a medical station with the total of 2 beds, 1 regional clinics with a total number of hospital beds is 5. The number of doctors, physicians, technicians, nurses,etc is about 15 people. In the case of workers with problems related to health will be taken to a medical station, then transfer to higher hospital.

Education, culture, information and sports

Currently, Nhut Chanh Commune has 4 schools, 3 temples, 3 and 4 family shrines.

Perform the movement "the entire people unite to build cultural life", the programs of building cultural villages, the culture families flourished throughout the residential areas and got the numerous social strata participated response.

There are cultural and artistic activities, friendly football between the hamlets of the commune. The commune has 1 radio station.

With its above advantageous geographical position, in recent years, the commune had the intereste of district and province to plan investment plan to exploit and develop their potentials, create favorable conditions for the overall development to contribute to the national industrialization and modernization of the country.

It can be asserted over the years, the patriotic emulation movement and work of emulation and commendation of the commune has experienced the drastic change to contribute positively to the successful implementation of the tasks of economic and social development, security and defense, building a clean and strong political system, to take Nhựt Chánh Commune from an agricultural commune gradually into the commume of Industry - Agriculture – Service Trade Commune.

CHAPTER 3

THE ASSESSMENT AND PREDICTION OF THE ENVIRONMENTAL IMPACT AND MITIGATION OF THE PROJECT

3.1. THE IMPACT'S ASSESSMENT AND PREDICTION

3.1.1. The assessment and prediction the impacts of the preparation stage

The relevance of the project location with the natural environmental and socio-economic conditions of the project area:

The location of the project area is in Nhựt Chánh Industial Zone.
The regional planning industrial zones is approved in Long An province under the reported decision approving the environmental impact assessment No. 1610/QĐ-dated on June 19, 2007 of People's Committee of Long An Provinc for the investment project of Nhựt Chánh Industrial Zone construction.
The existing plant went into operation stable after being granted Decision No.8 /QĐ-BQLKCN of the Management Board of Economic Zones of Long An province dated on January 17, 2011 on the report of approving environmental impact assessment of the project "Expansion of Outspan Vietnam coffee processing plants from 4000 to 12,000 tons / year."
The expansion location Phase 3 I located next to the existing plant of the company at Lot L2, Nhựt Chánh Industrial Zone, Nhựt Chánh Commune, Bến Lức Town, Long An Province with the total area of 27, 134 m^2.
Therefore, the project entirely appropriate with the plan of the industrial zone as well as the natural environmental and socioeconomic conditions of the area.

3.1.2. The assessment and prediction the impacts in the stage of constructing work of the project

3.1.2.1. The impact sources related to the stage of constructing work of the project

Activities and sources of environmental impacts during the construction are presented in the following table.

Tabbe 28 Activities and sources of environmental impacts during the expanding construction

No	**Activities**	**Impact sources**	**The nature of impact**
1.	Grading, leveling	- Dust and gas emissions from the transportation fill materials disposal. - Dust and gas emissions from the motor construction equipment such as bulldozers, compaction,etc.	Interruption, local
2.	Activities transportation, building and finishing works (offices, factories, sewage systems, waste water treatment systems, ...)	- Dust and gas emissions from trucks of transporting materials. - Dust, gas, noise from the machinery for construction. - Dust, emissions from the construction process which has heated as cutting, welding, hammering, melting burning,etc. - The dust from the sanding process mastic trowel wall. - The built waste water from concrete curing process, hygiene tools, construction equipment - Solid waste generated from the construction process - Hazardous waste (barrels, paint cans, solvents & mop stick coating)	Interruption, local
3.	Gathering activities, storing of fuel, raw materials	- Dust and gas emissions of raw materials transport such as: building materials, steel, paint,etc. - Solid waste includes fuel tanks, the paint bucket after use, greasy rags, paint.	Interruption, local
4.	Activities of the workers and contractors	- The waste water and waste life water of workers to participate in the construction and installation of the project items - Domestic waste disposed from the contractor's workers	Interruption, local

The dangerous waste may also arise in the process of building such as the greasy cloth, paint and solvent tanks after using process. However, the volume of this arised waste is minimal and arise only in a short term (3 months, the process of completion of works).

As café Outspan company had existing garbage collection system, the company will allow workers to use the toilet systems or daily collection, then putting into the closed garbage tanks, or arised dangerous waste will be collected in the tanks, each recurrent garbage waste will be treated exactly regulation by the competence contractors.

3.1.2.2. The impacted objects and the impacted scale in the stage of constructing work of the project

Because the project is located in Nhựt Chánh Industrial Zone which was planned the ground, to peel the soil layers and level the land previously completed (by the investors of Nhựt Chánh Industrial Zone), therefore, the effects from this process is negligible. The objects and the scale of impact in the construction phase are presented in the following table.

Table 29 The impacted objects and the impacted scale in the stage of constructing work of the project

No	Impacted objects	The impacted scale	The impacted levels and time
1.	Air	The expanding plant construction area is 27,134 m^2. A number of plants around and along the transportation route of transporting building materials.	Short term time (about 8 months)
2.	Atmosphere	Imapcted radius is 500 meters from the center of the project area	
3.	Land	The impact of erosion and runoff cause to pollute the land in the project area	The degree of influence is negligible, short-term time
4.	Vàm Cỏ Đông River	The area of river near the project area	The degree of influence is negligible
5.	Transportation road	Approximately 12 km of the transport line of materials for the construction of the project	The degree of influence is negligible
6.	Workers	The workers directly involved in the construction at site	Short term time (about 8 months)
7.	Health of community	And households in the project area	Short term time (about 8 months)
8.	Biology resources	Green trees along the transportation road of materials	Short term time (about 6 months)

3.1.2.3. The assessment the impacts in the stage of constructing work of the project and the existing plant.

a. The impacts of the air pollution sources

The construction work and the installation of machinery and equipment are made on the leveled premises. The sources of pollution in this satge lasts for a period of 18 months. These activities cause the air pollution as follows:

- Dust caused by the process of transportation and handling and mechanic equipments.
- The gases SO_2, NO_2, CO, THC from the exhausting of vehicles transporting soil, rocks, materials, equipment, fuel; fumes from trial commission activities;
- The spill of fuel, materials (sand, stone, cement, gasoline, paint, etc.);
- Heat radiation from the construction processes that generate heat and welding fumes (such as the iron and steel cutting and welding; cutting and welding for the assembling; melting bitumen for spreading asphalt on the road);
- Noise and vibration caused by the transport, machinery equipment, bulldozer, compactor.

- Among these causes, the impact due to dust, vehicle emissions and noise are the three major effects of the construction process.

- For the existing plant all the air pollution have be controlled to minimized affection to environment. The company have done environment supervison every 6 month to measure and control the air condition, all the items follow the regulation requirement. The result of air measurement nearest in Jun 2017, all items archived the regulations.

b. Detailed impact assessments are as follows

Pollution caused by emissions from the transportation of raw materials construction

Air pollution from the activities of means of treansport contains the products of fuel combustion from engines, such as NOx, SO2, CO.

The pollution load of the waste gases generated more or less depending on the number of vehicles involved in transporting as well as the kinds of used fuel.

However, it is difficult to determine accurately the number of vehicles involved in the transport. The number of vehicles is also different each time. In this case, the pollution load will be calculated during the rushed hours in the construction site.

The pollution load can be calculated based on following conditions:

- DO fuel is used;
- The density of DO is 0.85 kg / L, sulfur content in DO fuel is 0.5%

  (Source: Guide for fuel - oil and grease, Science and Technology Publishing House , 2000);
- The demand of used DO is about 0.2 liter/km per vehicle;

Moreover, with the scale construction, the project are carried out on the total area 27,234 m^2, the total volume of materials (iron, steel, sand, stone, cement, raw materials, etc) for the construction of technical infrastructure is 40,000 tons.

The amount of materials will be transported to the project area by heavy trucks with an average load of 10 tons, DO is the raw materials that is used. Thus, the total number of trips needed to transport materials in service during the construction process is about 4000 (trips). With the construction period is 400 days, there will be approximately 10 trips go in and out the site.

- Number of trips in one day: 10 trips per day;
- Impacteded distance of transport (from factory to the entrance of Nhựt Chánh Industrial Zone is 1.5 km;
- Number of working hours per day: 8 hours.

This calculation is based on the pollution load factor as presented in the following table:

Table 30 Coefficient of the pollution load of certain emissions

Emissions	Coefficient of the pollution load (g/km)		
	Engine < 1.400 cc	**1.400 cc ≤ Engine ≤ 2.000 cc**	**Engine > 2.000 cc**
Dust	0,07	0,07	0,07
SO_2	1,9 S	2,22 S	2,74 S
NO_2	1,64	1,87	2,25
CO	45,6	45,6	45,6

(Source: Assessment of Sources of Air, Water, and Land Pollution - WHO, 1993; S is the content of sulphur in the fuel (%))

Table 31 The pollution coefficient of DO burning from the vehicle calculated on the amount of used fuel

Emissions	**Dust**	**SO_2**	**NO_2**	**CO**
Pollution coefficient (kg / ton)	4,3	20S	55	28

(Source: Assessment of Sources of Air, Water, and Land Pollution -WHO, 1993)

Table 32 The pollution factor of DO burning from the vehicle calculated on the stretch of road

Emissions	**Dust**	**SO_2**	**NO_2**	**CO**
Pollution coefficient (g/km)	0,07	1,9S	1,64	45,6

(Source: Assessment of Sources of Air, Water, and Land Pollution - WHO, 1993)

The pollution load calculations (not use genset in construction site)

The number of trips needed to transport is about 3 trips a day. One vehicle will transport 1 trip per day →the amount of vehicles needed in one day is 3 (trips).

Total transportation distance in a day:

10 trips/day x 1.5 km / trip = 15 km / day = 1.875 km / h.

The amount of DO used in an hour of transportation:

1.875 km / h x 0.2 liters / km = 3.75 liters /h .

The amount of DO used in one hour:

m = 3.75 liters / hour x 0.85 kg / liter = 3.185 kg / h= 0.003185 tons / h.

Having the similar calculations as before, we have the load of pollution from DO burning are shown in the following table.

Table 33 The pollution load of DO burning from the vehicle calculated on the amount of the used fuel

Emissions	**Dust**	**SO_2**	**NO_2**	**CO**
Pollution coefficient (kg/ton)	4,3	20S	55	28
Pollution load (kg/h)	0,0073	0,017	0,094	0,05

(Source: Assessment of Sources of Air, Water, and Land Pollution -WHO, 1993)

Table 34 Coefficient and the pollution load from DO burning from the transport counted on the stretch of road

Emissions	Pollution coefficient and load *(g/km)*	Stretch of road *(km)*	Pollution load *(g/day)*
Dust	0,07	1,5 x 2	0,21
SO_2	1,9 S		2,85
NO_2	1,64		4,92
CO	45,6		136,8

(Source : Assessment of Sources of Air, Water, and Land Pollution - WHO, 1993)
S is the content of sulphur in the fuel (%))

Dust pollution caused by the operation of vehicles transporting and excavtion

These means of transport are mainly used for excavating-banking and excuting the foundation, etc. The total 6 means of excuting per day is the number as in the reference from other projects that have the equivalent area in the construction period, including:

- Dump truck : 2 units
- Grader : 1 units
- Bulldozer : 1 units
- Excavator : 1 units
- Crane : 1 units

Fuel (DO) consumption of the vehicles is completely different. According to the actual operation of the construction equipment (grader, bulldozer, road roller, excavator, crane), the average amount of oil consumption (8-hour workday) of a unit is about 50 liters per day. For dump truck, the demand for DO using is about 40 liters per vehicle per day.

Calculating of the oil consumption

In one day, the oil consumption of the grader, bulldozer, excavator, crane is:

4 vehicles x 50 liters/ day = 200 liters / day = 25 liters/ hour

The oil consumption in one day of the dump truck is:

2 vehicles x 40 liters / day = 80 liters / day = 10 liters/hour.

In one day, the total oil consumption of means of transportation and executing is 25 liters/hour + 10 liters / hour = 35 liters/hour

According to the guide for fuel - oil - grease using, Science and Technology Publisher, 2000, we have the following parameters:

- Sulfur content in DO: S = 0.5%.
- Density of oil: 0.85 kg / liter.

The amount of oil using in one day:

m = 35 liters / hour x 0.85 kg / liter = 29.75 kg / hr = 0.03 tons/hour.

The pollution load from DO burning is shown in the following table.

Table 35 ***The pollution factor and coefficient from DO burning of means of transportationand excuting on the site***

Emissions	Dust	SO_2	NO_2	CO
Pollution coefficient (kg/ton)	4,3	20S	55	28
Pollution load (kg/h)	0,24	0,55	3,03	1,38

(Source: Assessment of Sources of Air, Water, and Land Pollution - WHO, 1993)

The pollution caused by dust

During the period of construction, the dust will arise mainly from the following sources:

- Dust generated from the transportation of construction materials;
- Dust generated from the process of loading and unloading of construction materials;
- Dust generated from the foundation operations.

Measurements at several locations at 50 m - 100 m distance from the executing site, at down wind, the dust density is 20 to 30 mg/m^3, greater 60 to 100 times than the standard that fix the limit of dust density in the surrounding air environment. However, the construction process that is done in the form of rolling d affect mainly within a radius of 100-200 m. Moreover, the project is located in Nhut Chanh industrial zone that have the inconsiderable affect on surrounding atmosphere, only have the mainly affect on the health of workers who directly work in the site and on the employees of the company.

Road surface dust

With the workload as presented in Chapter 1, an estimated 3 trips of 10-ton truck a day that go in and out the site, the estimated tonnage of road dust load caused by the operation of truck is calculated as follows: (the exphere influence from the project to the extent of land affected by the project to the main roadline is 0.5 km.)

$$L = 1{,}7k\left[\frac{s}{12}\right]\times\left[\frac{S}{48}\right]\times\left[\frac{\mathrm{W}}{2{,}7}\right]^{0,7}\times\left[\frac{w}{4}\right]^{0,5}$$

Including:

- L: Tonnage dust (kg / km / trip / year).
- K: Particle size; k = 0.2.
- S: The amount of land on the road; s = 8.9%
- S: Average speed of vehicle; S = 20 km / h
- W: Loaded weight of the vehicle; W = 10 tons
- w: The number of wheels, w = 6 wheels

Replace the values on the load equation in order to determine the value:

$$L = 1{,}7\times 0{,}2\left[\frac{8{,}9}{12}\right]\times\left[\frac{20}{48}\right]\times\left[\frac{5}{2{,}7}\right]^{0,7}\times\left[\frac{6}{4}\right]^{0,5} = 0{,}198 \text{ kg/km/trip/year}$$

Dust pollution is distributed during the transportation of construction materials in the sphere of influence is 2 km. In this way, the estimated tonnage dust loads during the construction processed is as follows: 0.198 (kg / km / trip / year) x 1.5 km x 3 (trips) x 210/365 = 0.513 kg / day.

According to the obove calculation presented in the above tables, the amount of dust generated is negligible. Dust arising from the fuel combustion of transportation of construction materials is 0.0073 kg / h (calculated on the amount of used fuel), 0.3 kg / day (calculated on the distance of transportation) and dust arising from the fuel combustion for construction equipment on the site is 0.24 kg / hour. In addition, the dust also caused by scattering from the road and the transported materials. The air pollution load of the mentioned sources can be found in the following table.

Causes and coefficient of the air pollution during the construction process

Based on the actual result at truck and equipemt operating are 1.5 mg/m3, the TSP exceeded 5 times the permitted standards (QCVN 05:2013/BTNMT, average in one hour is 0.3 mg/m3). Dust pollution impact on the whole route.

However, with construction dust, with large particle (0.2 mm), has the ability of fast deposition and the narrow sphere of scatter in the atmosphere. It is easy to find that dust arise heavily in windy condition and hot and dry werather. Dust is also unable to avoid during the construction processs. The project requires special attention to the method in order to minimize dust pollution during the transportation of raw materials in the dry season such as watering on the road surface, wheel washing before leaving the construction site and cover the area which disposer dust. After that the resust dust reduce from 0.16 – 0.19 mg/m3

c. The impact of the noise pollution

Noise caused by construction equipment

The operation of vehicles and construction equipment such as concrete mixer, electric generator, crane, etc. would cause the considerable noise. The noise level generated from construction equipment for references is presented in the following table.

Table 36 Noise levels from construction equipments

No	Equipment	**Noise level** (dBA), 1.5 m distance from source	
		Spaces between values	**Maximum value**
1.	Bulldozer	93,0(1)	93,0
2.	Concrete mixer	75,0-88,0(2)	88,0
3.	Electric generator	72,0 – 82,5(2)	82,5

(Source: Nguyễn Đinh Tuấn and partners, 2000, Mackernize, 1985)

Therefore, within a radius of 1.5 m from the placement of construction equipment, any kind of operating device mentioned in Table 37 are all exceed the limit of allowed noise level for the administrative body (60 dBA - TCVN 5949-1998) during the period from 6 am to 6 pm. This is not including the noise resonance by the simultaneous operating multiple devices.

The means of executing are considered the main sources of noise, noise is reduced by distance and by the sound absorption, and was estimated by the following formula (Phạm Đức Nguyên, 2000):

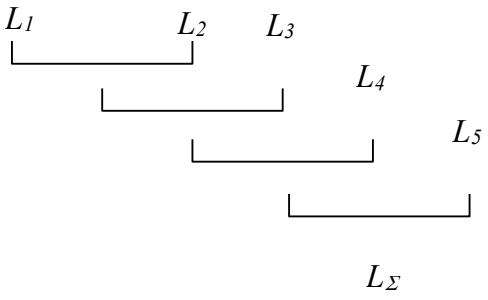
$$\Delta L_{kc} = k_b.20\lg\frac{r_2}{r_1}$$

In the formula, k_b is the coefficient represents the noise reduction due to the sound aborption of air. In the case of the project, as construction equipment are placed on flat ground, so $k_b = 1.0$. Assuming that each construction equipment is operated separately, the noise level by distance from the place whre the equipments are located on the site to the surrounding areas is estimated as shown in Table 38 (using the maximum value to predict the spread of noise into the surrounding environment). The estimated figures in table 3.9 show that in case of using the equipments without concomitant, noise pollution primarily affect workers who directly operate the equipment and within the project area. The neighboring areas (all over 200m away from the placement of construction equipment) is hardly affected (according to **QCVN 26:2010/BTNMT** - National Standard on the maximum limit allowed in the residential areas, hotels, pleasure houses and administrative agencies, the allowed limit from 6am to 6pm is 60 dBA).

Table 37 Estimated noise levels from construction equipment by distance

No	Equipment	Noise level by distance				
		1,5 m	**50 m**	**100 m**	**150 m**	**200 m**
1.	Bulldozer	93,0	62,5	56,5	53,0	50,5
2.	Concrete mixer	88,0	57,5	51,5	48,0	45,5
3.	Excavator	82,5	52,0	46,0	42,5	40,0
4.	Compressor (iron roller)	93,0	62,5	56,5	53,0	50,5
5.	**Equipment**	74,0	43,5	37,5	34,0	31,5
QCVN 26:2010/BTNMT		**70,0**	**70,0**	**70,0**	**70,0**	**70,0**

However, in cases these equipments are operated simultaneously, the resonant noise changes. Assuming that noise from equipments is created simultaneously (calculated at a distance of 1.5 m) including (1) bulldozer L_1 = 93.0 dBA, (2) concrete mixer L_2 = 88.0 dBA, (3) electric generator L_3 = 82.5 dBA, (4) excavator L_4 = 93.0 dBA, Compressor (iron roller) L_5 = 74.0 dBA, noise level is 106.9 dBA in total and is calculated according to the diagram below (Phạm Đức Nguyên, 2000):



$L_1 – L_3 = 93,0 - 110 = -17$ dBA → $\Delta L_{13} = 0,4$ → $L_{13} = 93,0 + 0,4 = 93,4$ dBA

$L_{13} – L_2 = 93,4 – 88,0 = 5,4$ dBA → $\Delta L_{123} = 0,4$ → $L_{123} = 93,4 + 0,4 = 93,8$ dBA

$L_{123} – L_4 = 93,8 – 93,0 = 0,8$ dBA → $\Delta L_{1234} = 0,08$ → $L_{1234} = 93,8 + 0,8 = 94,6$ dBA

$L_{1234} – L_5 = 94,6 – 74,0 = 20,6$ dBA → $\Delta L_{12345} = 0,08$ → $L_{12345} = 94,6 + 0,08 = 94,7$ dBA

In this case, 94.7 dBA noise level in total will cause significant impact to the workers on site. If workers have to work regularly in an environment with this noise level, they will be hurted on hearing without rehabilitation. In the surrounding areas 100m-200m distance from the project, the noise level dropped to 56.8 dBA (a distance of about 100 m) and 50.8 dBA (a distance of about 200 m). Therefore, the effect on the surrounding areas is very small from this distance, including in the case that the equipments are operated simultaneously.

According to Mackernize (1985), noise level caused by the transportation of vehicles range from 82 dBA to 94 dBA. Assuming that at peak, at the same time, three trucks or thereabout that go in and out the site, the resonant noise level caused by transportation will be calculated as follows:

$$L_\Sigma = L + 10lgn = (82 \div 94)\ dBA + 10\ lg3 = 86 \div 98\ dBA$$

This noise level also has effect on workers on the site. Therefore, in order to limit the resonance noise that has bad effect on the workers, investor and contractor will schedule the operation of construction equipment and vehicles to go in and out on the site and avoid the simultaneous operations of equipments that have high noise levels.

The company also do cover all the construction area, separately noise area so the result of noise level measure in Jun is below 70 dbA (the result Jun 2017) for surround area of contruction

d. The impact of thermal Pollution

Heat pollution arised from solar radiation and from the calorific construction process (such as the transport of construction materials and the machinary on the construction site, especially in hot weather). These pollution substances will mostly have effect on workers who directly work in the site.

The impact of sources that caused the water pollution

[1]. The pollution of the waste water from the operating activities of construction workers

During the construction process of the project, the waste water mainly is domestic waste water of construction workers on the site. At the peak, the number of workers participating in the construction site is estimated at 300 workers. Major components of water pollution domestic waste mainly contains impurities, suspended solids (SS), organic compounds (BOD / COD), nutrients (N, P) and microbiological .

According to construction standards and norms for domestic water supply is the average of 120 liters / person / day. Thus, the total flow of waste water generated in the course of the construction project is $36m^3$ / day.

According to statistical calculations for the developing countries, the coefficient of pollution per person daily into the environment (when waste water without treatment) is presented below.

Table 38 The pollution coefficient is given to the environment by everyone daily (the waste water before the treatment)

Base on the standard TCVN 7975:2008 about the pollution emission for construction activities.

No	Pollution substances	Coefficient (g/person/day)
1.	BOD_5	30 - 35
2.	COD	70 - 102
3.	Suspended Solids (SS)	60 - 65
4.	Amoni (N-NH_4)	8
5.	Total Nitrogen	6 - 12
6.	Total photphorus	0,8 - 4,0

Based on the calculation of pollution coefficient fast, it can predict the load of pollutants generated from the waste water during the preparation phase are presented in the following table.

Table 39 The pollution load generated from the domestic waste water (before treatment) in the process of construction.

No	Pollution substances	Load (kg/day)
1.	BOD_5	9 – 10.5
2.	COD	21 – 30.6
3.	Suspended Solids (SS)	18 – 19.5
4.	Amoni (N-NH_4)	2.4
5.	Total Nitrogen	1.8 – 3.6
6.	Total photphorus	0.24 – 1.2

The concentration of pollutants in the waste water is calculated based on the pollutant load, the wastewater flow and the average processing performance of septic tanks (3 compartments) is 60%, the estimated concentration results pollutants in the waste water during the construction phase are presented in the following table.

Table 40 The pollution concentration of the domestic waste water in the process of construction.

No	Pollution substances	Concentration *(mg/l)*		Output standard of Nhựt Chánh Industrial Zone	IFC EHS Guidelines
		No treatment	Treatment by septic tanks		
1.	BOD_5	250 - 292	**100 - 117**	**50**	**30**
2.	COD	583.3 - 850	240 - 240	**150**	**150**
3.	Suspended Solids (SS)	500 - 542	**200 - 217**	**100**	**50**
4.	Amoni (N-NH_4)	66.7	**26,7**	**10,0**	**--**
5.	Total Nitrogen	50 - 100	20 - 40	**40**	**10**
6.	Total photphorus	6.7 – 33.3	2,7 - 13,3	**6**	**2**

Comparing the concentration of pollutants in the waste water with the wastewater input standards of Nhựt Chánh Industrial Zone is shown that when untreated waste water or pre-treated by septic tanks, most of the pollution parameters exceeding the permitted limit values. Hence, the waste water must be collected and processed.

In the construction phase, workers and contractors will use the restroom availability of the existing plant, and the waste water will be processed through the centralized processing system of the existing plant with the capacity of 1,750 m^3/day and night.

[2]. The impact of waste water pollution caused by the construction

Sewage construction project is mainly the concrete curing water, the equipment wash water, the wash water for the construction material containing suspended solids and organic matter. It is estimated that the construction waste water flows about 5m^3 / day. The concentration of pollutants in the construction waste water is presented in the following table.

Table 41 The concentration of pollutants in the construction waste water

No	Parameter	Unit	Concentration	Output standard of Nhựt Chánh Industrial Zone	IFC General EHS Guidelines
1.	pH	-	6,99	5,5 - 9,0	6 – 9
2.	TSS	mg/l	**663**	100	50
3.	BOD_5	mgO_2/l	**429**	50	30
4.	COD	mgO_2/l	**641**	150	125
5.	Amonia	mg/l	9,6	10	N/A
6.	Total Nitrogen	mg/l	**49,3**	40	10
7.	Total photphorus	mg/l	4,3	6	2
8.	Total Fe	mg/l	0,72	5	N/A
9.	Zinc	mg/l	0,004	3	N/A
10.	Lead	mg/l	0,055	0,5	N/A
11.	Total oil and gease	mg/l	0,02	10	10
12.	Total Coliform	MPN/100ml	53.10^4	5.000	400

(Source: Center for Urban Environmental Engineering and Industrial Zone, 2007)

In general, the concentration of pollutants in the construction waste water are within the permitted limit values, except for parameters TSS, BOD 5, COD, and microbiology.

[3]. The impact caused by the spreading rain-water in the project area

Rain-water that overflow on the surface of the project can cause stagnant and obstruction of the construction process if the site doesn't have a suitbale drainage. In addition, rain-water also sweep sandy soil and other polluted components from ground surface into source of water's surface and cause sediment impacts on water resourc, directly has the effect on the aquatic biological resources.

According to the Hydrometeorology Forecast Center of Long An province, the

greatest amount of rainfall in one day is measure at 132.6 mm (May 9, 2002). Based on the area of the project (53,000 m^2), the estimated amount of rainfall falls and overflow on the project surface as follows:

The largest amount of rain water per day is: $Q_{day} = 0,1326 \times 27.134 = 3.598\ m^3$. The determination of the maximum flow of rain water falling on the surface of the project area is also an important basis to design the water drainage network of the factory.

In general, the pollution impact caused by the overflow of rain water during the construction stage is not significant. The rain water is opaque mainly due to the sweeping of gravelly soil and part of the spilled construction materials during the construction process.

The flow of rain water doesn't have significant impact to the drainage environment in the project area (Vàm Cỏ Đông River), as well as to the stagnant, inundated, swwampy probability on the project area, which has good drainage slope.

f. The araising impact from the solid waste sources

[1]. The impact caused by the construction solid waste

In the construction process, some types of solid waste such as remained or decayed rubble, scrap iron and steel, cement bags, wooden scaffolding poles, etc that are remained on the site. This is a kind of solid waste and the leader of the project will take all for reusing or saling.

The process of gathering and storing materials on the site less arise solid waste as well as waste due to the gathering too much materials on the site (take the initiative in buying materials that are sold near the site). And because the cement, iron, steel and lubricant fuel are well covered, the possibility of scattering and cause pollution is very low.

Vehicle maintenance activities at the site can also cause colloidal sludge, empty bottles and lubricating oil contaminated clout. These are the types of hazardous waste, although with inconsiderable quantity. And when these types of waste are arised, the project owner will collect immediately under the regulations for handling hazardous waste, minimizing negative impacts to the environment.

In general, most of the solid waste arising in the process of building are the reusing waste with the arising level of about 2.5 tons / ha. Calculated over the entire area of the construction project, the amount of CTR to be collected and tackled is about 1.25 tons. Material diminishing norm in the factory construction process as the following table.

Table 42 Material diminishing norm caused by the construction

No	Material	Diminishing level by original quantity (%)
1.	Yellow sand	2,0
2.	Silky sand	2,0
3.	Kinds of cable	2,0
4.	Paint	2,0

No	Material	Diminishing level by original quantity (%)
5.	Gravel	2,0
6.	Iron	0,5
7.	Cement	1,0
8.	Wooden tie	0,5
9.	Board	3,0

(Source: Mackernize, L.da, 1985)

[2]. The impact caused by solid waste of activities

With the total number of construction workers estimated about 50 people per day and in one day and according to National Standard on Construction 07:2010/BXD , each worker working in the project area discharged 1.3 kg of activity waste, then the total waste generated in the construction process is around 65 kg / day. This waste is collected by the contract with the rubbish collecting organization.

In general, with the concentrating of 50 construction workers on the site, the discharge of pollution substance every day also create conditions for pathogenous microorganisms develop and spread germs. If we don't keep strict control and organization, the temporary sanitation works will reduce the sanitation environment in the area. Environmental sanitary that are in bad conditions could generate some kinds of diseases affecting the health of construction workers and residential areas. In addition, the abov waste can be washed and swept by rainwater, which affects the sanitation situation in areas surrounding the project.

Therefore, the project owner will ensure the collection and handling of activity garbage and food safety to ensure strict control of the generation of disease and protect the workers' health.

g. The impacts on biological resources

The entire precinct was evened from the previous period, so the effect on the biological resources in this period is almost negligible.

h. The impact on the economy and society

[1]. **The positive impact**

In the period of construction to enlarge the Outspan coffee factory, there are some positive specific effects to the local economy and society. These effects are expressed through the mobilization of an idle labor force in the local (but not much), contribute to the increasing of employment and increase the temporary income for workers.

[2]. The negative impact

- The gathering a quantity of labor from other places are able to lead to the instability of public order in the area such as: contradiction, dispute with local people or with the empoyee themselves and the company's internal workers, etc.
- The impact on the living environment have affect on people's health and arise illness.

In general, the negative impact on the economy and society in the project area is negligible. Once completed, the negative effect is no longer.

i. *Other* impacts

[1]. The ability of bringing about flooded and waterlogged state.

The ability to occur the phenomenon that causes stagnant, flooded, waterlogged, marshy states, etc. at the project area or the surrounding area is low.

[2]. Increasing pollution and traffic accidents

Because the density of vehicles that go in and out the project is not heavy, so the impact on the traffic safety in the region is very low.

However, the project owner will care about arranging the construction plan, appointing machinery, vehicles, technical equipment scientifically and managing traffic safety in order to minimize the harmful effects to the environment such as: increasing noise, increasing traffic density when ending the working hours can cause traffic accidents outside the project area.

[3]. Cross-impact among the project that are under construction (the area that raise the productivity of coffee processing) and under operation (the existing coffee processing factory.)

Because the enlarged roject works are uninterrupted with the existing factory, *(diagram of the existing factory is showed in the appendix)*, the construction operation of expanding project for Outspan factory may have pollution cross-contamination effect among the works that will be constructed (for expanded projects) and the existing factory. Moreover, resonant effects among the works of the projects can also increase the risk of partial pollution about dust and exhaust fumes for the existing processes, noise and other substances that cause

air pollution during the construction process could affect the health of factory workers. Industrial accidents in the construction activity also have effects on the worker's spirit, psychology and efficient in production of all the employees of the company.

However, the construction process of expanding works try to execute necessary isolated methods. Therefore, the ability of occuring the cross-contamination effects on the project area is very low. However, due to the risk of causing economic losses and safety incidents of employees in the above cases, the coffee company will be interested in the arrangement the construction plan, appointing machinery, vehicles , technical equipment scientifically in order to minimize these harmful effects.

In addition to the above assessed impacts, the construction process of expanding project also cause other negative impacts such as: space clearance operations cause reducing surface area, changing botanical structure that cover ground, have effects on the microclimate conditions on the region. The trial running and adjustment of technological equipment before the official production on the expanded project can cause risk of environmental breakdown caused by the failure of technical equipment, production technology or technical infrastructure.

The influence level of microclimate conditions is considered negligible due to poor in vegetatioanl cover in the project area, with low covering density, airy, without covered terrain. And about the effectes caused by the trial operation and adjustment of technological equipment can be scheduled in advance and apply preventive measures, easily controlled by Café Outspan Vietnam Ltd that has experienced in the construction investment and project organization for agricultural products.

k. The overall assessment of environmental impacts caused by activities in the construction phase of the project.

The environmental impacts caused by activities in the construction phase of the project are synthesized briefly in the following table.

Table 43 The general evaluation of environmental impacts during the construction of the project

No	Evaluating activity	Ground	Water	AIR	biological resources	Economy - society
1.	Digging and leveling	++/S	++/S	++/S	+/S	+/S
2.	Transport materials and fuel for the project	+/S	0/S	++/S	+/S	+/S
3.	Construct an complete the construction items	+/S	++/S	+++/S	0/S	0/S

No	Evaluating activity	Ground	Water	AIR	biological resources	Economy - society
4.	Store fuel the raw materials	+/S	+/S	++/S	+/S	+/S
5.	Activities of workers on the site	+/S	++/S	+/S	+/S	++/S

Notes: Rating scale

0 : No significant impact on the size of the project area.
+ : Less harmful impact on the size of the project area.
++ : Medium harmful impact on the size of the project area.
+++ : Strong harmful impact on the size of the project area.
L (long term): Long term. S (short term): short term.

Comments: The environmental impact of activities in the construction phase of the building project

- Sources of impact: Activities of workers and the building of infrastructure have the biggest impact on the environment.
- Impacted objects: Air is the largest affect, then the second is the water, social and economic environment.
- Degree of impact: impacts caused with the relative impact and had the negligible impact and the short time influence about 6-8 months.

3.1.3. The assessment, prediction the impacts in the operation of the project

3.1.3.1. The impact of the sources that caused the air pollution.

a. *Identifying the sources of emissions impacts arising during operation phase of the project*

Activities, resources and scale of impact, the impact of the sources of emissions impacts arising in the operation phase is presented in the following table.

Table 44 The sources of emissions in the operation phase

No	Activities	Sources of impact and indicated pollutants	
		Existing plant	Project Phase 3
1.	Coffee roasting process (Roaster)	Emissions from roasting oven (Pollutants: Dust, SO_2, CO, NO_x, Smell (VOC_s)…	Emissions from roasting oven (Pollutants: Dust, SO_2, CO, NO_x, Smell (VOC_s)…
2.	Activities of boilers	Emissions from boilers (Pollutants: Bụi, SO_2, CO, NO_x…)	Emissions from boilers (Pollutants: Bụi, SO_2, CO, NO_x…)
3.	The operation process of electrical generator (standby)	Emissions from fuel combustion (dust, SO_2, NO_x, CO…)	Emissions from fuel combustion (dust, SO_2, NO_x, CO…)
4.	The transportation process of materials	Dust	Dust
5.	The operation process of waste water treatment	THC, CH_4	Evaporation of odors

Table 45 The impacted objects and scale in the operation stage

No	Impacted object	Scale of impact	Degree and time of impact
1.	Air environment, atmosphere	Environmental quality of the plant's ambient air, some plants surrounding and adjacent areas Affected radius is about 500 meters from the center of the project area	The degree of influence is negligible, long-term (during the duration of the project activities)
2.	Water environment	The production area, factory campus Sewer of the Industrial Zone Receiving water sewage (Vàm Cỏ Đông River surface water)	The degree of influence is negligible, long-term (during the duration of the project activities)
3.	Workers of the factory	The workers directly involved in production Officer	The degree of influence is negligible, long-term (during the duration of the project activities)
4.	Community	Households near the factory	Long-term (during the duration of the project activities)thời gian hoạt động của dự án)
5.	Biology resources	Trees along the transportation road of materials	

b. *The assessment of the waste load, the pollution characteristics sources of emissions in the operation of the project*

[1] Exhaust fumes from the coffee roaster

Refer to the evaluation documentation of emissions of the US Environmental Protection Agency, AP-42[5]for emisson sources of the coffee roasting oven, have emission factors are as follows:

Table 46 The emission coefficient from the coffee roasting oven , AP42

No	Sources	The emission coefficient (lb/ tons of fuel and materials)		
		Dust	VOCs	CO
1.	The roasting oven by the batch	-	0,86	180
2.	The roasting oven by the batch (produced by the gas treatment of thermal oxidation)	0,12	0,047	530
3.	The continuous roasting oven (produced by the gas treatment of thermal oxidation)	0,66	1,4	120
4.	The continuous roasting oven (produced by the gas treatment of thermal oxidation)	0,092	0,16	200

[5] *link: https://www3.epa.gov/ttnchie1/ap42/ch09/final/c9s13-2.pdf*

In the processing of coffee, the roasting and drying stages will arise smell. Under the temperature effect, some of aromatic substances contained in coffee will evaporate or decompose, such as trigonelli will decompose forming nicotic acid, cellulose, cellulose decomposition forming Hemi-de nalto xtrine, glicose and carbohydrates, etc. When the temperature reached about 150^0C, in the roaster and dryer will arise out of substances such as cacbodioxit, and steam, etc. These substances (with a low percentage in compostion) are very sensitive in odour, the threshold to discover is very low. The smell may affect the performance of workers (causing breathing difficulties, headaches, dizziness).

Prediction the pollution characteristics of the exhausted fumes for Phase 3 project

Based the data of 2 roasting oven with the existing technology at the factory, the exhausted fumes of Phase 3 project is estimated as follows.

Table 47 Load of pollutants in the coffe roasting oven Phase 3(before treatment)

No	Parameter	Concentration *(mg/Nm^3)*		QCVN 19:2009/ BTNMT (B)
		Existing emissions(*)	Predicted emissions	
1.	Quanity	< 20.000	< 20.000	-
2.	Dust	**2320**	**2320**	**200**
3.	SO_2	253	253	**500**
4.	NO_x	44	44	**850**
5.	CO	2270	2270	**1.000**
6.	THC	60	60	**-**

(Source: (*) The reusult before treatment 2016)

Comments:

The roasting process will create a dust (membrane shell fire coffee) and volatile organic compounds. According to the measurement results from the roasting oven system of the existing plant, the concentration of dust in the exhaust gas is 2320 mg / m^3, 11 times higher permissible standards threshold. In addition, a large amount of odor (VOCs) and odor-causing organic compounds will be dispersed into the surrounding environment to cause the negative impacts on the surrounding air environment as well as unpleasant odors for workers in the plant operation.

Through the above data, it is shown that the emissions sources from the roaster impacts negatively on the environment. It emits the dust and odors into the environment. Hence, it is necessary to control the pollution sources which are suitable for future waste.

[2]. Exhausted fumes from the boiler

For the Phase 3 project with the capacity 5,250 tons/y, Café Outspan Vietnam Ltd is using a boiler with capacity of 16 tons/h with the fuel combustion technology similar to 2 using boilers of 18 and 25 tons/h, therefore, that measurement is possible using measurement data of 2 actual emission current furnace to assess pollutant emissions as well as to quantify the gas boiler in Phase 3.

The prediction the exhausted emissions of the boiler using coal and coffee grounds with the capacity of 18 tons / h (estimated for the usage of Phase 3).

Table 48 The emission load of the pollutants of the boiler using coal and coffee grounds with the capacity of 16 tons / h (before treatment).

No	Pollutants	The emissions of the boiler 18 tons*	The emissions of the boiler 16 tons *(estimated)*	QCVN 19:2009/BTNMT *(column B), Kp:0,9; Kv:1*
1.	Quantity	< 20.000	< 20.000	-
2.	Dust	6240	6240	200
3.	SO_2	320	320	500
4.	NO_x	250	250	800
5.	CO	540	540	1.000

(Source: (*) The reusult before treatment 2016)

Table 49 The ambient air in contrustion site

Area	Parameters – mg/m3			
	Dust	CO	SO2	NO2
Front site	0.16	5.19	0.047	0.02
Back site (near river)	0.20	5.17	0.050	0.041
Side site (next to IP company)	0.18	5.30	0.036	0.016

Comments

According to the above results, the higher dust concentration is 31 times higher than standards. this is a source of significant pollution blankly, so it is necessary to apply the appropriate pollution control measures when the project comes into operation.

[3]. Exhausted gas from the transportation activities

In the current operation as well as the operation after the expansion, every day in the factory area will have the transportation activities that take the workers, raw materials and goods to go in and out the company. The means of vehicles (motorcycles, transport workers, service car, guest car) and vehicles that used to transport raw materials and goods to go in and out the project will generate exhaust gas including dust, SOx, NOx, CO, THC, etc. cause negative impacts to the environment. Load of pollutants in thi skind of gas depends on the number of vehicle, quality of used fuel, the technical conditions of transportation facilities as well as quality of roads in the internal IPs and in the district. According to the report that research the measures to control air pollution in

road traffic in Ho Chi Minh City showed that the average fuel consumption of the common types of 2-wheel and 3-wheel motorcycles is 0.03 liter / km , for all kinds of car using gasoline is 0.15 liter / km and for the vehicles using oil is 0.3 liter per kilometer. With the total number of employees of the company after the expanding of capacity is 128 people, we assume that the number of employees are picking up about 50% (200 people) and number of workers who go to work by themselves is 50% (200 people). Among the workers who have their own vehicles, the number of workers who use the 2-wheel vehicle is forecasted of 50% (100 people). So, if we do not counted the number of guests' cars to go in and out in some special occasions, we can forecast the number of the vehicle transporting workers every day as follows:

- 25-seat vehicle: 72 turns / day.
- 2-wheel motorcycles: 45 turns / day.

So, if the average length of the distance in a day is 10 km (from the factory to the farest distance to take the workers), the fuel for the vehicles can be calculated and presented in the following table.

Table 50 The fuel for transportation operations at the factory in a day

No	Means of transportation	Turns of vehicles *(turnt)*	Consumption *(t/km)*	Moving distance / turn	Total petrol *(l)*
1	2-wheel motorcyle	45	0,03	0,2 km	0,23
2	25-seat vehicle (DO)	4	0,30	0,2 km	0,21
	Trucks	80	0,40	0,2 km	5,50

Table 51 The pollution coefficient caused by transportation exhausted gas

No	Means of transportation	Pollution coefficient *(kg/ton of fuel)*			
		Dust	SO_2	NO_2	CO
1.	2-wheel motorcyle	-	20S	8	525
2.	25-seat vehicle (DO)	3,5	20S	12	18
3.	Heavy truck > 16 tons	4,3	20S	50	20

Source: World Health Organization (WHO), 1993

Based on the pollution factor and fuel consumption of vehicles that regularly go in and out the factory area, we conducted the forcasting for pollution load caused by means of transportation in the factory area is presented in the following table:

Table 52 The load prediction of the air pollution by main means of transportation in the plant

No	Means of transportation	Pollution coefficient *(kg/day)*			
		Dust	SO_2	NO_2	CO
1.	2-wheel motorcyle	0.000	0.000	0.002	0.121
2.	25-seat vehicle (DO)	0.001	0.000	0.003	0.004
3.	Trucks	0.024	0.006	0.275	0.110

*Note: **S** = sulfur content in DO (0.50%)*

The calculated result shows that the impact from the exhaust gas by means of transportation to the environment at the capacity expanding stage of the project is negligible.

- Other production activities such as: operating of machinery, waste water and operations of collection, storage, transport waste also generate gas such as NH3, H_2S, CH_4, and the smell of leakage petroleum, etc. cause air pollution with smell;
- The trading activities, transportation, storage of vehicles (cars, motorcycles) on the factory area generates suspended dust, steam of leakage fuel cause air pollution;
- The activities of living such as eating and public hygiene on the factory area generate smell from excess food , have effect on the air quality.

In general, the exhaust gas from othe rsources is very difficult to estimate the load and concentration, but the affect has the local nature and not large. Investors will apply the appropriate measures to control emissions, and minimize negative impacts to the environment.

Specific, the company have the actions as below:

- Not allow motorbikes and cars go inside the contrustion site
- All trucks must be covered to avoid materials out
- All trucks must be cleaned by water before go out the construction site
- Limited speed at the construction (5 km/h)

The reusult that company to measure actual as table 53

Table 53 The result actual for emmisson in during construction as below:

Area	**Parameters – mg/m3**			
	Dust	CO	SO2	NO2
Front site	0.16	5.19	0.047	0.02
Back site (near river)	0.20	5.17	0.050	0.041
Side site (next to IP company)	0.18	5.30	0.036	0.016

[4]. The exhausted gas from the standby generators

Currently, the factory was equipped with 3 standby generators and is used in case of out of electricity with the capacity of 6,000 KVA. At this stage of processing capacity, Café Outspan Vietnam Ltd will invest another 2 generators with the capacity of each generator of 2,250 KVA, using DO as the burning fuel (S=0,25%).

Table 54 The parameters of the generator of the factory using for the expanding capacity

Equipment	Quantity	Capacity	Fuel	Fuel consumption	Origin	Production year
Generator	2	2.250 KVA	Dầu DO	450 l/h	Europe	2015-2016

Two generators are equipped with the capacity of 2,250 KVA each machine, the generators can meet the operational needs after the expanding process. The fuel needed for the operation of the generator is DO - 450 l/h, equivalent to 390 kg/h (ratio of oil: 0.87 kg / liter). Therefore, we have the emission of air pollutants such as CO, CxHy, NO_2, SO_2, SO_3, dust, etc. The pollution parameter and load of pollutants in the exhausted gas from the generator of the factory are calculated and presented in the following table.

Table 55 The load of pollutants in the exhausted gas of generators

No	Parameter	Pollution score	Load of pollution *(g/h)*	Concentration of pollutants *(mg/m^3)*	QCVN 19:2009/BTNMT, column B *(mg/m^3),*
1.	Dust	0,369	0.2563	24,1	**200**
2.	SO_2	10,4S	1.8056	170,0	**500**
3.	NO_x	5,01	3.4792	327,1	**850**
4.	CO	1,14	0.7917	74,5	**1.000**
5.	VOCs	0,415	0.2882	26,9	**-**

Note: S = sulfur content in DO is 0.25%

These are the evaluated data when the generators are working at full capacity. The concentrations of parameters are quite low and reach the standard. Besides that, the source of this effect is only temporary and not continous, so in generally, the influence is negligible.

[5]. The impact of air pollutants from wastewater treatment system

In the Phase 3 expansion project, the factory invested and constructed 1 waste water treatment system with a capacity of 750 m^3/day with the same technology system of 1,750 m^3/day and night of the existing plant *(detailed technology plan described in section 4.1.2.2, Chapter 4).*

In the technology of waste water treatment, the plant applied the anaerobic

digestion technology. With the use of an anaerobic biological birth will make the measures emissions of pollutants such as C_xH_y, CH_4, etc. With the input of nature wastewater BOD5 / COD is high, the amount of biological biogas (Biogas) very significantly, if not appropriate collection and treatment, it will cause adverse impacts on the environment (odors, CH4 concentration risk of fire ...). Therefore this waste sources should also apply appropriate measures before discharging the pollution into the environment.

3.1.3.2. The impact of noise that arising from the production process

In the production stage, the noise is arised mainly from grain processing stage, conveyor system, roasting, grinding, etc. By surveying and measuring some machineries, noise levels are shown in the following table:

Table 56 The result of noise level measurement by some equipments

No	Equipment	Noise level	TCVS 3733:2002/ QĐ-BYT
1.	Mixer	84 – 87	**≤ 85**
2.	Grinding machine	81 – 82	

According to the decision No. 3733/2002-QD-BYT on 10/10/2002 of the Minister of Health about promulgating the 21 occupational health standards, 5 rules and 07 occupational health parameters, the noise level at the workplace should not exceed 85 dBA within 8 hours and maximum noise level does not exceed 115 dBA. If the contacting time to the noise is reduced by a half, the allowed noise level increases to 5dBA (ie contacting continuously within 8 hours, then the allowed noise level is 85 dBA, but if the contact time is 4 hours, then the allowing increased levels to 90 dBA ,etc).

The frequent contact with sources of noise in high level will suppress the central nervous, causing irritability fatigue status and reduce labor's productivity, can lead to occupational accidents. When working in manufacturing facilities or areas with high noise levels (factory sector) workers are equipped with ear plugs for noise.

Because the technological lines and equipment in the factory are new and modern, then the noise, vibration, heat balance, etc. from machinery and equipment is also not significant. However, in order to reduce pollution, the factory will install vibration reduction system on the ground and apply the anti-noise measures to ensure noise and vibration from the machines is at the lowest level.

Because the existing plant and construction site seperately area and built by brick, so the noise not cumulative for new and old site. Only boiler 3 the same area with boiler 1,2 so the company carried out measure noise level at this area at Jun 2017 and the result was 67 dbA.

3.1.3.3. The impacts related to the waste water

[1] –The waste water from production

[2] –The waste water from daily life

[3]- The spreading rain water

- The process of concentrating,
- The process of drying and freezing ,

The total amount of industrial waste water (life and production activities) from the existing coffee processing of the factory is: **1,019** m^3/ day and night. *(See Table 10, page 29)*

After the expansion, the total waste water (life and production activities) araises to **446** m^3/ day and night. *(See Table 10, page 29)*

The property of wastewater from the production process is the containing of specific pollutants as follow: color, temperature, BOD5, COD, SS, grease and oil, etc.

Due to the coffee processing of the existing factory and the expanding one are the same, and with the result of input from the sewage treatment process, we can assess the pollutant load as follows:

Table 57 The prediction of the waste water characteristics of Café Outspan Vietnam Ltd

No	Parameter	Unit	Value *(Statistics from the existing plant)*	Input threshold of Nhự Chánh Industrial Zone
1.	pH	-	4,9	**5,5-9**
2.	SS	mg/l	1300	**≤ 100**
3.	Total Nitrogen	mg/l	160	**≤ 40**
4.	Total Phophorus	mg/l	4,17	**≤ 6**
5.	Color (pH=7)	Co-Pt	11000	**≤ 150**
6.	COD	mg/l	5400	**≤ 150**
7.	BOD_5(20ºC)	mg/l	1800	**≤ 50**

(Source: The analysis result of the input waste water, in 2015, performed by Quality Assurance & Testing Center 3)

The load of actual emissions (according to the 3 first-month statistics, of the existing plant (capacity of 12,000 tons product/year): 1,019 m3/ day and night),

The Phase 3 expansion project (capacity of 5,250 tons product/year), the amount of wastewater generated approximately 44% (1,019 m3 / day and night) = 446 m^3/day and night.

Based on the results of the 3 statistics sampling stages of completion reports of environmental treatment facilities of existing plants (2015) showed that the production of waste water (untreated) of the plant is a huge environmental pressures. The above data showed that the most typical pollution parameters are exceeded Nhựt Chánh Industrial Zone standard several times, such as BOD5 (36 times), COD (36 times), color (73 times). If this waste source is not controlled

(collection and processing by the standards) will shock the treatment system of the industrial zone, and thereby it will reduce the water quality of Vàm Cỏ River (the last source input).

[2]. The industrial wastewater generated from daily life activities

The wastewater of daily life activities is generated primarily from the operations activities of officials and employees at the factory. The composition of this kind of wastewater including: The residuum (SS), nutrients (N, P), organic matter (BOD_5/COD), microorganisms, etc. to pollute the environment.

The estimate amount of the daily domestic waste water

- Total staff and workers of the factory is now 286 people, after the plant expansion should add about 125 people, *(table 13, page 31)*
- Standards for the water consumption (according to National Standard on Construction 33: 2006 Ministry of Construction issued on March 17, 2006 on "Water supply - pipeline network and work") for the workshop is 120 liters / person.

  Q_{sh} = 120 L / person × 125 people× 80% = 15,000 L / day = 15.0 m^3/day.
  The daily domestic waste water generated is 12.0 m^3 / day (equal to 80%)

  The concentration of pollutants in the lilfe waste water is calculated based on the amount of water discharged and the load of pollutants in the waste water. The results calculated the initial pollution concentration of waste water are given in the following table.

  Table 58 The components of the daily domestic waste water (before treatment)

No	Pollutants	Load kg/ngày	Concentration mg/l	Receiving limit of the waste water of Nhựt Chánh Industrial Zone
1.	BOD_5	1,35 – 1,62	467 - 562	50 mg/l
2.	COD (dicromate)	2,15 – 3,06	747 - 1.063	150 mg/l
3.	Suspended solids (SS)	2,10 – 4,36	729 - 1.513	100 mg/l
4.	Total Nitrogen (N)	0,18 – 0,36	62 - 125	40 mg/l
5.	Total Phophorus (P)	0,02 – 0,11	7 - 38	6 mg/l

Source: synthesized by the Industrial Ecology Solutions and Urban Company, 08/2012

Comments:

When the Phase 3 project comes into operation, it will incur a waste water volume of about 12.0 m^3/day. Five basic parameters are exceeded the receiving threshold of the industrial zone, so all the domestic waste water from the construction site will be pumped directly to existing waste water tank and be treated before send it to waste water industrial park.

[3]. The spreading rain water

According to the Center for Hydrometeorology Forecast for Long An Province, the biggest one day rainfall measured 132.6 mm (9 May 9, 2002). Based on the total area of the entire plant after expansion (rounded figures: 53,000 m2), can estimate the amount of rain runoff on the surface works as follows:

The largest flow of rain water per day is: Q_{day} Q_{day} = 53,000 m2 = 0.1326 m × 27,134m^3≈ 3.600 m^3. The spreading rain water in the entire project area is absorbed by the components of different pollutants are dropping,leaking, ... on the ground. The pollution components in the spreading rain water such as soil, waste, sludge,oil, ... may cause negative impacts to the environment. It is estimated the average concentrations of pollutants in the spreading rain water as follows:

- Total nitơ : 0,5 - 1,5 mg/l;
- Total Phophorus (P) : 0,004 - 0,03 mg/l;
- Chemical oxygen demand (COD) : 10 - 20 mg/l;
- Solids suspended (SS) : 10 - 20 mg/l.

Compared to other sources of wastewater, the spreading rain water shall be considered as relatively clean. So, the project investor will gather the spreading rain water into the rain water drainage system and through the trash screens, the sedimentation filtration in manholes and then discharged directly into receiving sources through common drainage system of the industrial zone.

The impact of pollutants in the waste water

The impact of pollutants in the waste water are shown in the following table

Table 59 The impact of pollutants in the waste water

No	Parameter	Impact
1.	Temperature	- Affect water quality, dissolved oxygen concentration in water (DO) - Affecting biodiversity; - Impact speed and form of decomposing organic compounds in water
2.	Grease	- Causing water pollution - Negative impact to aquatic life, don't create good conditions for the diffusion of oxygen from air into water; - The impact on the purpose of providing water and aquaculture. Causing thedeath of aquatic animals such as shrimp, fish, etc. - Transformed into other toxic compounds such as phenols, chlorinated derivatives of phenol.
3.	Organic chemicals	- Reduced levels of dissolved oxygen in the water; - The impact on aquatic resources.
4.	SS	- The impact on the water quality and the aquatic resources.
5.	Nutrients (N, P)	- Cause eutrophication, affecting water quality, aquatic life
6.	The bacteria	- Water and bacteria are the cause of the outbreaks oftyphoid, paratyphoid, dysentery, cholera; - Coliform is a group of intestinal bacteria E. coli (Escherichia Coli) is a group of coliform bacteria, can be found in human feces.

3.1.3.3. The impact of the solid waste

a. *Determine the source of the impact of the solid waste generated in the operation phase of the project*

Activities, resources and scale of the impact of the sources of emissions makes the arising impact in the the operation stage are shown in the following table.

Table 60 Activities and resources to cause the solid waste of the existing plant and the expanding phant

The company has built the storage for non-hazardous waste and hazardous waste seperatly with the square meter 97m2 and it's collected and treated by third party (Authorized company). Domestic waste storage has built with the square meter 100 m2 and be collected 2 times per week.

No	Activities	Resources of impact	
		The existing plant	Phase 3 Plant
1.	The stage of extracting coffee	Coffee grounds	Coffee grounds
2.	The exhausted fumes treatment system of the boiler	Coal slag and ash generated at the average level	Coal slag and ash estimated to generate at the average level
3.	Activities of offices, security house, canteen and dormitory	Daily life wastes: waste paper, glass, cartons, plastic bags	Daily life wastes: waste paper, glass, cartons, plastic bags
4.	Activities to take care of the trees in the factory	Watses has the origin from plants such as leaves, dry branch, etc.	Watses has the origin from plants such as leaves, dry branch, etc.
5.	Activities of waste water treatment system	Dry sludge	Dry sludge
6.	Activity maintenance for machinery and equipment, offices and workshops	Hazadous watse	Hazadous watse

b. *To assess the load of watse, pollution characteristics of the sources of the solid* waste *in the operation stage of the project*

[1]. The industrial solid wastes

The hazardous industrial wastes

The hazadous solid wastes in the coffee processing process before and after the project are estimated in the following table:

(The estimates of the hazadous wastes for the new project are based on the data of the existing plant, according to the capacity of the existing / new project).

Table 61 Code, type and quantity of the hazadous wastes araising the project

No	Name of wastes	Quantity *(kg/năm)*		CODE
		The existing plant	The Phase 3 plant	
1.	Waste oil	635	279	17 02 03
2.	Chemical cleaning cloths	918	404	18 02 01
3.	Fluorescent bulbs	315	139	16 01 06
4.	Battery	68	30	16 01 12
5.	Office printing cartridge box	57	25	08 02 04
6.	Chemicals & mixture of laboratory	886	390	19 05 02

No	Name of wastes	Quantity *(kg/năm)*		CODE
		The existing plant	The Phase 3 plant	
	Chemical Waste			
7.	Waste package of types hazardous components	2.836	1248	18 01 01
8.	Welding rod has the hazardous waste components	38	17	07 04 01
9.	The welding slag with the hazardous components	17	7	07 04 02
10.	Used abrasive objetcs with the hazardous components (grinding stones, sandpaper ...)	80	35	07 03 10
Total		**5.580**	**2.574**	

Source: The register book of waste resources of hazadous waste 80.000271T

The non-hazadous industrial wastes

The non-hazardous industrial solid wastes of the company are mainly coffee grounds, ash from coal burning, sludge from wastewater treatment processes ..., are presented in the following table.

Table 62 Listing and volume of the non-hazardous wastes during the coffee processing of the existing plant and the Phase 3 plant.

No	Name of wastes	Volume (kg/year)		Treatment methods
		The existing plant*	The Phase 3 plant	
1.	Compressed sludge	5.155.200	2.268.000	*Thuận Điền Construction - Trading - Services Fertilizer Company Ltd of Long An*
2.	Ash	2.457.000	1.810.000	
3.	Sack	934.600	411.200	Sell scrap
4.	Silic sand	1.753.200	771.408	Give to Bến Lức water supply and delivery urban services company
5.	CTRSH	18.000	7.920	
6.	Lathing rod	836	368	Sell scrap
7.	Nilon	19.152	8426	Sell scrap
8.	Carton paper	5.844	2.571	Sell scrap

*Source: * The register book of waste resources of hazadous waste 80.000271T*

The company has conducted to test the composition of ash, compressed sludge from waste water treatment system *(according to the certified license in the appendix)* with the result as:

- Fly ash: Not identifie the As, Hg, Cadimi, Crom, Zn
- Sludge: As – Not identify, Hg – Not identify, Cd – Not identify, Cr – 0.32; Ni – 3.19; Zn – 37.54 => All parameter under the limited.

So, fly ash and pressed sludge from the waste water treatment system not hazardous waste.

For the sludge, the company drier and take to boiler for burning, beside that we also contract to third party for sale as the material of fertilizer in case the drier breakdown.

For the fly ash, the company make the contracted with the authorized company for the collecting and treating.

[2]. The daily life solid wastes

The daily life solid wastes of officers and workers at the factory have the components including plastic bags, cardboard, waste paper, glass, food scraps, etc. may be collected and buried for the hygiene.

The estimates of the total waste load generated for the project: 7.920 kg/year (see details in **Table 62**)

3.1.3.4. The impacted sources not related to the waste substances

The impacted sources not related to the waste substances in the operation stage of the project is presented in the following table.

Table 63 The impacted sources not related to the waste substances in the operation stage

No	Impacted sources	Characteristics, Scale
1.	Biodiversity change, ecosystem degradation under the water	Negligible impacts, interrupted, local
2.	The spreading rain water in the entire factory area	
3.	The sedimentation of the river of the project area	
4.	The GHG generation from equipment running	

The company have the program to reduce energy for all activties as the activites to protect environment

3.1.4. The assessment of the impact of project activities to the economy and society in the area

The expanding project of coffee processing of Café Outspan Vietnam Ltd goes in the long-term and stable business and will have impacts on the economy and society in the are as follows:

[1]. The beneficial effects

- The project will contribute to promote the steady development Nhựt Chánh Industrial Zone;
- Provide product and service needs of coffee for export to foreign markets, thereby creating a stable power output for the bean coffee market of Vietnam;
- Create a stable income for the workers and pay the budget for Long An Province through taxes and rents;
- The project generates considerable income for the state budget, not including tax revenues export goods and equipments;
- On social -cultural fields, the production activities of the Company will contribute to stabilize people's life, contribute to poverty reduction, improving infrastructure, education and training of workers through industrial activities which improve the awareness among the people.

[2]. The harmful effects

Along with the benefits of economic –social growth, the project will cause some negative effects such as changing living conditions, population growth mechanism in the project area ...however, these effects are very small and can be considered negligible.

3.1.5. The assessment and estimate of impact to cause risks, incidents of the project

3.1.5.1. Risks in the construction of the project

[1]. Labor accidents

In general, the problem of labor accidents can occur in any stages of the construction stage of the project. The cause of the incident cases of occupational accidents on construction sites are mainly determined as follows:

- Traffic accidents can occur when workers go on the road to the construction site, left the workplace. This accident types can also occur on the construction site by the means of construction and transportation of materials caused to workers.
- The construction works on the high floor can cause a higher labor accidents falling out the scaffolding, transportation of construction materials (cement, sand, ...) on the upper floors.
- Hardworking labor, continuous and long-term working time, the working environment in the construction process mainly cause bad effects to the health of workers. Several types of acute pollution depends on the time and level of potential effects fatigue, dizziness or fainting of workers while labor.
- The accident in rainy days of laborers on construction sites is higher due to the slippery ground, easy to slip and fall, soft ground, subsidence easily cause problems for humans and other construction machinery. Wind storms cause to break wires.
- The installation work, construction and transportation process of materials with the density of vehicles, noise and vibration can cause the high labor accidents, traffic accidents.
- Due to the negligence of workers, lack of labor protection equipment, or the awareness about strict compliance with rules and safety of construction workers.

Thus, if the risks of labor accidents and traffic accidents occur, they will cause the huge impact on the health and lives, the enormous loss of morale for the families of people who have accidents. So safety issues for construction workers involved in the project are all particularly interested in.

[2]. Fire and explosive incidents

The fire and explosive incidents in the case of transport and storage of raw materials, fuel [DO], or the lack of safety for temporary power supply system can cause the damage during the construction. The causes of the fire are:

- The inventories of raw materials, fuel for the production (coal, DO / FO oil, etc.) are the sources of fire. When problems occur, they can cause the human losses, economy and environment;
- Power supply system for the machinery and construction equipment can cause convulsions, short circuit, fire, etc. and cause the damage of economy or labor accidents for workers;
- The use of heating equipment in the construction (heated, molten bitumen to burn asphalt road, etc) may cause fire and burns if there are no preventive methods.
- The heat pipelines can leak simultaneously with the high pressure piping system caused the explosive economic losses and people.
- Make sources of exposure to the explosive fire as the fuel tank.

Because these problems can occur at any time, the investor will ensure the application of preventive measures to effectively control in order to minimize the negative impacts.

3.1.5.2. Risks in the operation stage of the project

[1]. Incidents of labor accidents

Labor accidents can occur when the plant is operating. The main causes are:

- Negligence of workers in operating the machinery, equipment and electricity;
- Health status of workers is not good: falling asleep in working, overwork stun, etc.

Incident probability depends on the sense of observance of rules and regulations of labor safety of workers in each specific case. The effects can cause on the human: injury, occupational disease or damage lives. When the accident occurred , it would have dire consequences on human lives as well as the psychology of workers and many other related issues. Therefore, the Company will strictly observe the regulations on occupational safety.

[2]. The fire and explosive incidents

Fire and explosive incidents can cause the damages to the natural environmental elements (soil, water, air) to further damages to the property and can affect the lives of people. The origins of the type of problem can be caused by the following reasons:

- The system power supply for the plant can tuck and cause the explosion, etc.
- The heated pipelines can be leaked simultaneously with the high pressure piping system which causes the explosion to make the losses of the economic and people.

[3]. Incidents caused by the inefficient waste water treatment systems

As stated above, all the waste water generated in Phase 3 will be collected and treated at the waste water treatment plant of the factory (with the designed capacity of the expanding phase is 750 m^3/day and night). The waste water will be treated to meet the prescribed the waste water receiving threshold of Nhựt Chánh Industrial Zone. When the waste water treatment system operates inefficiently, the entire amount of the waste water with the high concentrations of organic matter, temperature and significant color will be discharged directly to the industrial zone treatment system which can cause the shock for the system, reduce the biodegradable efficient system and leads to the inefficient processing in the design, the waste water does not meet the effluent standards to affect the quality of the water receiving source (Vàm Cỏ Đông River).

[4]. Incidents caused by the inefficient exhausted fumes treatment system

When the exhausted fumes treatment system operate inefficiently, all pollutants (dust, odor and solvent vapor, inorganic) will influence the region directly to the labor of workers and workers work in the factory. In addition, the amount of pollutants released into the area around the plant.

[5]. Incidents by the transportation and storage of DO fuel oil and coal

The process of fuel storage and transportation can lead to the fallen and broken incidents to cause the serious damages to the route. The incidents include:

- Traffic accidents on the route of transportation;

The fire incidents of the inventory of raw materials and finished goods.

The incidents, if they happen, they will cause the serious impacts on the environment and people and potentially cause the death if not carefully controlled.

[6]. The leakages of raw materials, fuel, chemicals

The eakages of raw liquid or gaseous fuels occurred will cause great harm (especially leakage of gaseous compounds) such as toxic to humans, animals and plants, cause the fire and explosion, etc. The kind of incidents can lead to the huge economic and social losses as well as the ecology of the region and surrounding areas. The origin of this type of issue arising from the power station area.

The influence level of decomposition gases to the human body depends not only the changes the level of toxins but also levels of infection in the body. Monitoring indicators to assess the impact of this is TWA (Time Weighted Average concentration). The decomposition of leaked harmful gas as follows:

Table 64 TWA index of the decomposition gases

Components	**TWA** *(ppm)*	**Harm**
SO_2	2	Suspension smell
HF	2	Suspension smell
SO_2	5	Suspension smell

3.1.5.3. The overall assessment of environmental impacts caused by activities in the operation stage of the project

The environmental impacts in the operation stage of the project with the existing plant can be summed up briefly presented in the following table.

Table 65 The general evaluation of environmental impacts in the opration stage of the project.

No	Activities, impacted sources	Impacts				
		Air	Water	Soil	Biological resources	Economy-Society
1.	Exhausted fumes	+++	+	+	+	++
2.	Waste water	++	+++	+	++	+
3.	Solid watste và hazadous watse	+	+	++	+	++
4.	Production activities	+++	+++	+	+	+
5.	Daily life of employees	++	++	+	+	++
6.	Storage activities of H/động lưu trữ waste, pollutants	+	+	+	+	+
7.	Waste treatment	++	++	+	+	+

Notes: *(+) : The harmful impact at the low effect;*
(++) : The harmful impact at the medium effect;
(+++) : The harmful impact at the strong effect.

Comments: In general, Café Outpan Vietnam Ltd implements the Phase 3project, the impact of waste water on the environment remain a matter of most concern, then are the sources of emissions (such as mentioned above). The negative impact of the project is generally assessed in moderation, does not cause serious impact to the economy, society and ecological systems.

The most concerned negative impacts in the operation stage:

- Pollution of surface and ground water due to the production waste
- Pollution caused by dust, noise, smell from the coffee roasting processes.
- Air pollution caused by the emissions from fuel combustion (the boiler exhuasted fumes)
- Surface and ground water pollution caused by the daily life and production solid waste (the non-hazardous and hazardous solid waste).

The most powerful impacted objects:

- Air environment around the factory.
- Surface water environment of Vàm Cỏ Đông River.

3.2. COMMENTS ON DETAILED LEVELS, THE RELIABILITY OF ASSESSMENT RESULTS AND ESTIMATES

3.2.1. The methods used to assess environmental impact

[1] Statistical Method

Collect and process the data of the meteorological conditions, hydrology, socio-economic development in the area plant.

[2] Methods of field sampling and laboratory analysis

Determine the parameters of the current status of air quality, water, noise in the project land and the existing plant.

[3] Identification method

Determine the impact on the components of the project environment.

[4] Quick assessment method

Estimate pollutant loads from the activities of the project according to the pollution factor of WHO and national experts.

[5] Identical method

Determination of pollution levels of the components of the project based on similar projects have been implemented.

[6] Comparision method

Assess the impact on the basis of comparison with the existing standards, environmental standards.

- QCVN 01:2009/BYT: National Standard on the quality of water and food.
- QCVN 02:2009/BYT: National Standard on the quality of daily life water.
- QCVN 03:2008/BTNMT: National Standard on the permitted limit of heavy metals in the ground.
- QCVN 05:2013/BTNMT: National Standard on the quality of the ambient air.
- QCVN 06:2009/BTNMT: National Standard on the hazardous substances in the ambient air.
- QCVN 07:2009/BTNMT: National Standard on the hazardous substance threshold.
- QCVN 08:2008/BTNMT: National Standard on the quality of the surface water.
- QCVN 09:2008/BTNMT: National Standard on the quality of the underground water.

- QCVN 14:2008/BTNMT: National Standard on the daily domestic waste water.
- QCVN 19:2009/BTNMT: National Standard on the industrial exhausted fumes with the dust and inorganic substances.
- QCVN 20:2009/BTNMT: National Standard on the industrial exhausted fumes with the inorganic substances.
- QCVN 26:2010/BTNMT: National Standard on the noise.
- QCVN 27:2010/BTNMT: National Standard on the vibration.
- QCVN 50:2013/BTNMT: National Standard on the hazardous threshold with waste sludge from the water treatment.
- Standard of receiving waste water of the waste water treatment system of Nhựt Chánh Industrial Zone.

[7] Listing method

Make the correlation relationship between the impact of its activities of the project on the issues of environmental impact. Include:
Construct the different phases of the project, based on which content-oriented research detailed impacts.
List the environmental impact caused by the project construction activities, operation of the project, lists the impact on the socio-economic environment.

[8] Matrix method

In the matrix, the affected factors listed on the vertical axis and the development activities are listed on the horizontal axis and vice versa. This approach can show us a causal relationship between the different impacts of environmental factors simultaneously.

3.2.2. Assess the reliability of the methods

The reliability of the EIA methods are presented in the following table.

Table 66 The reliability of the EIA methods

o	EIA method	Reliable level	Cause
1.	The statistical methods	Medium	Based on the statistical data of local, data and measurement data
2.	Sampling method in the field and laboratory analysis	High	Based on sampling equipment, analysis equipment, analytical methods, etc.
3.	Identification method	High	Based on the data, the data collected
4.	Quick assessment method	Medium	Based on the ratio of pollution caused by WHO (not really suitable to Vietnam's conditions), old methods
5.	Indentical method	High	Identify all environmental issues, as well as waste-specific assessment of each source of emissions
6.	Comparasion method	High	Analytical results with high reliability
7.	Listing and matrix method	Medium	Methods of evaluation only semi-quantitative or qualitative, based on people's subjective evaluation

The report for the project "Café Outspan Vietnam Ltd, Phase 3 expansion with the capacity of 5,250 tons/year" in Lot L2, Nhựt Chánh Industrial Zone, Nhựt Chánh Commune, Bến Lức Town, Long An Province by Café Outspan Vietnam Ltd with VITA company with the functions of a consultant on environmental field, staff and collaborators have much experience in the field of environmental consultancy. Therefore, the possible impact of the project is forecasted relatively complete and accurate.

1. 3.3 PREVENTION METHODS, CONTROL AND REDUCE THE NEGATIVE IMPACT OF THE PROJECT

3.3.1. Prevention methods, control and reduce the negative impact of the project

- Prepare of detailed construction plan, using professional installation contractors, maximum mechanization to accelerate construction.
- Require the constructor unit combines with the investor, Café Outspan Vietnam Ltd to organize execute at work during every construction item to manage and to make fully resposibility for construction process.
- Apply the rolling construction methods in each specific category, proceed rapidly in order first - then between the rational construction of basic works to ensure short construction time, maintenance ensure traffic safety and minimize the harmful effects caused by dust or gas, ... between the areas of construction on site;
- Plan the construction schedule and reasonable staffing, sequentially, to avoid overlapping between the stages of construction and installation of equipment for line capacity expansion.

3.3.2. The environmental protection methods during construction items of the project.

- Café Outspan Vietnam Ltd will require the contractors to organize the unit construction to apply specific measures for the environmental protection during undertaken construction works;
- Arrange appropriate transportation and travel, limited transit passes over the region's manufacturing plant exists, no transportation and construction jobs have a high noise level at night, or reduce speed when passing through residential areas, mounted silencers for vehicles;
- Make fences to isolate the dangerous areas during the construction stage;
- Use the construction supervision of contractors to ensure the progress, construction techniques to ensure the absolute safety in the construction.
- Use toilet system's existing processing plant at present, required the construction of items used to expand the toilet system the entire waste water of workers collected in handling waste water treatment system capacity of Café Outspan Vietnam Ltd.

3.3.3. The pollution control methods in the operation stage of workers

- Priority selection of construction contractors which have a staff of proffesional and experienced construction workers.

- To concentrate meals for workers at sites to ensure the requirements of sanitation and food safety;
- Require all construction and equipment installation contractors engage to supervise the staff to conduct the environmental protection in working (Waste collection, cleaning up the construction site when the job done). They all concretized by the contractual commitments.

3.3.4. The labor safety methods during the construction stage of the project

- The occupational safety and environmental protection of Café Outspan Vietnam Ltd will be the representative who is responsible for the safety issues and the environment during the construction of items and equipment installation for the project;
- Regulation-specific rules to work at the site, include:

  + Rules on in and out entrance at the site.

  + Rules onlabor protection clothes;

  + Rules on uses the crane lifting device.

  + Rules on about electricity safety.

  + Rules on traffic safety.

  + Rules on fire and explosive safety.

  + Rules on working in high place, in close space.
- Organize common rules for workers in different forms in different rules on boards hanging at the site, inspecting and reminders at the scene, etc.
- Monitor occupational accidents and determine causes of accidents in time and apply corrective measures in time to avoid similar accidents.
- Install of signboards across the working area of the crane lifting.
- Make the system guide road signs, traffic safety billboards in the public sector site.
- Install the fire banning signs in areas to cause an explosion (storage flammable materials, electrical systems, etc).
- Equip with the fire fighting vehicles in inventory (the foam bottle, CO_2 bottle, sand, water meters, the stage of mechanical shock, etc).
- Require the contractor units provide full and exactly types of equipment and labor protection for workers.
- Strengthen inspection and remind workers to use protective equipment when they are working. Uncompromise suspension for workers with lacking safety.
- First-aid cases of simple occupational accidents and first -aid cases of serious accidents before transfer to hospital; Regulate the individual reponsibilty in each case.

3.3.5. Methods in preventig ans reducing the negative impacts in the operation stage of the project

3.3.5.1. Methods to control and reduce the air pollution

Based on the identification the pollution resources and estimates of impact mentioned in Chapter 3, methods to reduce the negative impacts in the operation stage of the project is listed as follows:

Table 67 Methods to prevent and reduce the negative impacts in the operation stage

No	Activities	Methods to prevent and reduce	
		The existing plant	**The Phase 3 plant**
1.	The exhausted fumes of the roasting oven (Roater)	Handling systems include: dry cyclone + thermal oxidation (combustion)	Handling systems include: dry cyclone + thermal oxidation (combustion)
2.	The exhausted fumes of the boiler	The system of dust filter electrostatic precipitator	The system of dust filter electrostatic precipitator
3.	Exhausted fumes from the standby generator	The capacity 2 X 1.500 KVA, using DO oil fuel S <0.25%; Emissions through the 10 meter-chimney	The capacity 2 X 1.500 KVA, using DO oil fuel S <0.25%; Emissions through the 10 meter-chimney
4.	Dust from the coffee transportation	The asphalt paving for all internal roads, yards	The asphalt paving for all internal roads, yards
5.	The air from operation of the waste water system	Use Biogas fire nozzles	Use Biogas fire nozzles

[1] The specific methods to prevent and reduce the negative impacts of the exhausted fumes of the roasting oven

As mentioned above, oven roasted coffee chain's expansion capacity is 3,000 kg/hour, the exhausted fumes components are mainly dust and volatile organic compounds. Apply technology to treat exhaust fumes from the roasting oven is imported from overseas, comes with oven roasted system and have significant investment costs. In existing production lines, the Outspan coffee company has applied this measures and effective treatment of this waste gas treatment is quite good, in expansion line the company will continue to apply that treatment and specific processing content as:

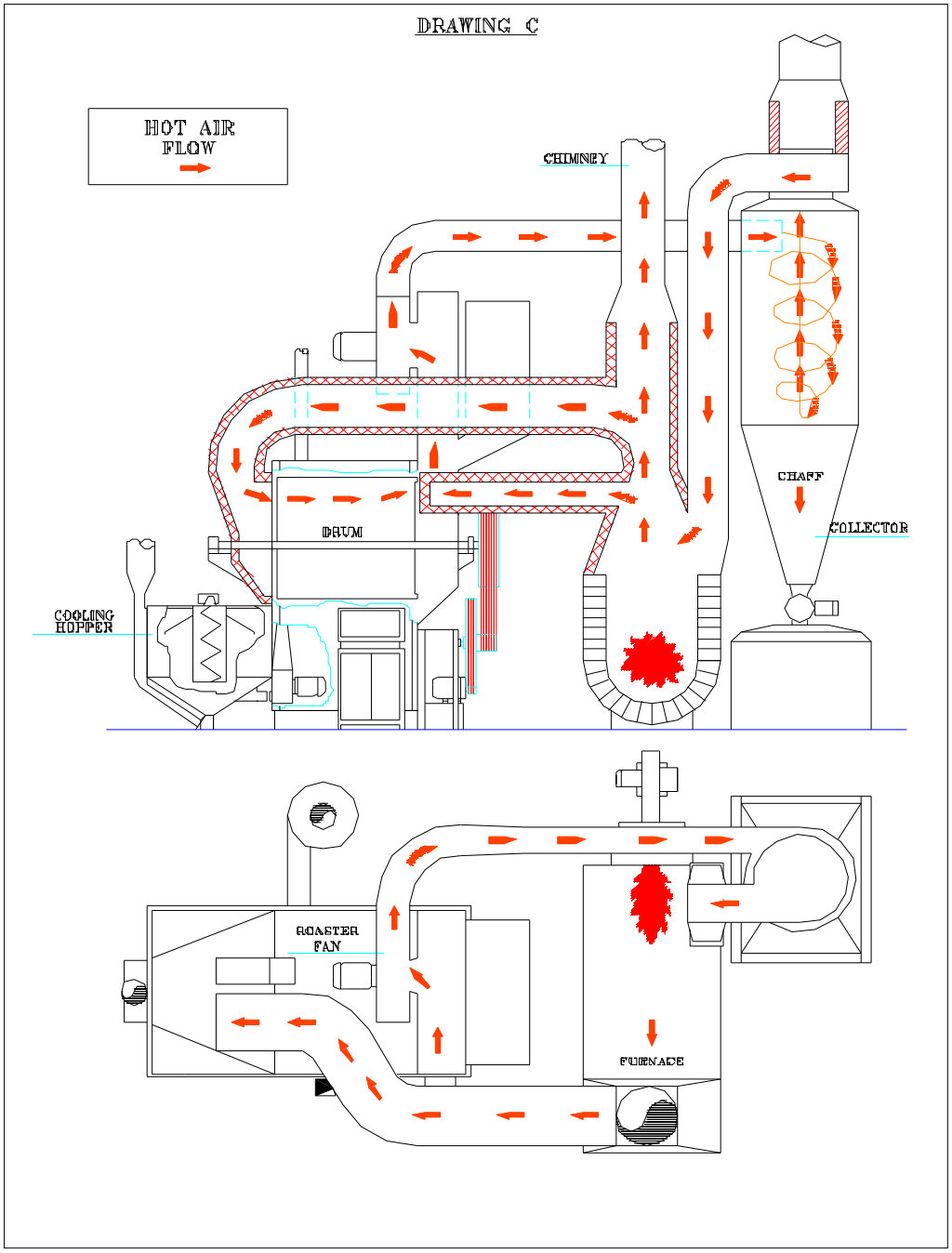


Figure 6 The flowchart the treatment system of dust and volatile organic compounds.

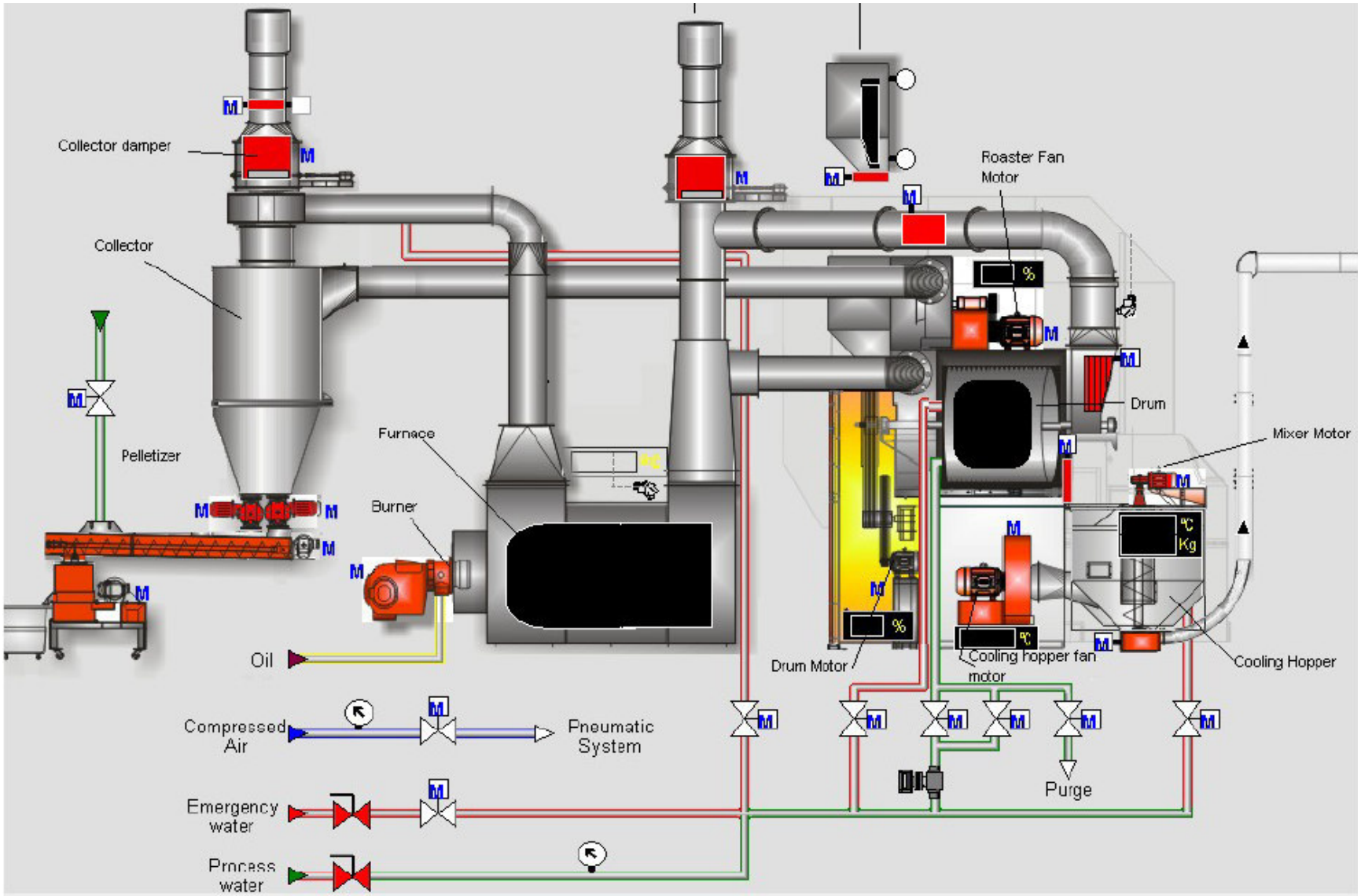


Figure 7 The diagram of the roasting oven technology and the exhausted fumes treatment system

The explanation for the treatment process

The process of roasting is done by hot air (750^{o}C), the heat used by DO fuel.

The exhausted fumes from roaster are taken to the Cyclon, to remove dust and gas stream after separating dust from cyclon continue into the combustion chamber, where the organic solvent evaporates during roasting will burned completely (at a temperature of 750^{o}C), after the complete combustion of volatile organic compounds, as these pollutants generated in the process of roasting coffee drying (dust and volatile organic compounds) was difficult to remove the gas stream.

The waste gas stream after removing the pollutants will be discharged through the chimney, part of the gas flow will lead to continued circulation oven roasted, continue the roasting process.

Acording to process technology, the exhausted fumes arise from the coffee roasting stage is treated thoroughly, dust collector cyclone very little from the system and do not contain hazardous waste. This waste is collected periodically and handling of solid waste normally.

The output exhausted fumes of the coffee roasting process after treating meet the national standarc on the industrial exhauted fumes QCVN 19:2009 / BTNMT.

Thus, the proposed height of the furnace chimney roasting phase capacity of at least 15m (it is higher than the closest construction barrier).

Table 68 Equipments for the exhuasted fumes treatment system of the roasting oven of the project

No	Equipments, items	Nature	Quantity
1.	The fire nozzles	Heatproof alloy	01
2.	Chimney	Rustless steel	15m
3.	The received dust Xyclon	Rustless steel	01
4.	The suction fan	2,5 HP	02
5.	Control cabinet	-	01

The effects of methods of controllingthe exhausted fumes of the roasting oven

The mentioned effectiveness of pollution control methods of the roasting oven for the Phase 3 is confirmed by the results of existing measurement of the existing system. The results shown in 2 monitoring stages of the exhausted fumes of the roasting oven are measured by the licensed units (VIMCERT 026), namely as follows:

Table 69 The concentration of pollutants from the boiler system after treating

No	Parameter	QCVN 19:2009/ BTNMT	12/2015		03/2016	
			Boiler with 18 tons/h	Boiler with 25 tons/h	Boiler with 18 tons/h	Boiler with 25 tons/h
1.	Temperature	-	98	110	100	120
2.	Dust	**200**	112	105	199	165
3.	SO_2	**500**	86,2	98,5	20,8	25,2
4.	NO_x	**850**	45,6	51,4	496,5	333,5
5.	CO	**1.000**	486	512	446,6	453,9

(Source: Center of Consulting of Safety hygiene and Environmental Consulting Technology COSHET)

The results showed that the methods for the emissions of roasting oven are appropriate and effective, the parameters are achieved with the current national standard QCVN 19: 2009 / BTNMT.

[2] The preventive methods to minimize the negative impacts of the exhausted fumes from the boiler

As mentioned, in the expanding phase, Café Outspan Vietnam Ldt will use 1 boiler with the capacity 16 tons of steam/h using the coal fuel and coffee grounds.

Similar to the existing plant, the Phase 3 project with the similar technology and fuel, the plant will invest the exhausted treatment system of the boiler with ESP technology as follows:

The explanation of the treatment process

The ESP system has the function to proceed the dust in the exhausted fumes stream with the performance up to 99.8%.

The principle of operation of this device are summarized as follows:

The ESP equipment uses the electrostatic forces to separate the dust from the exhausted fumes stream, basiclly insludes the 2following sectors:

- The discharged electrodes (-) regitrodes,
- The deposition electrode (+) collecting electrodes,

The discharged electrodes are arranged reporter at the center of each pair of deposition electrodes.

A DC voltage fields generated by the high voltage equipment connected to discharged electrodes, while the electrode plate obtained grounding.

Under the electric field is created (with the very high voltage), the ion flow will move sharply, collisions with dust particles, as well as the ionized particles (-),

After ionized (-), under the effect of the electric field, the dust particles and gas lines will move about collecting electrode plate, depending on the nature of the dust and the process will continue to shake the dust periodically on the electrode

plate deposition, dust is collected on containers, packaging, temporary storage and transfer to the functioned unit to collect and treat.

Some form of dust adhesion properties, will cling to the door leading into the gas system, as the distribution of air flow in ESP equipment fail as the design, to eliminate this negative effect must always keep the door gas distribution systems clean of dust by shaking off identical periodical dust.

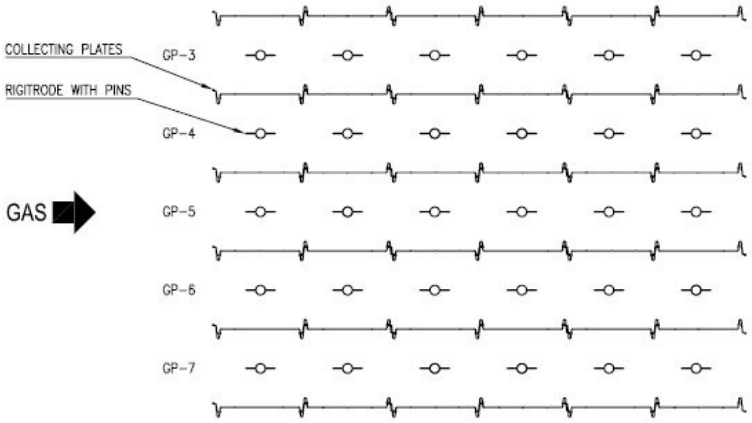


Table 70 The system devices for distributing gas boiler with the capacity of 16 tons/h.

No	Equipments, items	Tính chất	Số lượng
1.	Chimney	Rustless steel	01
2.	The exhaust fans	20 HP	01
3.	ESP system		01

The effectiveness of pollution control measures gas boiler

With the existing treatment technology and methods to reduce the pollution, Café Outspan Vietnam Ltd can control the source of these emissions effectively to ensure the output emission after the treatment systems to meet environmental standards of Vietnam (QCVN 19:2009 / BTNMT). The effectiveness of this method is expressed through the quality of the output of the existing exhausted fumes treatment system, specifically mentioned in the following table:

Table 71 The concentration of pollutants from the boiler system after treatment

No	Parameter	QCVN 19:2009/ BTNMT	12/2015		03/2016	
			Boiler with 18 tons/h	Boiler with 25 tons/h	Boiler with 18 tons/h	Boiler with 25 tons/h
1.	Quantity	-	-	-	-	-
2.	Temperature	-	98	110	100	120
3.	Dust	**200**	112	105	199	165
4.	SO_2	**500**	86,2	98,5	20,8	25,2
5.	NO_x	**850**	45,6	51,4	496,5	333,5
6.	CO	**1.000**	486	512	446,6	453,9

(Source: Center of Consulting of Safety hygiene and Environmental Consulting Technology COSHET)

[3] The preventive methods to reduce the negative impacts of the standby generators

In the expansion phase, the company will invest 2 standby generators with the capacity of each 2,250 KVA existing machine if something goes wrong on the electrical grid. If the generatord operates continuously, the pollution sources mainly is NO_x, but this is the nature of the problem often should load of air pollution caused by NO_x remains in the load capacity of the environment. However, to ensure the safety of the environment, the company will use the fuel to run the generator with fuel with sulfur content and low carbon residue. With the above criteria, the Company will use diesel oil with sulfur <0.25% would help to limit the status of environmental pollutants and do not need treatment. The current generator is 12 meter- chimney.

To the noise of the generators:

- The company has arranged the generator in a separate area, which is located in the soundproof chamber.
- Regular inspection and maintenance of machinery and ensure the work well.
- Cleaning and maintenance lubricants investigation, viscous, hoses, the system to reduce friction caused loud noise.

[4] Control the dust pollution from the transportation of raw materials

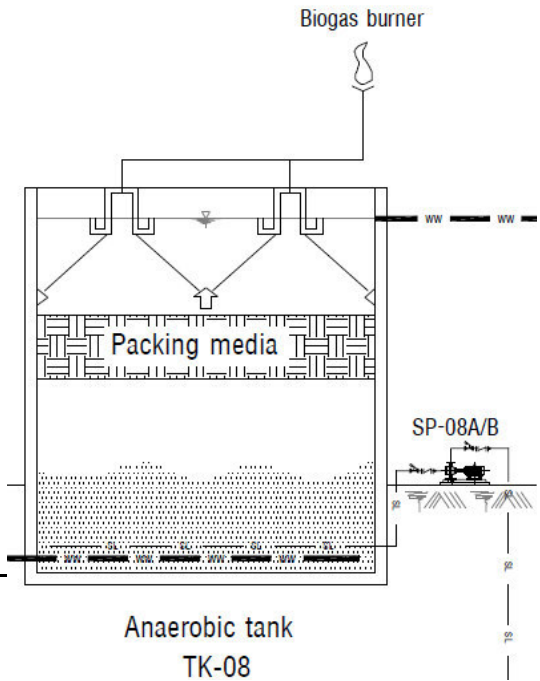
Minimize the dust from the traffic vehicle:

- Concrete yard area and the internal sugar factory site, away from the dust generated when the vehicle entered the car out on the raw materials, finished products;
- Use water spray system for humidifying the road at times dry and hot to curb emissions from road dust;
- In addition, the company will land plans for minimum area planted grass and trees in the right position to reach the green area of at least 20% of the total surface area of the plant to cool landscape plant and prevent dust dispersed into the surrounding environment.
- Not the car running while waiting for import, export of raw materials and products, etc.

[5] Control the the smell pollution, exhausted fumes for waste water treatment system

Odour does not come across the treatment works which only arise in the collection pit, anaerobic tank. The decay reaction of organic sunstance above releases CH_4, NH_3, H_2S gas, etc. these are causing the smelling and will affect air environment quality.

The smell of gas is the product of anaerobic decomposition, so to limit this process, in the air conditioning system arranged continuous gas supply to avoid odors.



Calculate the waste water system at the ventilated location downwind, away from production areas and the main office.

Gas arising fromthe anaerobic biological treatment (bio gas) is collected and burned with the fire nozzles, specifically shown as follows:

3.3.5.2. The methods to control and reduce the water pollution

[1] –The waste water from production

[2] –The waste water from daily life

[3]- The spreading rain water

As identified, the calculation and evaluation of emissions in Chapter 3, Section 3.1.3.3, the waste water sources generated when the project goes into operation need to require the control pollution methods, specifically showed as follows:

[1]. The industrial wastewater from the production process

Café Outspan Vietnam Ltd has the plan to build the focused sewage treatment plants focus to treat all waste water from the production process and activities for chain extension. The designed capacity of the existing plant system is 1,750 m^3/day and night (*The effectiveness was confirmed in a report certifying the completion of the Phase 2 plant, 2013)*, in the expansion phase, the company will invest more system 1 new waste water treatment with the capacity of 750 m^3/day.

The waste water from the production process is calculated in the section *3.1.3.3* page 71 and 72 as follows:

- Daily domestic waste water with generated flow about 10.5 m^3/day and night;
- The waste water production (arising mainly from the concentration of coffee products): The generated flow approximately 446 m^3/ day and night.

Based on the efficiency of the waste water treatment system has operated in the Phase 2 project with the capacity of 1,750 m^3/day, the company is currently applied to the waste water treatment system of the Phase 3 with the capacity of 750m^3/day and night, the process *(Figure 9, page 98)* are specific explained in the below next section.

Explanation

(The process of the production waste water with the capacity of 750 m^3/ day and night os Café Outspan Vietnam Ltd-Phase 3)

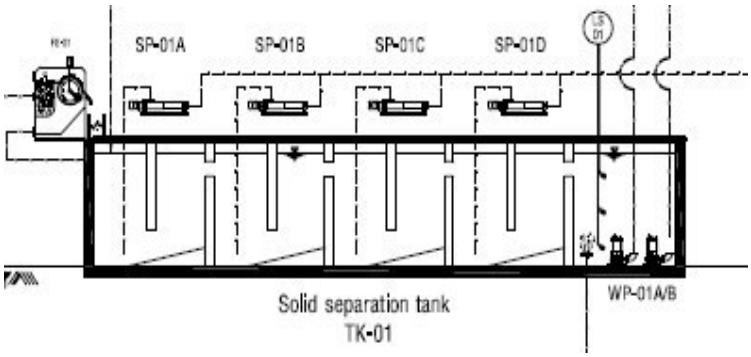
Collective tanks

The waste water from production processes, according to the pipeline is pumped to the focused tank, with a stable role in terms of traffic initially, and consistent

to the quality of waste water input, create the stability for the operating system the subsequent processing steps.

Solids separation tank

The waste water is pumped from collective tank to t solids separation tank, with 4 sedimentation drawers, the solids components in the waste water (has the large size) will slowly subside and separate from the waste stream under the effect of weight before being collected in tanks.

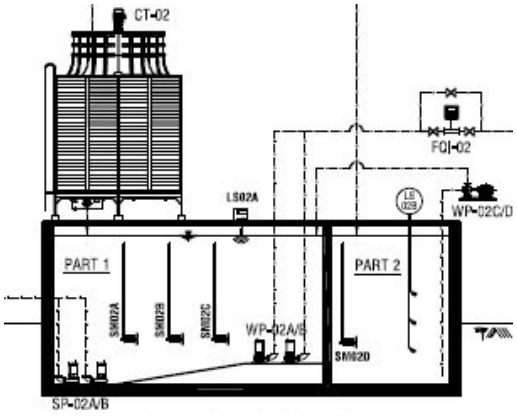


This is the important step to provide the stability and facilitate for the next process. The solids separation tank separates the coffee dregs out of the waste water. After the separation of sewage sludge continues into the balance tank, there will be a part of the sedimentation sludge, the sludge will be pumped to storage slugde tanks. The waste water in the tank will be pumped to the cooling tower to reduce the temperature, because the temperature of the incoming waste water is at high levels sometimes more than 60^{o}C, after lowering the temperature, the effluent is led to an equilibrium (this stage can overcome the problem of high temperature compared to the existing waste water treatment systems).

Balance tank

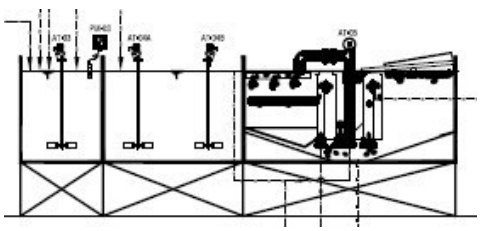
It has the function in terms of flow stability as well as the pollution load of waste water in order to create stability for the inputs of the processing system,

In this deposition process, separated solids in the effluent continues to take place, sludge, sediment in the bottom of the tank is separated submersible pumps, pump the sludge storage tank.



pH adjustment tanks, flocculation tank and flotation tank

In this tank of wastewater pH is adjusted to approximately match before joining the following physical and chemical processes, adjust pH of wastewater to improve the processing efficiency of the process of creating flocculation. In this tank, it is equipped with tracking devices pH value constantly updated automatically.



The waste water reaches pH values in the suitable range to be pumped through the flocculation tank, polymer deposition aid is added, under the agitation of forming polymer molecules and linked together to form larger bodies (flocculation) and settled down under the effect of gravity, the deposition process takes place in the dissolve air flotation (DAF) tank.

Dissolve air flotation tank (DAF Tank: Dissolve Air Flotation)

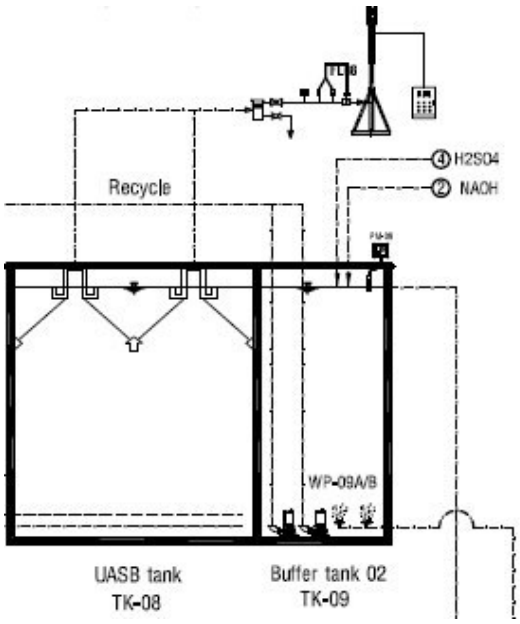
at this tank, the air which is pumped into the tank will create the super-saturated state to form the gas bubbles in the micro size, the tiny air bubbles have the stick gravity and suspended the particles in the water and the suspended particles float on the liquid surface to form a layer of floating sludge which is removed by the surface mud scraping. Heavy solids settle to the bottom of the tank was also scratched and collected in the tank and pumped by the sludge pump.

The intermediate tank 1

The waste water flows from the flotation tank to the intermediate tank where the waste water is adjusted to achieve the optimum pH process of anaerobic biodegradation (suitable pH for the anaerobic microbial activity). This is a very important step to ensure efficient handling and stability of the next process of anaerobic digestion.

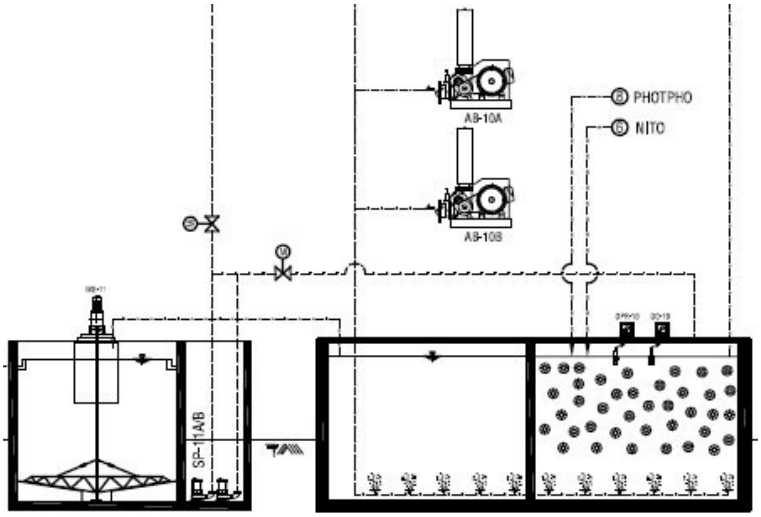
The anaerobic biological tank (UASB)

After reaching the suitable pH, the sewage is pumped into UASB tank. Here, it takes place the decomposition of organic compounds in the waste water under the action of microorganisms (sticking on the substrate) in the absence of oxygen. In anaerobic conditions, this process produce CH_4 and CO_2 along with an increase in the biomass of microorganisms (represented by the amount of formed sludge. This process is often selected to handle the waste water pollution with the high load of organic matter. The produced gas will be collected and burned through the torch.



The aero tank 1 and the sedimentation tank 1

The next step leading to the waste water is aerobic biological tank, where the equipment can be used (Figure 3) to increase the specific surface area also means increasing the number of microorganisms and aerobic activity with on the surface, along with the presence of O2 is granted by the aeration plant microbes will consume the organic material remaining in the waste water converted into biomass.



The process takes place in aerobic biological tanks can be described through the following reaction

$C_xH_yO_z + O_2$- Enzime $\longrightarrow CO_2 + H_2O + \Delta H$

$C_xH_yO_z + NH_3 + O_2$- Enzime $\longrightarrow$ Bateria cell $+ CO_2 + H_2O + C_5H_7ON_2 - \Delta H$

$C_5H_7ON_2 + 5O_2$- Enzime $\longrightarrow 5CO_2 + 2H_2O + NH_3 \pm \Delta H$

The continuous use of two-step biological treatments (anaerobic, aerobic) will improve the treatment efficiency of the amount of organic substance, especially is appropriate for the type of waste water has a high BOD_5 load.

The aero tank 2 and the sedimentation tank 1 & the sedimentation tank 2

The waste water completes from the biological treatment and continue to to be sedimentated again by the biological aero tank and the sedimentation tank 2 (which are composed and operated as a cluster 1) and treat the left organic substances.

The created-cotton tank, flocculation tank and sedimentation tank 3

The following step is the second process of flocculation (the processes also take place as in flocculation and sedimentation tank 1), the second flocculation and sedimentation process is to remove the left solid waste, sludge will be formed deposited in the sedimentation tank 3.

After the second flocculation, the waste water is directed into sedimentation tank 3, here, the solid waste will be pumped to the concentrated tank.

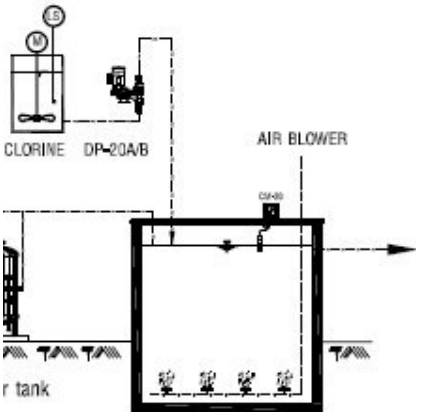
The intermediate tank 2

The wastewater in the sedimentation 3 will be pumped to the intermediate tank 2, before being filtered by the following pressure filtration system.

Pressure filter tank (sand filter and activated charcoal)

The waste water will be pumped into a high pressure filter tank, in this device has the layer of sand and activated charcoal, the left components filtered through these layers, and activated carbon layer will be absorded on the surface of colored compunds remaining in wastewater. The use of activated charcoal in the pressure filter tank will solve the problem of color in the remaining wastewater (resolve to the remaing problems in the old system)

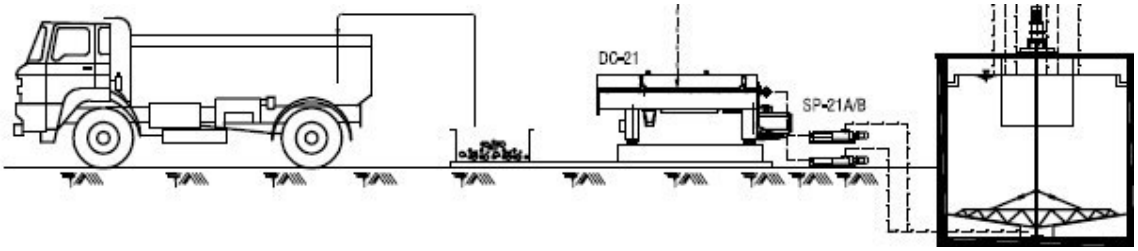
The disinfection tank



Here, the most powerful oxidised agents will be used for the purpose of oxidation these left compounds along with the antiseptic effects to eliminate microorganisms (coliform). Water after disinfection, the quality of waste water reaches the national standard of the industrial waste water QCVN24: 2008/BTNMT, shall be discharged into the system connected Nhựt Chánh Industrial Zone.

The sludge storage tank and the dewatering sludge device

The collected sludge from the tank in the system will be pumped in the sludge storage tank, the sludge dewatering filter device uses to separate the remaining water from the sludge, the remaining sludge is concentrated, packaged and a fertilizer production company peroidly collect, transport and process into fertilizer products.



The effectiveness of the waste water treatment system

The waste water after through the treatment system, with the input of the same nature and the same process technology, is operating in reality shows that the input waste water always meet the standards of the industrial zone, which is shown by the analysis results from 2012 to 2016, the specific reference in the following table.

Table 72 The concentration of pollutants in the water of the existing plant through the treatment system

No	Parameter	Unit	N_1	N_2	N_3	N_4	N_5	N_6	N_7	**Receiving threshold of the industrial zone**	**IFC EHS Guidelines on Food and Beverage Processing**
1.	pH	-	7,9	7,2	7,8	7,5	7,8	7,13	7,7	**5.5-9**	**6-9**
2.	Temperature	^oC	-	-	-	29,5	-	29,8	-	**40**	**< 3**
3.	Color	*Pt-Co*	74	50	78	47	-	86,4	38	**150**	**NA**
4.	BOD_5	mgO_2/l	39	23	44	35	<7	40	15,7	**50**	**50**
5.	COD	mgO_2/l	142	93	120	88	50	115	70	**150**	**250**
6.	TSS	*mg/l*	12	20	8	20	2	51	5	**100**	**50**
7.	Residual chlorine	*mg/l*	0,06	KPH	KPH	KPH	KPH	KPH	KPH	**2**	**NA**
8.	Oil and gease	*mg/l*	-	-	-	KPH	-	1,1	KPH	**20**	**10**
9.	Total Nitrogen	*mg/l*	11,5	9,2	14,0	11,4	7,6	1,14	19,1	**30**	**10**
10.	Total Phosphorus	*mg/l*	<0,2	0,7	<0,2	0,54	<0,2	0,105	KPH	**6**	**2**
11.	Total Coliform	*MNP/100ml*	-	-	-	300	-	2,800	-	**5,000**	**400**

Source: Center of Consulting of Safety hygiene and Environmental Consulting Technology (COSHET)-QUATEST 3

N1: Samples on April 4,2012 *N2: Samples on May 3, 2012* *N3: Samples on October 5, 2012*
N4: Samples on December 5, 2012 *N5: Samples on December 25,2012* *N6: Samples on December18, 2015*
N7: Samples on January 25, 2016

The above result shows that the existing waste water treatment system effectively treats the generated waste water from the project to meet IFC EHS Guidelines.

The diagram of the technology of the waste water treatment system with the capacity of 750 m^3/day and night

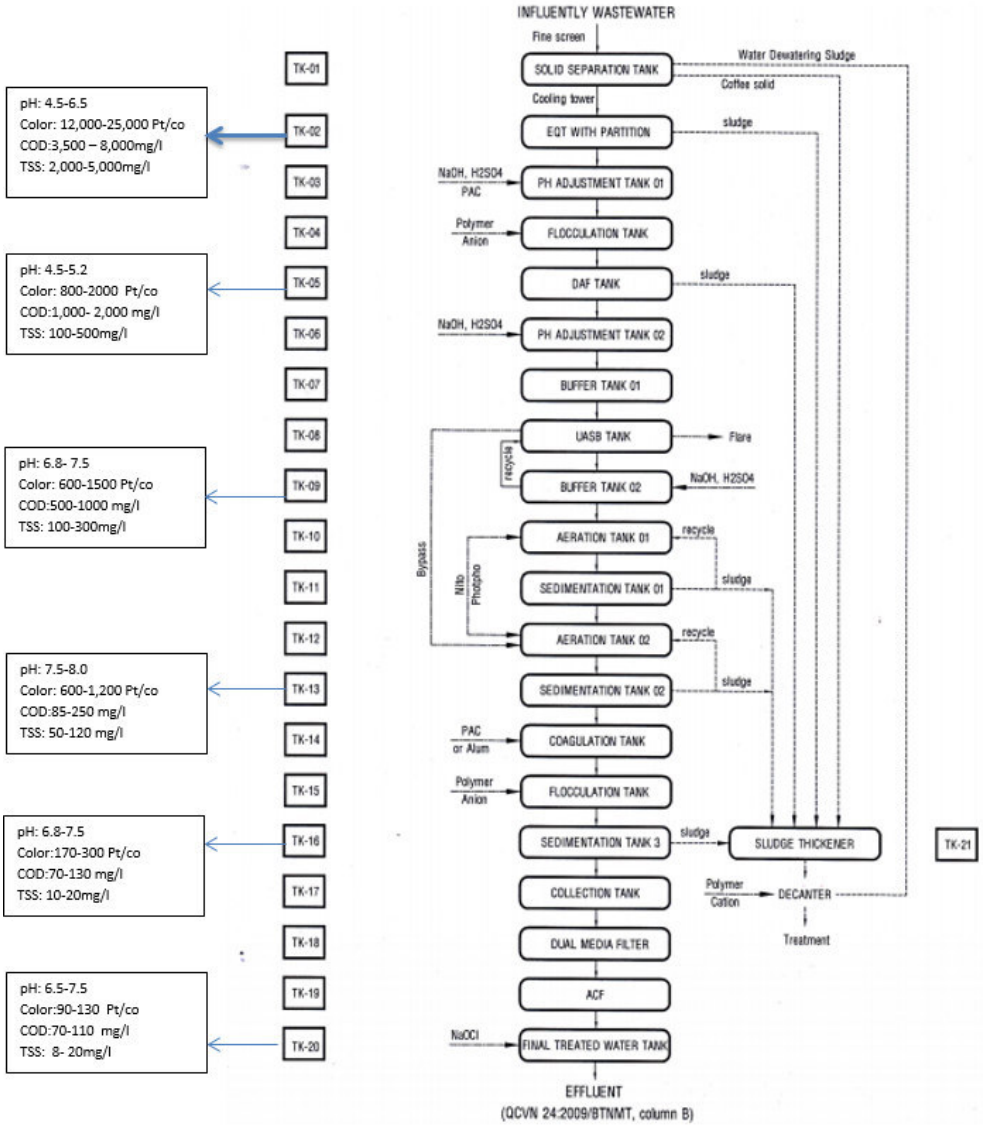
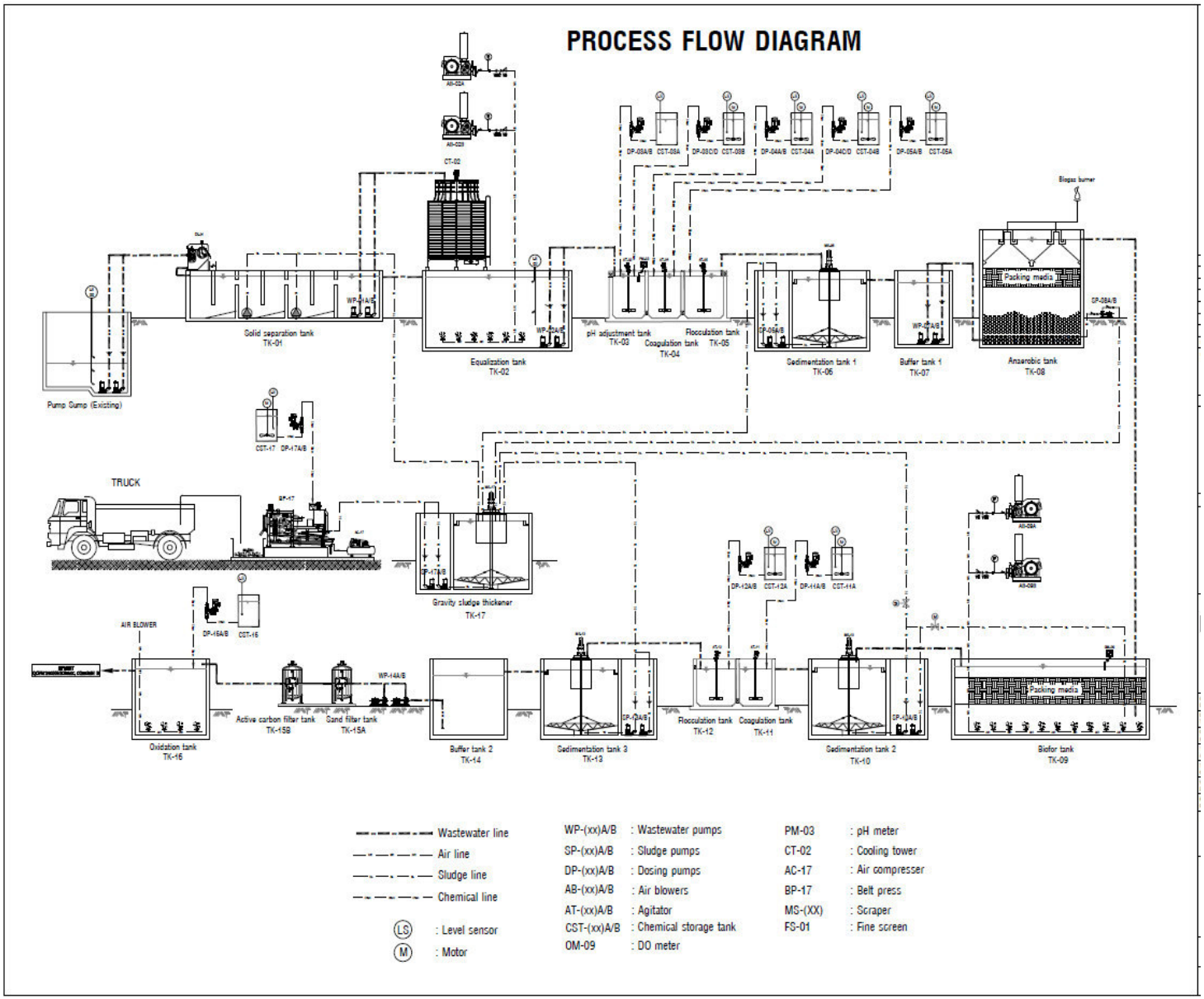


Figure 8 The diagram of process of the waste water treatment

For the Phase 3 in during construction activities, all the waste water from the worker's activities will be pumps to IPS tanks and be treated before discharge to IP tank.

Figure 9 The diagram of waste water treatment system of Phase 3



For the phase 3 in during construction activities, all the waste water from the worker's activities will be pumps to IPS tanks and be treated before discharge to IP tank.

3.3.5.3. Methods to control and reduce the solid wastes pollution

The problem in controlling the pollution caused by solid wastes, including the control and handle of common wastes in daily, non-hazardous and hazardous industrial solid waste.

Based on careful analysis of the composition and characteristics of each type of solid wastes, Café Outspan Vietnam Ltd apply the control measures mainly the following:

Common solid waste of the plant will be collected in the garbage collector arranged at the places such as offices, canteen, ... and will be collected at the concentrated center to process daily. The contractor proposes Bến Lức supply water company, is the company to collect this type of waste collection. Café Outspan Vietnam Ltd make a contract with this company to collect and transport. At the stage of Phase 3, the company also will maintain and adjust the contract value to match the composition and volume of waste generated in the reality.

To the non-hazardous wastes from the production processes such as coal ash, sludge drying pressure from wastewater treatment process, etc. will be collected and the company will sign the contracts with funtional contractors to process.

These types of wastes generated in the production processes of the plant are similar to the waste generated in the period of the capacity increase, so the nature and composition of wastes is similar. The types of generated waste in the production processes of the existing plant similar to the generated waste in the expanding phase, so the nature and composition of wastes are similar. The analytical results showed that the wastes does not contain non-hazardous substances have been inspected by the QUATEST 3 for collection and processing; especially all the coffee grounds of the existing plants and the expanding phase will be collected and used as raw materials for boilers using burning coal (the management board of Long An industial zones has a written approval of the use of wastes- attached in the appendix).

To the hazardous wastes: before entering into formal operation (trial operation in 6 months), the company will conduct the registration statistics and register the actual amount of generated hazardous waste, thereby conducting the registration procedures of hazardous waste source with the Department of Natural Resources and Environment of Long An (catalog, code can refer to existing books of hazardous wastes, (80.000271.T dated on January 15, 2015, certified the 4th).

To the temporary storage area for hazardous wastes: The company will dedicated an area to contain hazardous wastes, is the covered area, waterproof concrete floor, collecting runoff ditch, and each container for each separate code.

During the operation, Café Outspan Vietnam will always follow with Circular No.38/2015/TT-BTNMT on June 30, 2015 by Ministry of Natural Resources and Environment on the management of hazardous wastes.

Figure 10 Common solid wastes storage

Figure 11 Hazardous wastes storage

3.3.6 MANAGEMENT METHODS,PREVENTION AND AND FACING TO RISKS AND THE ENVIRONMENTAL INCIDENTS

The project will be implemented in full and strict regulations of local authorities as well as the State's to ensure labor safety and fire safety.

The operation, maintenance and production equipment repair of the project; the recording and storage of operation parameters, the equipment failure incidents, etc. will be in compliance with the rules of the manufacturer to ensure safe operation and the efficiency of the device.

The company will work closely with the local professional management about labor safety, fire prevention to be guided and trained on these tasks as well as to handle these unsafe situations about safety or fire.

After the operation line in increasing capacity, the company will be equipped and reasonable distribution of fire fighting vehicles (average CO2, sand, burlap bag, etc.) at the production departments. Reserve water source for fire fighting will be maintained regularly to ensure sufficient demand for use in situations in necessary. The means of labour safety for workers at the production location will be followed strictly with the provisions of the plant.

The electrical conductors must be calculated with reasonable cross-section with current intensity, the device must have overload protection. The high temperature region, the cord is lying underground or well-protected.

3.3.7. Management methods, prevention and facing to risks and fire incidents

To prevent the incidents, the project owner will build the project to prevent accidents as the following standards:

- TCVN 2622-1995: National Standard on fire prevention and fire fighting for home and work
- TCVN 3255-1986: National Standard on explosion safety – General requirements.
- TCVN 3254-1989: National Standard on fire safety – General requirements.

- TCVN 5760-1993: National Standard on fire fighthing system which requires the design, installation and usage.

Some things need to be implemented as follows:

- Conduct the industrial hygiene measures strictly in production workshops.
- Workers directly works in the factory must be trained and guides the fire preventive method.
- Invest the fire and exlosive fighting equipment in the cargo area of fuel storage. Layout the anti- fire and explosive system around the manufacturing sector.
- The plant will equip the fire fighting equipment to treat promptly when problems occur.
- To ensure a timely response to fire incidents, based on the system's main water supply of planning area, the company will arrange the fire hydrant D100, the distance between the fire hydrant is 15 0m / head. Traffic levels to ensure adequate water for fire fighting 15 l / s for a fire, in the case of, there are two fires occur at the same time, (TCVN2662-1995). Furthermore, to ensure the flow of water while fighting the fire ,the company will arrange the 2 stations to ensure adequate water run continuously in 2 – 3 hours.

For the education and training of fire protection

- Open regular classes to raise awareness about fire protection for all staff in the whole plant.
- Periodically perform fire protection training
- To arrange appropriate fire protection force, this force is always in a ready state.
- Must have specific fire fighting plans for each area and fire levels

Prevention the electricity incidents

- The electrical equipment calculated carefully with suitable wiring size is suitable with current intensity, and has overload protection device. High temperature areas, or underground wires are well protected;
- The electricity moteurs have protection shielding box, make sure not to have solvents, water or flammable objects fall into;
- There are regulations about industrial cleaning regimes for each machine, each part for handling each shift;
- Regularly check the temperature of the engine or transmission parts. If the engine surface temperatures rise too 1,500C must be stopped immediately and consider to detect the causes.
- All machines are guaranteed ground wire grounding with the resistance is less than 2 Ohm;
- Regularly check electricity wiring system in the factory. Electrical breakers box is always tight and are in good condition.
    - In the manufacturing process, the electrical problems leading to fires and explosions can occur due to subjective reasons such as negligence, not following the safety regulations ... or other objective reasons, such as the old

electrical wiring, malfunctioning machines, etc. When these incidents occur, the fire alarm system will let all know to evacuate workers and troubleshoot the problems, disconnect all electrical systems, aid injuries before transferring them to the hospital.

3.3.8. Management methods, prevention to face with the fuel and chemical leaking

Make a list of the risk sites

A list of risk sites includes the placement of production facilities of primarily dangerous chemicals, equipment or storage areas concentrated with dangerous chemicals production technology conditions and preservation; number of employees expected to be present in the region in areas includes: the external storage of warehouse and buildings, the area of tank oil, the coal warehouse, the warehouse of hazardous wastes, the chemical warehouse for waste water treatment system, etc.

Plan the inspection schedule and monitoring

Make the periodical inspection planning, monitoring sources of risk incidents (daily inspection, periodic inspection, sudden inspection), component inspection regulations, the liability of the inspection and supervision; regulations on keeping check records.

Measures to prevent the problem in the manufacturing process

To minimize the problem in the manufacturing process, the plant will comply with strict operating procedures and safe production. On the door test, area bucket, screw attaching the sensor error and the limit switches trip when overloaded obstruction occurs automatically switches overload relay thermal effects. Alarm incidents, technicians handle according to regulations.

Systems of inventory of fuel and materials

-Storage system materials and fuels will meet all the standards of Vietnam on technique, safety (including the cooling system, the exhalation valve, the lightning protection system, fire fighting system,etc).

-In the process to transport and import-export the fuel materials must:

-Implement strictly technical regulations and safety in the import and export of fuel materials.

-The transportation means of oil, liquid materials, .. will have legal status, as well as meeting safety standards and techniques when transported on roads.

- Investors must be cooperated with other agencies to plan for leaking incidents, organize, implement frequent emergency maneuvers.

Planning for risk prevention and response

-Evacuate all those who do not have the responsibility to the safe place;

-Extinguish any open flames, sources of heat or other irritation;

-Use the appropriate personal protection device with chemical spillage or leakage;

-Controls at the generated sources to limit chemical spill more widespread;

-Notify the departments and functional units about the hazardous waste handling, collection of spilled chemicals, etc.

3.3.9. Management methods for lightning protection

-Install the lightning protection system in the high positions in the project area;

-Install lightning and static electricity collection system, and improve the systems based on new technologies to achieve high security for the activities of the project;

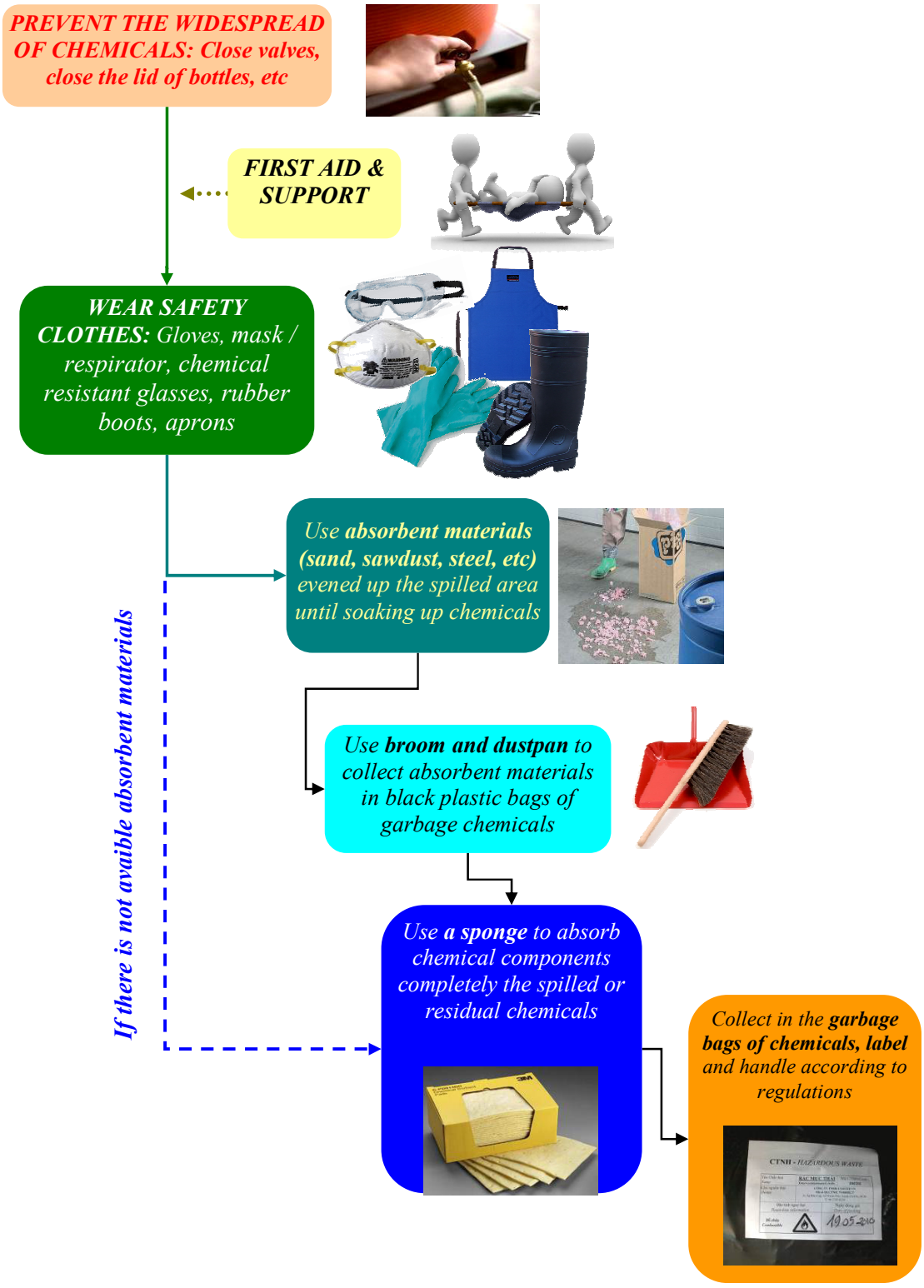
-The lightning protection system for the high positions of the plant is located directly on the roof with a radius of 100m protection include: the 5 meter-lightning collecting needles, the lighting copper drainage, copper rods, anchor cable, resistance checking checkboxes, the grounding resistors ground <Ω10 the soil resistivity of <50,000Ω/cm2. The grounding resistors shock > 10Ω when soil resistivity> 50,000 Ω/cm2.

-Install of lightning protection systems to the entire project area and each factory, warehouse construction;

-Use the type of positive lightning protection, the lightning protection heads are arranged with the height of protection is 10 - 14 m;

-Conduct the investment *according to in the progress of infrastructure construction*.

The diagram to face with the incidents



3.3.10. Work of labour safety

Labour safety is the top target of the operation of the plant. Therefore, to ensure to provide the best practice in labour safety besides the pollution control methods to reduce negative impacts on the health of workers.

The labour safety measures will be implemented by the plant:

- Interested in designing the plant and choosing the suitable equipment.
- Build up the regulations of production.
- Regulations about labour safety.
- Increase the education of awareness for all factory workers.
- Wear full protective devices such as gloves, helmets,etc. All direct production workers must comply with the regulations.
- When working in dust and toxic environment, workers will wear masks, protective masks and respirators.
- When cleaning equipment, the plant will shut down all associated valves, motors, conveyors, ... and have enough time to vent the tank, the closed devices.
- Factory builds a maintenance mode, periodic maintenance of all production equipment as well as environmental treatment equipment according to a certain frequency in order to prevent equipment failure and create a safe and stable production environment.
- When working in an environment with frequent noise, workers will be equipped with noise reduction equipment. Boots are equipped to work in the wet, slippery workplace.
- Smoking in the workshop and the specific area have put up signboards banned completely.
- To avoid any unfortunate accidents may occur, workers are not allowed to drink beer while working.
- The industrial hygiene is a top concern. Standing-machine workers must keep the machine clean in their work area.
- Day-off-work every weekend are devoted to maintenance and machinery repair .
- The plant will regularly check and replace old, damaged lamp to ensure light. Workers are received full instructions and safety measures in using of electricity, machinery, and full-equipped facilities for labor protection, periodical medical examinations to detect early risk of occupational illness professional to remedy.
- Having the health department with the tools and medicines to take care of workers on the site as well as timely aid in the event of occupational safety issues before moving to the upper level.
- Organize the health care every 6 months/time for employees working for the company, which focuses on occupational diseases.

3.3.11. Plant green trees in the factory

Trees can be extremely useful for climate and environment. Trees provide shading effects, smoke less solar radiation, vacuum and keep dust, clean the

air, reduce smoke and noise, on the other hand it also creates aesthetic landscape, creates a pleasant feeling of color to the environment.

Reflection coefficient of radiation of the treea are small, the distance from 0.2 to 0.3 while the reflection coefficient of the surface radiation of concrete and wall surface are 0.6 to 0.7.

During the day, trees absorb solar radiation and absorb water in the soil to conduct the chlorophyll by the reaction:

$$6CO_2 + 5H_2O \Leftrightarrow C_6H_{10}O_5 + 6O_2 \pm 674 \text{ calories}$$

$$\text{or} \quad 6CO_2 + 6H_2O \Leftrightarrow C_6H_{12}O_6 + 6O_2 \pm 674 \text{ calories}$$

Thus, the trees suck on thermal radiationin the day, receiving CO_2 and releasing O_2 air, while at night, by contrast, releasing heat and CO_2, but the physiological activities of trees at night are very weak. Therefore, the amount of heat and CO_2 emissions by plants at night is negligible. Therefore, the air temperature in the gardens is often lower the empty seats 2 - 3^oC, the surface temperature of the grass yard is usually lower than the surface temperature of empty yard 3 - 6^oC.

Air with dust often flows through the trees, the dust will stick to the leaf surface by the friction force and the weight falls. The air blowing through the foliage will make the drag of air flow rate decreases and dilute. Therefore, a particle will halt on the leaves. So trees have an effect to filter the air.

The range of trees planted along the road also reduces the effects of disturbances on the air. Therefore, it needs to reduce the dust from the road flying into the plant area.

Trees also reduce noise effects. Sound waves pass through the ranges of trees will be reduced energy, the sound intensity is reduced more or less depending on the density of leaves, leaf type, size and width range grove woodland. The trees range also works to reduce sound reflections. Therefore, reducing noise levels within the plant.

Therefore, to minimize the negative impacts to the natural environment, along with increase the beauty, we should take care about planting the tree fence and to increase the number of trees and plants within the plant.

3.3.12 METHODS TO ORGANIZE, IMPLEMENT THE CONSTRUCTION ITEMS, METHODS TO PROTECT THE ENVIRONMENT

3.3.12.1 A summary of cost estimates of the implementation of environmental

protection projects

Café Outspan Vietnam Ltd bases on the construction planning of the transportation system, electricity and water supply, rainwater collection systems, wastewater, solid waste industrial and separate living appropriate to manage the waste water, nature solid waste production and other activities in the project area.

The investor collaborates with the management board of Long An industrial zone, with the authorities in the evaluation of the technical design and

supervision of the collection system, the waste water treatment, exhausted fumes and the solid waste following the general environmental protection of the Environment Protection Law, and the regulations of Nhựt Chánh Industrial Zone.

The investor will timely adjust the waste treatment system to strictly enforce the commitments made in the EIA report of the project.

The cost estimates of the environmental protection projects is presented in the following table:

Table 73 Estimates of construction and installation costs for the project

No	Items	Unit	Quantity	Unit price *(triệu đồng)*	Total money *(triệu đồng)*
I. The construction stage					
1.	Garbage containers	piece	10	1	10
2.	Workig protective equipments	-	-	-	20
3.	Firefighting devices	System	01	20	20
II. The operation stage					
1.	Construct the waste water treatment system with the capacity of 750 m^3/day	System	01	22.500	22.500
2.	Operate the waste water treatment system	System		3.000	3.000
3.	Construct the exhausted fumes treatment system of boiler using coal and spent ground.	System	01	14.000	14.000
4.	Operate the exhausted fumes treatment system	System		2.000	2.000
5.	Hazadous waste storage inventory	System	01	120	120
6.	The rain water drainage system	System	01	350	350
7.	Dustbins	Piece	10	1	10
8.	Working protective tools	-	-	-	200
9.	Lighting protective system	System	01	150	150
10.	Costs for fire protection and other risks	-	-	-	3.000
11.	Plant green trees	-	-	-	500

Table 74 Estimates of the cost of the waste storage equipments

No	Items	Construction and installation cost	Operation cost
A	**The construction stage**		
1.	The daily life solid wastes (10 buckets)	Price: 1,000,000 VNĐ/ a bucket	Contracted with a functional unit (Lâm Phát Company- 3,000,000 VNĐ/a trip/a month)
B	**The operation stage**		
2.	The daily life solid wastes (10 buckets)	Price: 12,000,000 VNĐ/ 12 buckets	Contracted with a functional unit *(2,000,000 VNĐ/month)*

3.	Hazardous waste (05 buckets)	Price: 1.000.000 VNĐ/ a bucket	Contracted with a functional unit *(Price depends on the monthly quantity)*
4.	Common wastes (ash, dried sludge)	Sack: 10.000 đồng/ a sack	Contracted with a functional unit to collect and treat *(Price depends on the monthly quantity)*

3.3.12.2 Organization, management to operate the environment protection work

Café Outspan Vietnam Ltd have made organizational structure of the management and operation of environmental protection facilities in the organization of specialized departments in charge of health security and environment (HSE), the mission of this department are defined as follows:

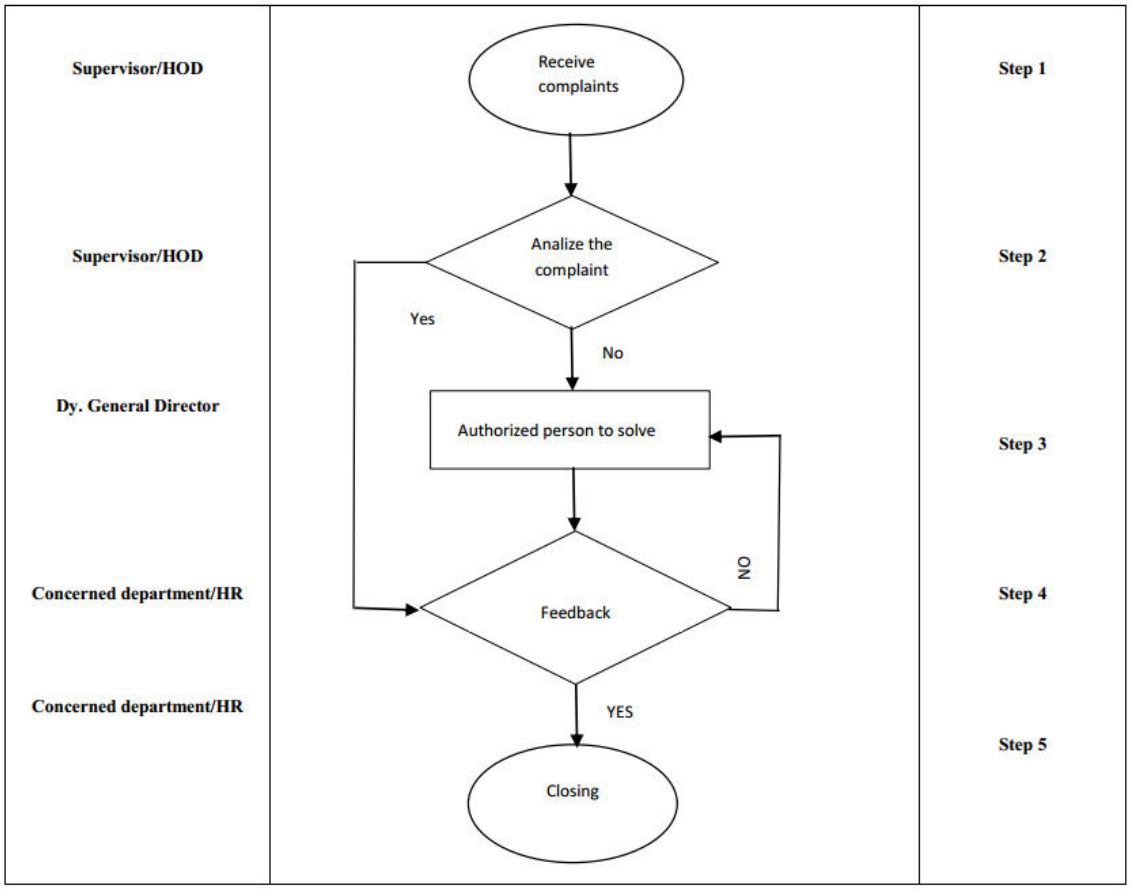
HSE is the directly person to guide members of group. This department is in charged of the responsibility with BOD for safety and environment problems on the site. Under chief of group's arrangement and guidance, the members will carry out as follows:

- Determine the plan of project, technology and method to restrict, minimize the pollution and occurs which is raised in report is general method and forced to perform by all staffs.
- Perform all activities to minimize the pollution on preparation, on construction and on operation as well as collection solid waste to contract for collecting and treating all material and wastes generating on the site.
- Supervise the construction progress and quality of environment treatment, minimizing construction such as building WWTP in stage of installation upgrading process system, drainage system and rain water system, etc.
- Frequently check the labor safety, occurs prevention on site on construction stage and expansion operation.
- Supervise and force the owner of means serving for construction to obey all methods for minimizing dust, noise, labor safety… which is raised in this EIA report.
- Perform gardening programme to minimize dust and pollution substance emission as well as create friendly environment.
- Be responsible for solid waste treatment and management, other environment problem.
- Plan and perform the environment monitoring surround the factory and near area (supervising on air quality, noise, dust, waste water, underground water if any…).
- On behalf of the company to report to competent authorities if necessary, obey the supervising and monitoring of competent authorities.
- Collective and classify the data of environment safety, consult to investor any complement method (if any) to minimize and constrain the pollution, prevent occur to improve the enviornment better.

Table 75 Organization, management to operate the environment protection projects of Café Outspan Vietnam Ltd

No	Full name	Function and duty
Management		
1.	Maharajula Jagannath Rao	Director of the project
HSE Department		
2.	Cao Tuấn Khôi	Head office
3.	Hồ Đắc Hiền Hiển	Supervisor
Operation		
4.	Võ Nguyệt Điền	The operator of the exhausted fumes treatment system
5.	Trần Viết Cường	Supervisor
6.	Võ Nguyệt Điền	The operator of the waste water treatment system
7.	Lê Hữu Thoại	Supervisor
8.	Hồ Đắc Hiền Hiển	Manager of solid waste

The company have the procedure for solve the complaint.



Until now, the company not yet received any complaint from the neighborhood, but the company will invite the neighborhood in Octo to solve the complaint if it happens

CHAPTER 4

THE ENVIRONMENT SUPERVISING AND MANAGEMENT PROGRAM

4.1. THE ENVIRONMENT MANAGEMENT PROGRAM

In the process of construction and operation of the project, the investor must adhere strictly with:

- Decree Noc 18/2015/NĐ-CP dated on February 14, 2015 by the government on the regulations of the environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental protection plan.
- Circular No 27/2015/TT-BTNMT on May 29, 2015 by MoNRE on the regulations of the strategic environmental assessment, environmental impact assessment and environmental protection plan.
- Standard of ADB and International Finance Center EHS guidline

Incorporate environmental management programs of the project are shown as follows:

Table 76 Incorporate environmental management programs of the project

No	Activites / impact of the project	Environment impact	Construction work, methods to reduce and protect the environment	Cost	Duration	Responsibility	Supervisor
A. The construction stage of the prpject							
1.	Leveling	Dust from the digging and filling activities with the concentration of 0,36mg / m^3 Dust from loading, unloading and gathering activities, a total load of materials of about 0.58 – 5.8kg Dust, emissions from 58 turns of vehicles to fill materials disposal Residual sand and soil from digging and leveling about 200m^3	Implement to shield the work Shield the transport vehicles Wash the wheels when leaving the construction site; Supervise trucks out on the construction site Move the residual soil form the balance of disposal at a designated area of 1,000 m	-	1 month	The investor The owners of means	The investor The owners of means
2.	Build factories and other works; Transportation process	Dust, noise and vibration. Waste oil, construction waste. Operation of motor vehicle construction. Incidents and risks.	Do well the methods of construction organization; Arrange the sprinkler system layout in the works to limit the amount of dust emissions during construction; Arrange temporary focus areas, household waste containers, debris, brick, stone built, etc; To arrange reasonable working hours to avoid the effects of noise.		Plan before the construction process. The work was finished when the construction is complete.	The investor The construction snd installation contractor	The management Board of Long An Industrial Zones
B. The operation stage of the project							
1.	The exhausted fumes from the transportation.	Dust, smoke, smell. The acidic gases: CO, NO_x, SO_x, heat, etc The organic solvent vapor.	Use new vehicles and check periodically			The investor The owners of means	The manageme nt Board of Long An Industrial

2.	Dust, odors and volatile organic compounds from the roasting process.	Dust, SO2, NOx, CO, etc, odor and volatile organic compounds (in beans of coffee).	Cyclone dry and thermal oxidation (combustion gas)		Operate when the company goes into operation	The investor	
	The exhausted fumes of the boiler of 16 tons/h	Dust	The ESP system				
	The smell from the waste water treatment system of the project	CH_4, NH_3	Burn by nozzles				
	The exhausted fumes from the generators	Dust, SO_2, NO_x, CO…,	(Work only when power redundancy, DO fuel > 0.25% S)				
3.	Noise by the equipments of the project	Noise	Place the device may cause noise in the room soundproof isolation from other areas. Cast the machine foundation sufficient volume of high grade concrete and plant enough depth Regular maintenance of equipment; Ensure the green area> 25%		Build imultaneously with the construction companies Operate when the company goes into operation	The investor	
4.	- The production waste water - Daily domestic waste water	Temperature, color, organic matter pollution, suspended solids, oil and grease, microbial contamination, etc.	- The waste water treatment system with the capacity of 750m^3/day - Collection and treatment in septic tanks before being discharged into the focused sewage system of the company	Total construction cost of the waste water treatment system is about…….. billion	Build imultaneously with the construction companies Operate when the company goes into operation	The investor	

5.	Common production wastes, daily life wastes	Biodegradable organic waste. Common wastes; coal ash from coal combustion. Coffee grounds	To be collected in containers with lids, in a separate area to the contracted company to collected functional units to transport them to the waste processing as usual (do fertilizer) Do the fuel for boilers		To be equiped when the company goes into operation	The investor	
6.	Hazardous wastes	Maintenance, operation, Lab, waste water treatment system	- Registration of waste generators - Sort at the generated source - Temporary storage to regulations - Give the licensed contractor for handling collection and transport		To be equiped when the company goes into operation	The investor Contracted with the functional units	
7.	Environment incidents	Labor accidents, traffic accidents Material leaks, chemical spills, etc Fire incidents	- Organize propaganda and dissemination of rules on labor accident prevention; - Develop plans for prevention and rescue of chemical incidents the authorities for approval - Build fire protection systems, fire-fighting plan-rescue and the relevant authorities for approval - Regular training and periodical exercises enhance the ability to respond in case of incidents - Set tables of rules and labor safety; - Tool labor protection for workers; - There are periodic inspection regimes machinery and equipment in the company.		Build fire protection systems in the building phase of workshops	The investor	

4.2. THE ENVIRONMENT MONITORING PROGRAM

Café Outspan Vietnam Ltd will combine with the functional units for eligible environmental monitoring (licensed VIMCERTS) to conduct periodic monitoring measurements of environmental quality for the project which aims to control and evaluate the effectiveness of the treatment system. The environmental status will be regularly monitored, the data will be statistical, store and periodically report to Department of Natural Resources and Environment of Long An Province.

4.2.1. Supervising the the environment quality in the construction stage

Monitoring the waste water, odour

During the construction phase of the project, workers at the project site to use the toilets in the designated area of the existing plant and a number of portable toilets fitted at the construction site should not conduct environmental monitoring of the waste water at this stage.

However, the environmental monitoring reports of the existing plants are still monitoring the quality of wastewater, odour after treatment systems with the frequency of 3 times under the current regulations.

- Frequency of inspection: 3 months / time.
- Methods of sample collection, preservation and analysis: according to current standards.
- Compared standards: National standard on the receiving waste water of Nhựt Chánh Industrial Zone and IFC EHS General Guidelines

Monitoring the air quality:

- Parameters: Dust, SO_2, NO_2, CO, noise.
- Monitoring points: 2 locations in project area and 2 locations in nearby community (upwind and downwind)
- Monitoring frequency: 6 months / time.
- Sampling collection equipments and analysis method: current standard.
- Compared standard: QCVN 05:2013/BTNMT, QCVN 26:2010/BTNMT and IFC EHS General Guidelines

4.2.2. Monitoring the environment quality in the operation stage

Monitoring waste water

According to Circular No.27/2015/TT-BTNMT, dated on May 17, 2015 on the regulations to projects connected to the sewage treatment in centralized treatment systems are not required to do, however, monitoring will still be conducted to meet ADB SPS requirement on an annual basis.

Frequency of inspection: annual

- Methods of sample collection, preservation and analysis: according to IFC EHS Guidelines

- Compared standards: IFC EHS General Guidelines on Food and Beverage Processing including the following parameters: pH, BOD, COD, Total Nitrogen, Total Phosphorus, Oil and Grease, TSS, Total Coliform, Temperature;

- Monitor at discharge point connecting to the Central Industrial Wastewater treatment Plant

Emission Monitoring

- Monitoring parameters: dust, SO_2, NO_x, CO, temperature, flow.
- Monitoring location: rosting oven, boiler.
- Frequency of inspection: 3 months / time.
- Methods of sample collection, preservation and analysis: according to IFC EHS Guidelines
- Compared regulation: QCVN 19: 2009/BTNMT, IFC EHS Guidelines

Monitoring the work environment

- Monitoring parameter: total dust, SO_2, NO_2, CO, Noise; light, vibration, temperature, humidity.
- Monitoring location: 3 monitoring points in the production area of the expanding category.
- Frequency of inspection: 6 months / time.
- Methods of sample collection, preservation and analysis: Standard methods.
- Compared standard: TCVS 3733: 2002/QĐ-BYT.

4.2.3. Cost of the evironment monitoring

Cost for the management of environmental monitoring is estimated as follows:

Table 77 Cost of the annual evironment monitoring of the plant

No	Content	Monitoring cost (VND)
The constructing stage		
1.	Monitor the solid wastes and hazardous wastes	10,000,000
2.	Monitor the ambient air quality	6,000,000
The operation stage		
3.	Monitor the solid wastes and hazardous wastes	10.000.000
4.	Monitor labor environment	34.000.000
5.	Monitor the exhausted fumes	100.000.000
6.	Monitor the waste water	10.000.000
Total		**170.000.000**

Total cost for the annual environmental monitoring of the expnading plant is 170 million/year excluding the cost of sample collection, transport and preservation.

CHAPTER 5

THE COMMUNITY CONSULTATION

The project "Investing and constructing the instant coffee processing plant Phase 3 with the capacity of 5,250 tons/year" is located in Nhựt Chánh Industrial Zone.

According to the provisions of Clause 3, Article 21 of the Law on Environmental Protection by the National Assembly of the Socialist Republic of Vietnam adopted on June 23, 2014 and took effect from the date of January 1, 2015, the project project "Investing and constructing the instant coffee processing plant Phase 3 with the capacity of 5,250 tons/year" is the kind of matching of the production planning, sales, and service has been approved reports environmental impact assessment for the construction phase of infrastructure. Therefore, the EIA report for the project does not need to consult the community.

To meet ADB SPS requirements, community consultations will be conducted by COVL prior to start of operations of Phase 3 project.

CONCLUSIONS, RECOMMENDATIONS AND COMMITMENTS

1. CONCLUSIONS

Project "Enhancing the capacity of the coffee processing plant Phase 3 of Café Outspan Vietnam Ltd with the capacity of 5,250 tons /year " at Lot L2, Nhựt Chánh Industrial Zone, Nhựt Chánh Commune, Bến Lức Town, Long An province completely in accordance with occupational planning of the province and direction of economic development - society in general of the province. Contributing to promotelocal industry at the local area and create revenue for the state budget as well as Long An province.

However, the project of Outspan cafe also have negative environmental impacts on with the current plant and to other issues - economic and social environment without taking measures to control pollution and limiting negative effects.

In chapters 3, 4 and 5 of the report highlights the environmental impacts that may occur after the plant enhances the capacity. The report also proposed mitigation measures include: air emissions, wastewater, solid waste and other environmental incidents arising in the process of the project operation. The given solutions are based on actual operating experience of existing factories and processing results of companies with similar types of activities should be feasible very high level (especially water treatment emission technology is enhanced because they are getting the specific nature of wastewater generated).

The company is committed to provide capital to strictly implement the plans to reduce pollution and limit the negative effects outlined in the report to meet the standards, environmental standards of Vietnam, ADB SPS requirements, and IFC applicable EHS Guidelines throughout projet operations.

APPENDIX

APPENDIX 1 – LEGAL DOCUMENTS RELATED TO THE PROJECT

- Investment Certificate No.502043000046 issued on December 25, 2007 by the Management Board of Industrial Zones of Long An Province for Café Outspan Vietnam Ltd for the first time certification and changed the 2nd on June 14, 2011.
- Certificate of registration of investment (adjusted) No 4336144325 issued the Management Board of Industrial Zones of Long An Province for Café Outspan Vietnam Ltd for the first time certification on March 14, 2016.
- Land lease contract No 01-03/ HĐTLQSĐ-TY-08 dated on March 6, 2008 between Café Outspan Vietnam Ltd and Thanh Yen Joint Stock Company, and the annex contract 01-COVL / CPTY-PL -13 dated on February 27, 2013.
- Land lease contract No 18-07/HĐTLQSĐ-CPTY-11 dated on July 18, 2011 between Café Outspan Vietnam Ltd and Thanh Yen Joint Stock Company.
- Decision No. 43/1998/QĐ-TTg dated on February 23, 1998 of the Prime Minister on the establishment of the Management Board of Industrial Zones of Long An province.
- Decision No. 1610/QĐ-UBND dated on June 19, 2007 on approving reports environmental impact assessment for an investment project to build Nhựt Chánh Industrial Zone.
- Decision No. 8 / QĐ-BQLKCN of the Management Board of Industrial Zones of Long An Province dated on January 17, 2011 on thee report of approving the environmental impact assessment of the project "Expansion of Café Outspan Vietnam Ltd from 4,000 to 12,000 tons / year."
- Decision No. 1610/QĐ- UBND dated on July 19, 2007 on approving the project's environmental impact assessment report of investment in infrastructure construction of industrial zones.
- Decision No. 22/GXN-STNMT dated on October 31, 2013 on the validation work performed works, environmental protection measures serving the operation phase of the investment project to build the infrastructure of the industrial zone.

APPENDIX 2 – THE ENVIRONMENT CONTRACTS RELATED TO THE PROJECT

- Register book No 80.000271.T of the waste generators of hazardous wastes by the Department of Natural Resources and Environment of Long An Province dated on January 15, 2015.
- Contract for collection and transportation of daily life wastes No. 27/HDLP.CTCN.2015 between Café Outspan Vietnam Ltd and Lâm Phát Import Export Ltd dated on November 27, 2015.
- Contract for collection and treatment of hazardous waste 24 / HDLP / CTNH.2015 between Outspan Coffee Company Limited and Vietnam Import Export Pte Ltd inflation.
- Contract to collect coffee grounds and ash between Café Outspan Vietnam Ltd and Thuận Việt Environmental treatment Ltd.

APPENDIX 3 – DIAGRAMS, DRWAINGS RELATED TO THE PROJECT

- The drawing of the overall plant (the existing and expanding project Phase 3).
- The drawing to show the work (the existing and expanding project Phase 3).
- The drawing to show the drainage system (the existing and expanding project Phase 3).
- The drawing of the fire protection (the existing and expanding project Phase 3).
- The diagram of the exhausted fumes technology.
- The diagram of the waste water treatment technology.
- The diagram of sampling and environmental monitoring.

APPENDIX 4- THE FORM OF THE ENVIRONMENT ANALYSIS RESULTS

APPENDIX 5 – FIGURES RELATED TO THE PROJECT