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LIST OF ABBREVIATIONS AND ACRONYMS

MNRE	Ministry of Natural Resources and Environment
MC	Ministry of Construction
SW	Solid waste
HW	Hazardous waste
HTP	High-tech Park
DS	Drainage system
FPF	Fire protection and fighting
NTR	National technical regulations
Decision	Decision
TSS	Total suspended solids
OHS	Occupational hygiene standards
NS	National Standards
LTD	Limited
WHO	World Health Organization

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INTRODUCTION

1. Background of the Project

Along with the development of the southern key economic region and Ho Chi Minh City, District 9 is taking advantage of raw materials, goods and labor to serve industrial production and services, one of which is the production of drugs and pharmaceuticals. Besides, District 9 is also the connection point between Ho Chi Minh City and neighboring provinces. The routes from District 9 to the center of Ho Chi Minh City and the provinces of Dong Nai and Binh Duong are very convenient, which has created favorable conditions for District 9 to develop economically and socially.

Pharmaceuticals are of two types: one is over-the-counter (OTC) and the other is a prescription drug. OTC drugs are drugs that are sold directly to consumers without a doctor's prescription, and prescription drugs can only be sold to consumers with a valid prescription. In the Vietnamese ophthalmology market, most Vietnamese pharmaceutical companies such as Traphaco, DK, Pharma, F.T.PHARMA, Merap Group or DHG Pharma focus on non-prescription drugs. Prescription drugs are mainly supplied by foreign companies such as Pfizer, Novartis, Allergan, Rohto and Regeneron. Understand this fact, Samil Pharmaceutical Co., Ltd. decided to invest in the project "Factory of Samil Pharmaceutical Co., Ltd." to develop and produce eye drops (single dose and multiple dose) of both prescription and non-prescription types, with a capacity of 1,800 tons of products/year in the High-Tech Park of Ho Chi Minh City, the project's pharmaceuticals will replace imported drugs. In addition, the project also engages in research and development (R&D) of special drugs after eye surgery, stem cell drugs to treat eye diseases.

Over the past 70 years, Samil Pharmaceutical Co., Ltd., headquartered in Korea (Samil Pharmaceutical Co., Ltd.), has developed and supplied many pharmaceutical products to the Korean market. Samil Pharmaceutical Co., Ltd has self-formulated new drugs and improved the production process. By maintaining R&D and strict quality management system according to EU GMP guidelines, Samil has been recognized as one of the top five drug manufacturers in Korea. Samil Pharmaceutical Company Limited has 14 patents and 344 trademark rights. Samil's 70 years of technology and know-how have been recognized in the Korean pharmaceutical market.

In Vietnam, Samil Pharmaceutical Co., Ltd. operates under the Enterprise Registration Certificate of One Member Limited Liability Company No. 0315022409 issued by the Department of Planning and Investment of Ho Chi Minh City for the first time on May 3, 2018, registered for the first amendment of October 24, 2018 and Investment Registration Certificate No. 4397716355 issued by the Management Board of the High-Tech Park of Ho Chi Minh City for the first time on April 5, 2018, and registered for the third amendment on November 19, 2019. The company is headquartered at Lot I-15-2, D15 Street, High-Tech Park, Tang Nhon Phu B Ward, District 9, Ho Chi Minh City.

Pursuant to Section No. 76, Column 5, Appendix II of Decree No. 40/2019/ND-CP dated May 13, 2019 of the Government amending and supplementing a number of articles of the decrees detailing, guiding the implementation of the Law on Environmental Protection, Samil Pharmaceutical Co., Ltd. conducted an environmental protection plan for the Project "Factory of Samil Pharmaceutical Co., Ltd." to produce eye drops (single dose and multiple dose) with a capacity of 1,800 tons of products/year at Lot I-15-2, D15 Street, High-Tech Park, Tang Nhon Phu B Ward, District 9, Ho Chi Minh City in order to forecast and assess the adverse impacts that may occur, and at the same time propose solutions to minimize and limit these impacts during the operation of the Project.

2. Competent agencies and organizations to approve investment projects

The investment project "Factory of Samil Pharmaceutical Co., Ltd." is approved by the Management Board of the High-Tech Park of Ho Chi Minh City.

CHAPTER 1. DESCRIPTION OF PROJECT, PRODUCTION, BUSINESS AND SERVICES PLAN

1.1. General information about projects, production, business and service plans (collectively referred to as projects):

1.1.1. Name of the project

"FACTORY OF SAMIL PHARMACEUTICAL CO., LTD."

1.1.2. Investor

a) Name of investor

SAMIL PHARMACEUTICAL CO., LTD.

b) Address and means of contact

Address: Lot I-15-2, D15 Street, High-Tech Park, Tang Nhon Phu B Ward, District 9, Ho Chi Minh City.

Telephone: 0901 473 131

Website: www. Samil-pharm.com

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1.1.3. Geographical location of the Project implementation site

1.1.3.1. Geographical location of the Project

The project "Factory of Samil Pharmaceutical Co., Ltd." is implemented at Lot I-15-2, D15 Street, High-Tech Park, Tang Nhon Phu B Ward, District 9, Ho Chi Minh City to produce eye drops (single dose and multiple dose) with a capacity of 1,800 tons of products/year. The project is implemented on a land with a total area of 25,008 m^2.

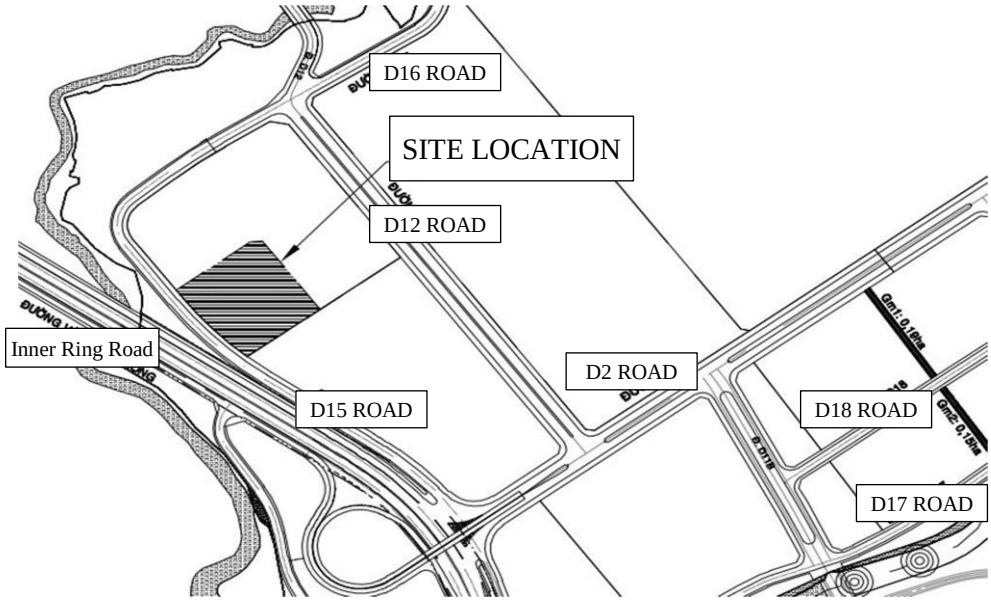

Figure 1.1. Geographical location of the Project

a) Coordinate landmark

The land area for project implementation is determined by the following coordinates (VN2000 coordinate system in HCMC area).

Table 1.2. Statistical table of coordinates of the boundary marker of the Project area

Point name	X	Y
1	1197287.16	613326.15
2	1197164.99	613416.57
3	1197080.54	613302.46
4	1197187.40	613199.84
5	1197199.25	613191.07
6	1197284.96	613306.89
1	1197287.16	613326.15

(Source: Samil Pharmaceutical Co., Ltd., 2020)

Figure 1.2. Location of project boundary markers

b) Contiguous directions

- North: Adjacent to EPS Vina Hi-Tech Co., Ltd.
- East: Adjacent to part of the vacant land of the High-Tech Park.
- West: Adjacent to part of the vacant land of the High-Tech Park.
- South: Adjacent to D15 Road.

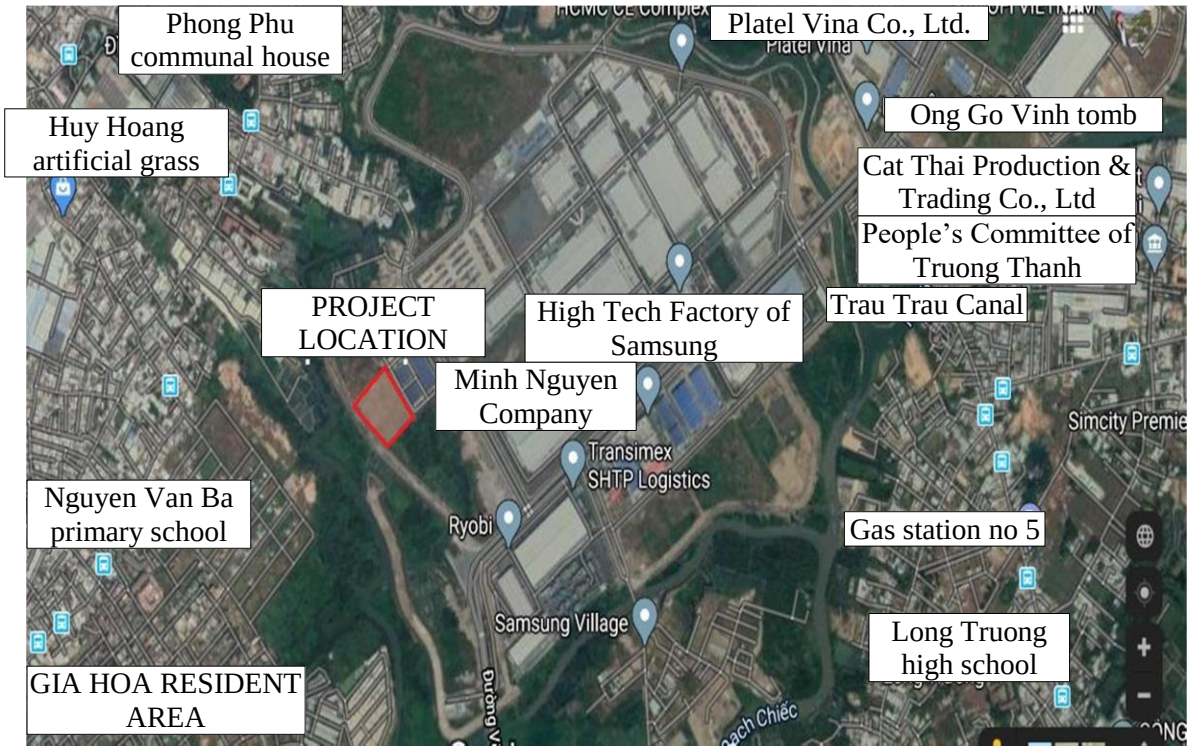

Figure 1.3. Relative geographic location of the Project according to google maps

In addition, the project's distance from other works is as follows:

- About 458m from D2 road to the Southeast;
- About 107m from the small canal in the area to the southwest and about 1.51 km from Rach Chiec to the west;
- About 1.07km from Samsung Factory to the Northeast;
- Within a radius of 1km, there are no religious buildings or historical sites around the Project.

Current status of the project land: The project land is currently a relatively flat vacant land with no construction works.

Objects that may be affected by the Project: Around the Project is vacant land and most are factories in the High-Tech Park. The Company will apply measures to minimize the impact on the environment from the construction and operation activities of the Project in order to limit the impact on the health of construction workers and the environment surrounding the Project.

1.1.4. Scale; capacity; technology and type of the project

1.1.4.1. Area:

The project "Factory of Samil Pharmaceutical Co., Ltd." is implemented at Lot I-15-2, D15 Street, High-Tech Park, Tang Nhon Phu B Ward, District 9, Ho Chi Minh City with a total land area of the Project of 25,008 m^2.

Table 1.3. Land use planning of the Project

No.	Land type	Area (m²)	Percentage (%)
1	Land for construction works	12,494.84	49.96
2	Green land	5,002.14	20.01
3	Land for traffic and yard	7,511.02	30.03
Total		**25,008**	**100**

(Source: Samil Pharmaceutical Co., Ltd., 2020)

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1.1.4.3. Project Type:

The project "Factory of Samil Pharmaceutical Co., Ltd." is located in High-Tech Park to develop and produce eye drops (single dose and multiple dose) with a capacity of 1,800 tons of products/year. In addition, the project also engages in research and development (R&D) of special drugs after eye surgery, stem cell drugs to treat eye diseases.

1.1.4.4. Production technology:

The project's production technology flow chart is shown in the following figure:

a) Technological process for the production of multi-dose eye drops

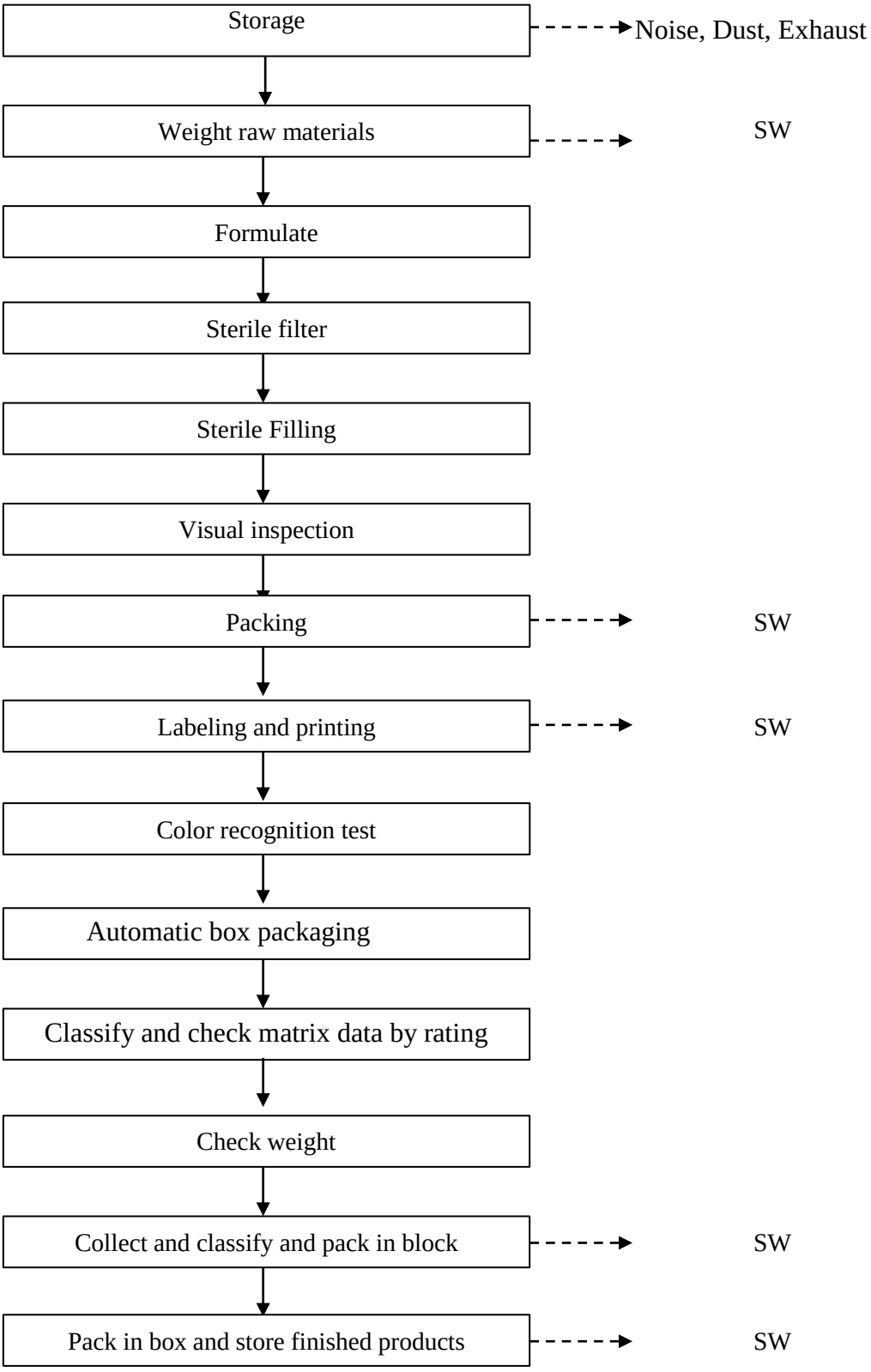

Figure 1.4. Technological process for the production of multi-dose eye drops

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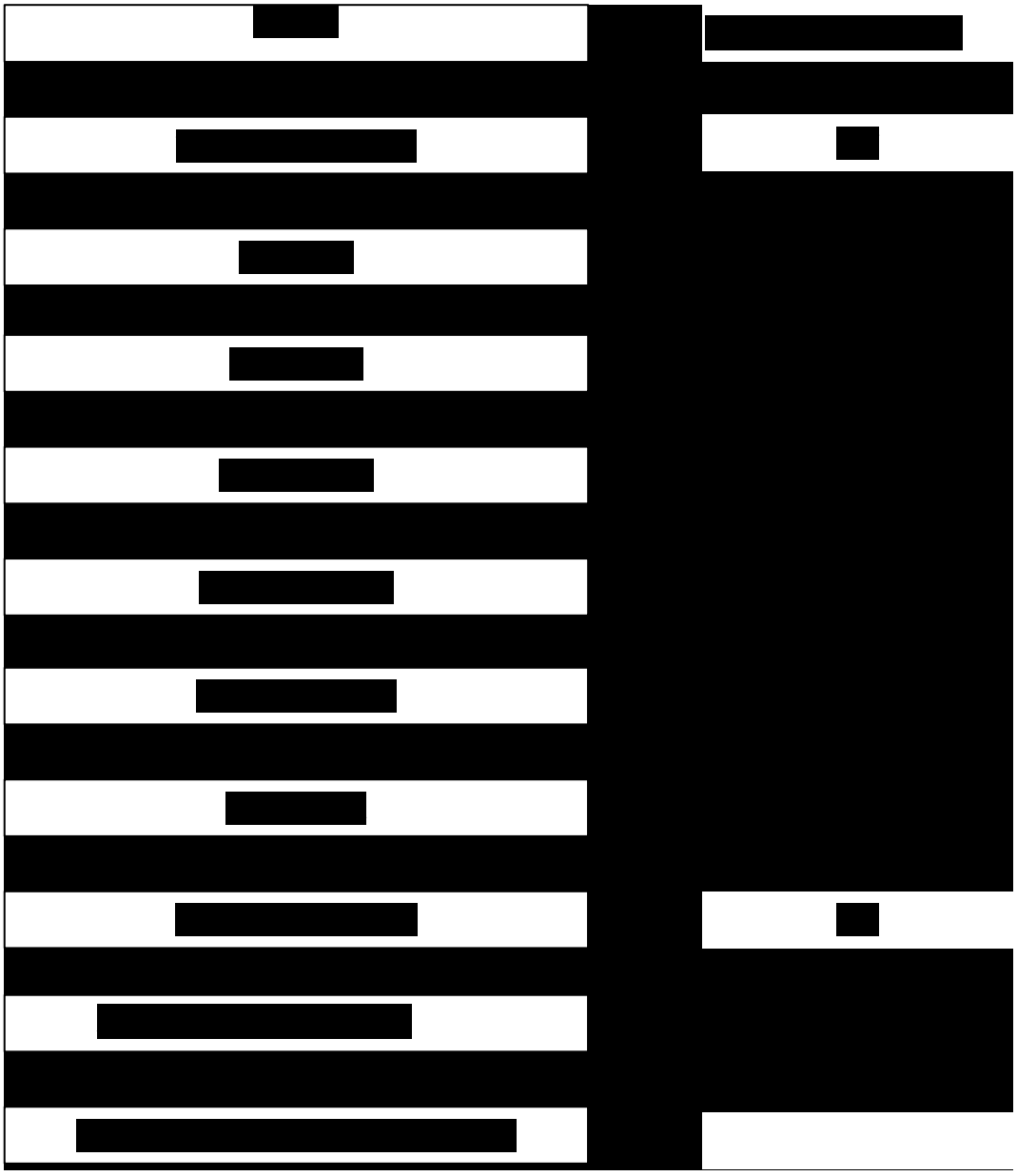

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1.3.3. Environmental protection items

1.3.3.1. Rainwater collection and drainage system

Rainwater collection system and wastewater collection system are built separately.

The project arranges a rainwater collection network including HUME pipes, PE pipes, U-shaped box culverts, ditches along the internal roads of the area, to ensure the collection of rainwater runoff and discharge to the rainwater collection system of High-Tech Park on D15 road at 02 manholes.

1.3.3.2. Wastewater collection and drainage system

The project arranges a network to collect domestic and production wastewater with PE pipes with outer protective layer at the locations of wastewater generation throughout the factory to ensure the collection of all generated wastewater. The project mainly generates domestic wastewater and wastewater from cleaning of machinery, equipment, and factories, so all wastewater is collected and discharged into the wastewater collection system of the High-Tech Park on D2 street at 01 manhole, then treated at the Wastewater Treatment Station of the High-Tech Park, with a capacity of 5,000 m^3/day before being discharged into the environment.

1.3.3.3. Wastewater treatment plan

Domestic wastewater is preliminarily treated through a septic tank along with wastewater from the cleaning process of factories, machinery and equipment, collected into a storage tank, and then led to the wastewater collection system of the High-Tech Park on D2 street at 01 manhole, then treated at the Wastewater Treatment Station of the High-Tech Park, with a capacity of 5,000 m^3/day before being discharged into the environment.

1.3.3.4. Exhaust gas treatment plan

Exhaust gas generated at the Project is mainly from boiler combustion.

The boiler uses LPG as a fuel, which is a clean form of natural gas that is compressed at a pressure of 200 ÷ 250 bar at ambient temperature. Compared to other traditional fuels (gasoline, oil...), LPG is the most environmentally friendly fuel, so the exhaust gas from the combustion of LPG gas when released into the environment meets QCVN 19:2009/BTNMT without any treatment.

At the Project, exhaust gas from the operation of LPG boilers is released into the environment without any treatment.

1.3.3.5. Solid waste storage works

- Hazardous waste storage (59.19 m^2) is built of concrete, with a roof.
- Normal solid waste storage area (domestic and non-hazardous industrial waste (50.4 m^2) is built of concrete located in factory 1.

1.4. Environmental status of the Project area

1.4.1. Assessment of the possibility of receiving waste generated from the Project

a) Wastewater receiving source:

Wastewater generated during the operation of the Project is the domestic wastewater of employees, wastewater from the washing of protective clothing when entering the sterile room, floor cleaning, cleaning of machinery and equipment, and laboratory activities. The maximum amount of wastewater generated regularly from the project is 25.1 m^3/day.

Domestic wastewater is preliminarily treated through a septic tank along with the remaining wastewater, collected into a storage tank, and then led to the wastewater collection system of the High-Tech Park on D2 street at 01 manhole, then treated at the Wastewater Treatment Station of the High-Tech Park, with a capacity of 5,000 m^3/day before being discharged into the environment. Wastewater meets the connection standards of the High-Tech Park before being discharged into the manhole.

Table 1.11. Connection standards of the High-Tech Park

NO.	INDICATOR	UNIT	Standards for wastewater reception of High-tech Park
1	pH	-	**5 - 9**
2	TSS	mg/L	**300**
3	BOD_5 (20^0C)	mgO_2/L	**250**
4	COD	mgO_2/L	**600**
5	Total nitrogen	mg/L	**60**
6	Nitrate (NO_3^-)	mg/L	**-**
7	Total Phosphorus	mg/L	**14**
8	Ammonium ($N\_NH_4^+$)	mg/L	**10**
9	Animal and vegetable fats and oils	mg/L	**100**
10	Mineral oil	mg/L	**-**
11	Coliform	MPN/100Ml	**$37x10^7$**

(Source: Decision No. 214/QD-KCNC dated December 30, 2009 of the Management Board of the High-Tech Park of Ho Chi Minh City on the promulgation of "Quality standards of input wastewater to the High-tech Park Concentrated Factory – Phase I)

b) **Sources of receiving exhaust gas of the Project:**

During the operation at the Project, the sources of dust and exhaust gas include:

- Dust, noise and exhaust gas from the operation of vehicles entering and leaving the Project.
- Exhaust gas from the operation of 02 LPG boilers.
- Odor arises from the decomposition of organic household waste.

Dust and exhaust gas generated at the Project will affect the staff at the Project, the air environment and the operation of factories around the project area.

1.4.2. Conformity of the project location with the planning and plans approved by competent agencies

The project "Factory of Samil Pharmaceutical Co., Ltd." produces eye drops (single dose and multi-dose) with a capacity of 1,800 tons of products/year (equivalent to 17,049,970 products/year) at Lot I-15-2, D15 Street, High-Tech Park, Tang Nhon Phu B Ward, District 9, Ho Chi Minh City, under the Investment Registration Certificate No. 4397716355 issued by the Management Board of the High-Tech Park of Ho Chi Minh City for the first time on April 5, 2018, and the third amendment on November 19, 2019.

1.4.3. Current status of operation and technical infrastructure of the High-Tech Park

The High-Tech Park of Ho Chi Minh City, established under the Prime Minister's Decision No. 145/2002/QD- TTg, is an industrial park with a concentration of companies operating in the field of high-tech development. Based on the Prime Minister's Decision No. 49/2010/QD-TTg dated 19/07/2010, the high-tech industries prioritized for development in the High-Tech Park are the technology industries that create high value products applied in the fields of information technology, biology, medicine, agriculture, industry and environmental protection. Some specific high-tech industries such as microbiological technology in environmental pollution treatment; recognition of handwriting, speech, images, gestures, movements and thoughts; manufacturing and operation technology for computers and mobile devices; technology applied in diagnosis, treatment and replacement of tissues and organs; technology for manufacturing medical imaging equipment for diagnostics; medical equipment using nuclear technology… and other high-tech industries.

The High-tech Park is located in the northeast of Ho Chi Minh City, 12 km from the city center. The High-tech Park is located on the side of Hanoi Highway, District 9, Ho Chi Minh City. The location adjacent to the High-Tech Park is as follows:

- North: adjacent to the overpass at station 2, Hanoi highway;
- South: adjacent to the residential area of Tang Nhon Phu A ward, district 9;
- West: adjacent to Hanoi highway;
- East: adjacent to Suoi Tien tourist area, residential area of Tan Phu ward, district 9.

The total area of the High-Tech Park is 913 hectares, divided into 2 development phases: phase 1 invests 300 ha, phase 2 invests 613 ha. Currently, the High-Tech Park has completed phase 1 and moved to phase 2 constructions, becoming a reliable destination for high-tech investment in Vietnam, attracting 46 units, companies with the presence of big-name high-tech corporations in the world such as Intel (USA), Nidec (Japan), Datalogic Scanning (USA), Sonion (Denmark) and leading high-tech companies in Vietnam such as FPT, Vingame, CMC, etc.

The current infrastructure status of the High-Tech Park is briefly presented as follows:

a) Industry attracting investment

Currently, the HTP focuses on attracting projects in high-tech production, high-tech services, research & development, training, and high-tech incubation in the following 4 industry groups:

- Microelectronics, information technology, telecommunications.
- Precision mechanics and automation.
- Advanced new materials, nanotechnology.
- Biotechnology applied in medicine, agriculture and environment.

b) Traffic status

The industrial zone area has a complete traffic status. There are 02 main traffic systems:

- The main axle system is 30m wide and has 2 lanes.
- The internal axle system is 20m wide and has 2 lanes.

c) Water supply

Water is supplied from 2 water plants Thu Duc and Binh An. The High-Tech Park has built a water pumping station with a capacity of 9,500 m^3/day, which can reach 24,300 m^3/day with high-pressure pumping stations.

d) Power supply

The High-tech Park is supplied with electricity from the national grid (grid and underground power) through two power supply stations 15/22KV and 63 MVA. To ensure adequate and stable power supply, the HTP uses 02 independent power supplies Thu Duc Bac and Thu Duc Dong.

In addition, the HTP also built a turbine power plant for backup operation in case of power failure.

e) Telecommunication

- Metropolitan area network (MAN) under the model of "One system, multiple services";
- Wired and wireless data transmission system;
- Ability to operate between national and international networks;
- On-demand bandwidth, high-speed internet access: On-demand bandwidth, high-speed internet access: ISDN, xDSL, FE/GE 100M/1000M, 11/22 Mbps Wireless Internet).

f) Rainwater and wastewater collection system

- Rainwater collection system and wastewater collection system are built separately.
- Rainwater collection system: arrange a rainwater collection network along the internal roads of the High-Tech Park premises, to ensure the collection of rainwater runoff in the area.
- Wastewater collection system: the domestic and production wastewater collection network is arranged along the companies to collect wastewater leading to the concentrated wastewater treatment system of the High-tech park.

g) Centralized wastewater treatment system

Centralized wastewater treatment plant in the High-Tech Park with a capacity of 5,000 m^3/day is built on an area of 3 hectares, ensures the collection of wastewater from sources in phase 1 of the High-tech Park and thoroughly treats the wastewater to meet Vietnamese environmental standards before being discharged into the Go Cong River, Thanh Long My Ward, District 9, Ho Chi Minh City.

Currently, the Centralized Wastewater Treatment Station of the High-Tech Park receives wastewater from operating companies with a total flow of nearly 4,500 m^3/day, and the Hi-Tech Park is building a concentrated wastewater treatment system for phase 2, with a capacity of 4,000 m^3/day to ensure the collection and treatment of all wastewater from units operating in the High-Tech Park.

Currently, the Centralized Wastewater Treatment Station of the High-Tech Park has not operated at full capacity of 5,000 m^3/day, therefore, the Centralized Wastewater Treatment Station of the High-Tech Park can receive wastewater from the project.

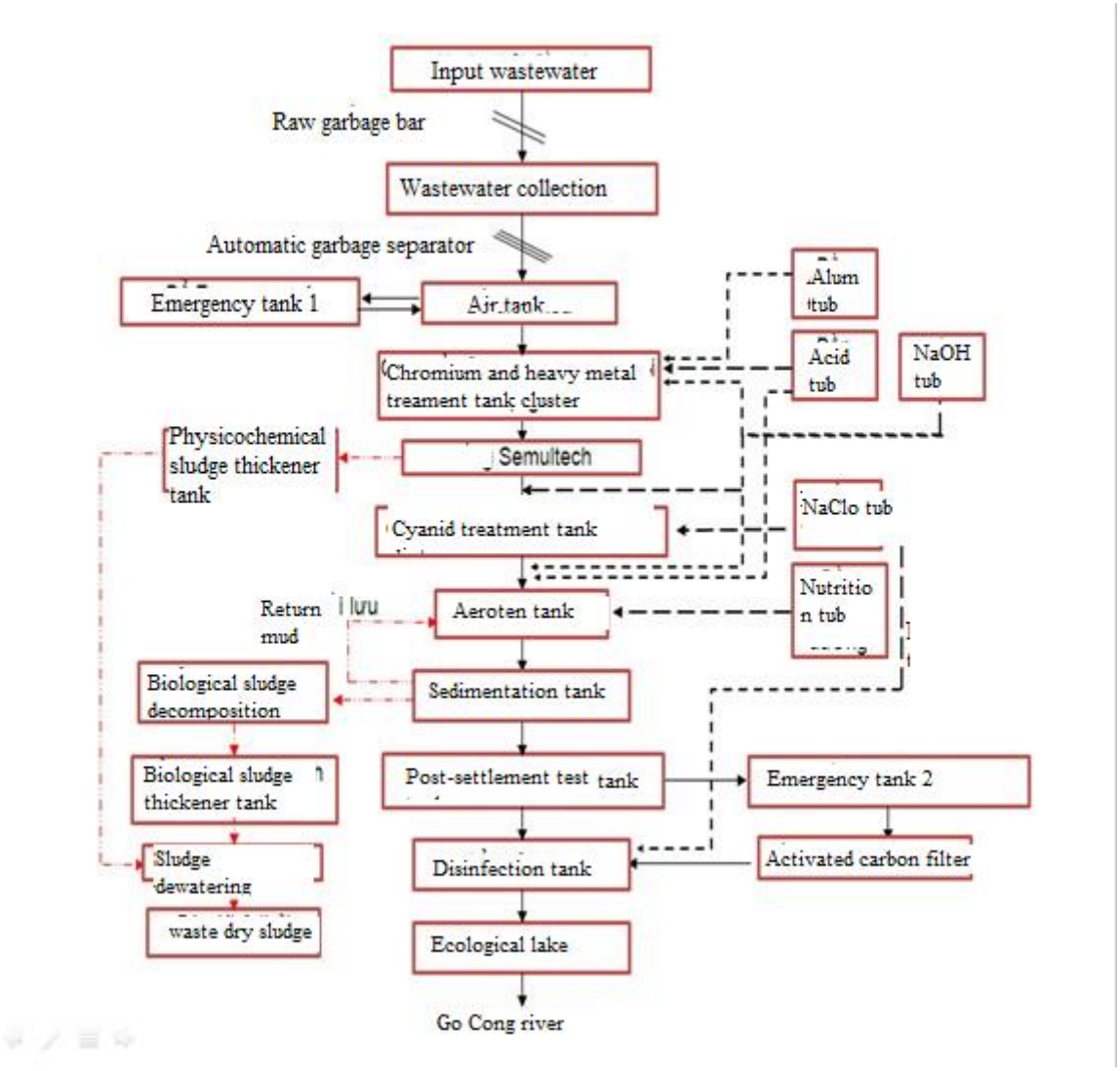

Figure 1.6. Diagram of wastewater treatment system at High-tech Park

Wastewater from production, business and service establishments in the High-Tech Park is treated to meet the requirements specified in Decision No. 214/QD-KCNC dated December 30, 2009.

Assess the suitability of the selected site for project implementation:

On the basis of analyzing the current conditions of infrastructure and environmental quality of the High-Tech Park and the incentive regimes to attract investment, some specific conclusions can be drawn as follows:

- The project location is completely suitable for the type of production of the project;
- When the project is conceived and put into operation, the effects may be as follows:

+ Increase the water supply demand of the water supply system of the High-Tech Park.

+ Increase the amount of wastewater to the centralized wastewater treatment plant of the High-Tech Park.

+ Increase traffic density in the area.

CHAPTER 2: ASSESS ENVIRONMENTAL IMPACT OF THE PROJECT; FORECAST TYPES OF GENERATING WASTE AND ENVIRONMENTAL PROTECTION WORKS AND MEASURES

2.1. Forecast impacts and propose measures to protect the environment during the project construction stage

2.1.1. Forecast impacts

2.1.1.1. Sources of impacts related to waste

During the construction process of the Project, the following activities are carried out:

- Transportation of construction materials.
- Gathering construction materials.
- Construction activities of the Project.

Impact assessment during the construction stage of the Project is as follows:

Table 2.1. Sources of impacts related to waste in the construction stage of the Project

Main pollutants	Origin
Sources of impacts related to waste	
Air pollution	
SO_2, NO_2, CO, dust, exhaust gas	- From the combustion of fuel during the operation of transportation vehicles of construction materials. - From the operation of construction machinery, - Exhaust gas from mechanical operations.
Dust	- From the transportation of construction materials. - From the process of gathering building materials, construction activities.
Water pollution	
Domestic wastewater (BOD_5, TSS, Ammonium, Coliform, pH, Animal and vegetable fats and oils, Nitrates, Phosphates...)	During daily activities of construction workers
Construction wastewater (oil, grease, TSS...)	From the process of washing vehicles and construction machinery
Rainwater	Rainwater runoff in the area
Pollution due to solid waste	
Domestic waste (packaging, food, waste paper, bottles, etc.)	During daily activities of workers
Non-hazardous waste	From the construction process
Hazardous waste	From the construction process
Sources of impacts not related to waste	
Noise	- Operation of construction machinery and equipment - The noise of transportation means

Heat	Construction process with heating: welding, cutting.
Vibration	Transportation vehicles in and out of the Project, foundation reinforcement, construction activities: transportation, electricity, communication system, water supply system, rainwater and wastewater drainage, ... In addition to pollution caused by construction activities, the operation of construction vehicles and equipment such as: dump trucks, road rollers, compactors, excavators, etc. also make significant noise.
Security, social order, traffic	The construction of the Project requires the concentration of workers and the transportation of construction materials.

2.1.1.1.1. Air environment impact assessment

a) Dust pollution during leveling process

In the process of leveling the ground for the Project, the activity of raising the foundation will generate dust.

The average ground elevation existing in the area is about 2.4m. The design leveling elevation is +2.60m, the average leveling elevation is +0.3m compared to the national standard elevation (Hon Dau system). Thus, the project will add about 0.2m high around the work with an area of 12,494.84 m^2. So the volume of leveling soil is 2,498.97 m^3.

The leveling work was carried out in about 5 days. According to *AIR CHIEF, US Department of Environment, in 1995*, the specific emission factor (E) diffused from the leveling process was calculated according to the following formula:

$$E = k(0{,}0016)\frac{\left(\frac{U}{2{,}2}\right)^{1{,}3}}{\left(\frac{M}{2}\right)^{1{,}4}}$$

Where: E = Pollution factor (kg/ton), E = 0.00059 kg/ton.

k = dimensionless factor for dust size (k = 0.74).

U = Wind speed (m/s), U = 2 m/s;

M = The average moisture content of the material is (M = 3%).

Diffuse dust pollution load due to leveling process (kg/day)

= Pollution factor (kg/ton) x Soil use (ton/day)

= 0.00059 x (2,498.97 x 1.5/5) = 0.258 kg/day = 0.442 g/s

(the specific gravity of the soil is 1.5 tons/m^3)

According to the above calculation results, the dust load generated by the leveling operation in 5 days is relatively low, calculated at about 0.442 g/s. However, the amount of dust generated from ground leveling activities may affect workers on the construction site and the Southeast area of the Project because the main wind direction of the area in the dry season is East - Southeast.

b) Dust and exhaust gas generated from the operation of transportation vehicles of materials during construction

According to the Investor's calculation, the project's material volume is estimated at 423,805 tons, specifically as follows:

- Sand: 195,478 tons.
- Rock: 97,739 tons
- Iron and Steel: 15,870 tons.
- Cement: 43,983 tons.
- Concrete piles: 12,091 tons
- Other materials: 58,644 tons. Including bricks, scaffolding, formwork, power supply system, pavement materials

Sources: Exhaust gas are mainly generated from the operation of trucks transporting construction materials, the volume of construction materials, the installation volume of equipment and materials of the Project, is about 423,805 tons and the volume of leveling soil is about 3,748.5 tons (equivalent to 2,498.97 m^3). It is estimated that there are about 74 trips/day ~ 148 times/day with and without load (*use 16-ton trucks, construction time is 1 year (about 360 days*))

Composition: Exhaust gas from the combustion of fuel during the operation of transportation vehicles, mainly include: CO, SO_2, NO_x and dust.

The report "Research on measures to control road traffic air pollution in Ho Chi Minh City" shows that the average fuel consumption for diesel vehicles is 0.3 liters/km, (*the specific weight of DO oil is 0.86 kg/liter*). With 148 vehicles using DO oil, with an average transportation distance of 10km, the daily fuel consumption of the transportation vehicles is 381.8 kg/day.

Table 2.2. Pollution coefficient and load due to truck operation during the transportation of construction materials during the construction stage

No.	Pollutant	Pollution coefficient (kg/ton of raw materials)	Fuel consumption (kg/day)	Average daily load (kg/day)
1	Dust	1.1	381.8	0.4199
2	SO_2	20*S		0.3818
3	NO_x	11		4.1998
4	CO	7.4		2.8253

(Source: Atmospheric Brown Clouds Emission Inventory Manual– ABC EIM, 2013)

Note: The sulfur (S) content in DO oil is 0.05%.

Comment:

+ The amount of dust and exhaust gas generated by the transportation vehicles of materials during construction is not high. Besides, as the space is large, the travel distance is quite long, combined with the time of a trip, the concentration of pollutants generated will not be too great.

+ However, in case the transportation vehicles of raw materials are not carefully covered, dust, soil and sand will be scattered along the transportation route. Main subjects that can be affected: activities of factories around the project often along the transportation route, especially Hanoi highway, Le Van Viet, and D2 roads (this is the main route for transporting construction materials for the Project). This impact and the construction time lasting for 360 days may have certain impacts

on the environment around the Project area, the operation of factories around the Project and on the transportation route of these vehicles.

Therefore, this impact is recognized as moderate and can be controlled and minimized by appropriate measures.

c) Diffuse dust from material transportation during construction

The forecast of the possibility of dust collection due to wheels during transportation by a team of experts based on an empirical formula proposed by the *US Department of the Environment* takes into account real conditions in Vietnam.

According to the progress of the project, the construction process of the project will take place in 360 days.

According to the mine design textbook - Hanoi University of Mining and Geology, the load in the transportation process is calculated as follows:

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

Where:

+ L: dust load (kg/km/vehicle/year).

+ k: particle size; k = 0.2.

+ s: the amount of soil on the road; s = 8.9%

+ S: average speed of the vehicle; S = 10km/h

+ W: the loaded weight of the vehicle; W = 16 tons

+ w: number of wheels; w = 6 wheels

With these number we get: 0.224 kg/km/turn of vehicle/year. (360 working days/year)

Dust pollution is dispersed during the transportation of construction materials, however, it is only calculated for the affected area, which is 20 km for the round trip. Thus, the dust load during the construction process:

0.224 (kg/km/turn/year) x 74 (trip/day) x 20 (km) / 360 (day) = 0.9208 kg/day.

Dust pollution has an impact on the whole transportation route. However, as the construction dust has a large particle size (0.2mm), the ability to deposit quickly, the range of dispersion in the air is narrow, it can also be noticed that dust only arises when it is windy and dry. The project needs to pay special attention to measures to minimize dust pollution, cover the trunk when transporting materials.

d) Diffuse dust from material gathering

The forecast of the possibility of dust collection due to the process of dumping materials by a team of experts based on an empirical formula proposed by the *US Department of the Environment* takes into account real conditions in Vietnam.

According to the progress of the project, the construction process of the project will take place in 360 days.

Dust dispersed by piles of materials gathered for construction. *According to AIR CHIEF: US Department of the Environment, in 1995*, the emission factor due to piles of materials (mainly sand) was calculated according to the following formula:

$$E = k(0{,}0016)\frac{\left(\frac{U}{2{,}2}\right)^{1{,}3}}{\left(\frac{M}{2}\right)^{1{,}4}}$$

Where:

+ E is the dust emission factor for 1 ton of material (kg/ton)

+ k: dimensionless factor for dust size (k = 0.74 for dust particles <30 microns)

+ According to the Statistics Office of Ho Chi Minh City, the highest average wind speed in Ho Chi Minh City is 2 m/s.

+ M: The moisture content of the material is 3%

Then we have:

Pollution coefficient (corresponding to wind speed of 2 m/s): E = 0,025 kg/ton.

Diffuse dust pollution load due to construction materials gathering (kg/day)

= Pollution factor (kg/ton) x Amount of construction materials used (ton/day)

Dust load = 0.025 x (427,553.5 / 360) = 29.69 kg/day = 1,237.1 g/hour

The total volume of leveling soil, sand, stone and cement transported from other places is 427,553.5 tons, the total amount of dust generated is 1,237.1 g/hour, which is relatively high. Therefore, when gathering materials, the Company will apply measures to prevent diffuse dust from affecting the surrounding environment, the health of workers and neighboring factories.

e) Dust, exhaust gas from construction vehicles

Sources: exhaust gas is mainly generated from the operation of construction vehicles and transportation vehicles on the Project construction site.

Composition: exhaust gas from the combustion of fuel during the operation of vehicles on the construction site, mainly include: CO, SO_2, NO_x and dust.

Load, concentration: The load calculation mentioned below is based only on the assumption of construction equipment and vehicles on the construction site operating in a concentrated manner (synchronous operation on the same day). The concentration of substances in the exhaust gas is calculated at the discharge opening of each construction equipment and vehicle.

Table 2.3. Summary of fuel used by some equipment and vehicles used in the construction stage of the Project

No.	Equipment and vehicles	Quantity (piece)	Amount of DO oil/equipment (liter/shift)	Total Amount of DO oil used (liter/shift)
01	CARTEX 12E truck	01	50	50
02	10-ton dump truck	02	45	90
03	24 ton vibration roller	01	60	60
04	Platform vibrator	01	70	70
05	Concrete vibrator	01	70	70

06	Amphibious backhoe excavator	01	80	80
07	Crawler tractor set 1,6 m^3	01	60	60
08	16-ton self-propelled crane	02	75	150
Total				**630**

(Source: Saigon Trade and Production Joint Stock Company, 2019)

Hence, the maximum amount of oil used is about 630 liters/shift = 541.8 kg/day = 0.5418 tons/day (*the specific weight of DO oil is 0.86 kg/liter, 1 shift/day*).

Based on the fuel consumption norm and pollution coefficient, the load and concentration of pollutants in the exhaust gas of DO oil are as follows:

Table 2.4. Load and concentration of pollutants in exhaust gas from construction vehicles during the construction stage of the Project

Pollutant	**Pollution coefficient (kg pollutant/ton oil)**	**Pollution load (kg/day)**
Dust	1.1	0.595
SO_2	20 x S	0.541
NO_x	11	5.949
CO	7.4	4.002

(Source: Atmospheric Brown Clouds Emission Inventory Manual– ABC EIM, 2013)

Note:

S: Sulfur content in DO oil = 0.05%

Comments:

The operation of motorized machinery and equipment emits dust and pollutant gases, mainly NO_x, SO_2, CO. The level of air pollution around the construction sites and along the transportation routes will increase. However, because construction activities are scattered at many locations, the number of vehicles and machines used is not high and they do not operate regularly, hence the actual values of pollution parameters are often lower than the estimates.

Construction equipment during operation is the main source of air pollution during the construction stage. In windy conditions, the dust concentration at the construction site decreases, but the dust disperses and spreads far in the direction of the wind. The object at the end of the wind direction is mainly affected.

f) Exhaust gas from mechanical activities

During the welding process of steel structures, the chemicals in the welding rods are burned and emit smoke containing toxic substances, which can pollute the air environment and affect the health of workers. The project uses about 30,000 welding rods with a diameter of 3.25mm during the construction period of about 02 months. The most directly affected subject based on the calculation is the welding worker, the space around a welding worker is about 12m^3 (2mx2mx3m). In order to have a basis for estimating the amount of pollutant gases from the electric welding process, the report is based on the proportion of pollutants in the metal-electric welding process shown in the

textbook "Air environment" of Pham Ngoc Dang, in which: 1 welding rod of 3.25 mm diameter emits 508 mg of welding smoke (containing other pollutants), 15 mg of CO and 20 mg of NO_x. Concentration of toxic gases during the electric welding process of metal materials are summarized in the table below:

Table 2.5. Concentration of toxic gases during the electric welding process of metal materials

No.	Pollutant	Load (g/day)
1	Welding smokes contain other pollutants	42.3
2	CO	1.25
3	NO_x	1.66

Notes: Load = Density (mg/1 welding rod) x 30,000 welding rods/360 days/1000

The emission load from the welding process is not expected to be high compared to other pollution sources but will directly affect the welders. With appropriate personal protective equipment, adverse effects on workers will be limited.

In addition, the process of cleaning the wall surface also generates an exhaust gas containing metal oxides such as Fe_2O_3, SiO_2, K_2O, etc., welding slag and other debris that will be dispersed into the environment plus the solvent vapor generated in the process of painting wall surfaces will cause air pollution and especially directly affect workers working in the area. However, this amount of exhaust gas is not significant and this work is only done during the construction period, so the impact is local and only temporary.

2.1.1.1.2. Water environment impact assessment

a) Rainwater runoff

– *Sources:*

+ As a rule, rainwater is conventionally considered clean water if it is not exposed to pollution sources: wastewater, exhaust gas, contaminated soil, etc. When flowing through areas containing pollutants, rainwater will carry pollutant compositions to the receiving source, creating favorable conditions for the rapid spread of pollutants.

+ During the construction of the Project, if the sources of environmental pollution are not controlled according to regulations, when rainwater falls on the project site, it will carry pollutants in the exhaust gas, wastewater, SW polluting the receiving source.

Depending on the local rainwater control plan, the composition and concentration of rainwater change significantly.

– *Flow:*

The highest volume of rainwater runoff: Q_{max} = 0.278 KIA (m^3/s)$^{(*)}$

In which:

+ A: land area = 25,008 m^2.

+ I: The highest average rainfall intensity = 574.6 mm/month = 14.37 mm/h = 0.01437 m/h (the highest rainfall in the period 2013 - 2017 was in October 2017, the average estimated rainy day number in a month is 20 days (in the rainy season), 2 hours per day).

+ K: Runoff coefficient = 0.3 (applied to bare land, tight ground).

Q_{max} = 0.278 x K x I x A = 0.278 x 0.3 x 0.01437 x 25,008 = 29.97 m^3/hour = 0.0083 m^3/s

((*): Source: Le Trinh, Water pollution monitoring and control, Science and Technology Publishing House, 1997)

Composition, concentration, load: Concentrations of pollutants in rainwater runoff are shown in the following table:

Table 2.6. Concentration and load of pollutants in rainwater runoff during the construction stage of the Project

No.	Pollution parameters	Concentration (mg/l)
01	Total nitrogen	0.5 ÷ 1.5
02	Total Phosphorus	0.004 ÷ 0.03
03	COD	10 ÷ 20
04	Total suspended solids	30 ÷ 50

(Source: Hoang Hue, Water supply and drainage Textbook, 2011)

b) Construction wastewater

The source of wastewater generated in the period is mainly wastewater from the process of washing cars, equipment and machinery used in the construction process. The amount of washing water for each vehicle is about 100 l/day.night. vehicle (*According to water supply and drainage standards - water supply for construction sites, the Ministry of Construction 2005 stipulates that the amount of washing water for each vehicle is 50 - 150 l/day.night.vehicle for trucks*). Estimated amount of water for washing cars, construction vehicles, machinery and equipment is about 7.4 m^3/day.

This amount of wastewater has a fairly high concentration of suspended matter and can be contaminated with impurities such as garbage, leveling materials and other wastes on the ground. If not treated, it may affect the quality of soil and surface water around the Project.

c) Domestic wastewater

Sources: mainly arising from the daily activities of construction workers.

Flow: Construction activities of the Project are carried out according to each item, so the maximum number of workers gathered during the construction process is about 80 people, of which the number of workers staying at the construction site at night is about 8 people.

Average demand for domestic water used per worker (TCXDVN 33:2006), norm of domestic water supply for construction workers is 45 l/person.day, (unbalanced coefficient K=1.2):

The amount of water needed for construction workers at the time of highest concentration is: 80 people x 45 l/person.day x 1.2= 4.32 m^3/day

Generated wastewater flow: about 4.32 m^3/day (estimated wastewater volume is equal to 100% of water supply).

Load, concentration: The loads and concentrations of pollutants in this wastewater are presented in the following table:

Applying the pollutant load from domestic wastewater to 01 Vietnamese citizen (TCVN 7957:2008 Drainage – network and external works – Design standard), the load and concentration of pollutants are calculated as follows:

Table 2.7. Estimated pollutant load generated from domestic wastewater of workers

Pollutant	Pollution coefficient (g/person/day)	Pollution load (kg/day)
Suspended solids (TSS)	60 – 65	4.8 – 5.2
BOD_5	30 – 35	2.4 – 2.8
Surfactants	3.3	0.264
Grease	2 – 2.5	0.16 – 0.2
Cl-	10	0.8

From the pollutant load in a day of domestic wastewater, the concentration of pollutants can be calculated as shown in the following table:

Table 2.8. Estimated pollutant concentration in the domestic water of workers during the construction stage

Pollutant	Flow (m^3/day)	Concentration (mg/l)	Connection standards of the High-tech Park
Suspended solids (TSS)	4.32	1,111 – 1,203	**300**
BOD_5	4.32	555 – 648	**250**
Surfactants	4.32	61.1	**-**
Grease	4.32	37 – 46.3	**100**
Cl-	4.32	185.2	**-**

Comment:

Most of the pollutant concentrations exceed the standards of wastewater reception of the High-Tech Park of Ho Chi Minh City. With the concentration far exceeding the allowable standards, direct discharge will greatly affect the surface water and soil environment in the area near the project. According to the results from the above table, the concentration of pollutants in the wastewater is capable of causing organic pollution, reducing the amount of dissolved oxygen. Therefore, the investor will take measures to minimize the impact of the above wastewater on the environment in the project area.

In addition to the above-mentioned waste source, there is also a significant amount of excreta in feces and urine. The organic content of feces and urine can be assessed using BOD_5 or similar indicators (COD or TOC). Urine has a BOD_5 of about 8.6g/liter and feces have a BOD_5 of about 9.6g/100g.

Domestic wastewater contains concentrations of polluted compositions COD, BOD_5, NH_4, TSS, pathogenic microorganisms. Therefore, this source of waste needs to be properly treated during the construction period to avoid polluting the surrounding environment as well as limiting the spread of disease.

2.1.1.1.3. Impact assessment of solid waste

a) Domestic solid waste

On average, the amount of solid waste generated per capita at the construction site is 0.5

kg/day. Therefore, as the number of people participating in construction on the construction site at the highest point is about 80 people, the amount of domestic waste is estimated at 40 kg/day.

For domestic SW, if not properly managed, concentrated and collected, organic wastes will decompose, create odors, pollute the environment, and create conditions for disease outbreaks.

In addition, SW can be carried by rainwater causing pollution or blocking the flow. Leachate can seep into the soil, contaminating the soil and groundwater.

b) Solid waste from construction process

They are mainly wastes scattered during construction and transportation such as sand, stone, bricks, cement, scrap iron, etc. Based on the fact that the volume of materials used is 423,805 tons and the norm of average construction material loss is about 1% (According to Decision No. 1329/QD-BXD of the Ministry of Construction dated December 19, 2016 on the publication of the norm of using materials in construction), the volume of estimated solid waste generated during construction (360 days) is about 4,238.05 tons, equivalent to 11.77 tons/day. This portion of solid waste does not significantly affect human health, but it affects negatively the landscape of the area.

For waste from the construction process that will hinder the movement of workers, debris and scrap metal can cause labor accidents, the packaging has a long time to decompose when not thoroughly collected, it will be buried in the soil causing soil pollution.

c) Hazardous waste

Hazardous waste arises from the operation of construction vehicles, the process of using paint to finish the work. Referring to the actual construction works, the amount of hazardous waste generated during the construction stage (360 days) is not much, about 5-10 kg/month.

During the construction process, hazardous solid waste will be generated such as: waste grease, grease rags, oil containers, paint containers, paint solvents, paint brushes, waterproofing agents, light bulbs... for construction and traffic activities.

Although the volume is small, if not properly stored and handled, waste oil and grease spilled onto the ground or washed out with rainwater will have negative impacts on soil, groundwater and surface water in the area.

2.1.1.2. Sources of impacts not related to waste

a) Noise

- *Sources:* Noise comes from:

+ Transportation vehicles come in and out of the Project.

+ Foundation reinforcement, construction: transportation, electricity, communication system, water supply system, rainwater and wastewater drainage, ...

+ In addition to pollution caused by construction activities, the operation of construction vehicles and equipment such as: dump trucks, road rollers, compactors, excavators, etc. also make significant noise.

- *Noise level:* Reference noise levels generated from construction equipment when measured at a position 1.5 m from the source are presented in the following table:

Alternatively, apply the following formula to calculate noise levels from various sources:

$$L_{10} = 10lg \sum_1^i 10^{0,1L_i}$$

In which: L_{10}(dBA): total noise level at 10m distance

L_i(dBA): noise level of each individual source (source i)

Apply the above formula to calculate total noise levels from various sources: The noise level at the exploration pit is estimated based on the simultaneous operation of the equipment as follows:

We have a table to estimate the noise level from construction equipment according to the distance from the location of the equipment as follows:

Table 2.9. Predicted resonance noise levels from construction equipment of the same type on the construction site

Construction equipment and machinery	**The highest noise level 1.5 m from the source (dBA)**	**Quantity (piece)**	**Total noise source caused by each type of equipment (dBA**
CARTEX 12E truck	93.0	1	93.0
5-ton and 10-ton dump truck	74.0	2	77.0
24 ton vibration roller	96.0	1	96.0
Platform vibrator	94.0	1	94.0
Concrete vibrator	88.0	1	88.0
Amphibious backhoe excavator	83.0	1	83.0
Crawler tractor set 1,6 m^3	93.0	1	93.0
16-ton self-propelled crane	85.0	2	88.0
Total max noise level		**10**	**101.03**

(Source: Nguyen Dinh Tuan and Nguyen Thanh Hung, 2007)

The forecast noise reduction by distance is calculated according to the following formula:

$$L_x = L_o - 20 \lg e.\alpha x$$

In which L_x: sound intensity (dBA) at x distance (m)

L_o: sound intensity (dBA) at source

x: survey distance (m);

α: absorption coefficient of the medium ($\alpha = 0{,}3x10^{-4}$ cm^{-1} is the absorption coefficient of the air with a relative humidity of 80%).

Table 2.10. Predicted resonance noise levels from construction equipment on the construction site

Number of equipment	**Noise level according to the distance to the equipment (dBA)**			
	1.5 m	**50 m**	**300 m**	**500 m**
10	101.03	88.8	73.2	68.8
QCVN 24:2016/BYT	**85**	**-**	**-**	**-**
QCVN 26:2010/BTNMT	**-**	**70**	**70**	**70**

Impact: Noise directly affects construction workers on the construction site, causing damage

to parts of the human body, especially for workers working directly in high noise areas. In addition, noise can drown out necessary commands, endangering construction workers on the construction site. First of all, the hearing organ is directly affected by noise, reducing the sensitivity of the ear, causing hearing loss, occupational deafness. In addition, noise causes headaches, ringing in the ears, dizziness, nausea, nervous disorders, cardiovascular disorders and diseases of the digestive system.

b) Vibration

Sources of vibration include: Transportation vehicles in and out of the Project, foundation reinforcement, construction activities: transportation, electricity, communication system, water supply system, rainwater and wastewater drainage, etc. In addition to pollution caused by construction activities, the operation of construction vehicles and equipment such as: dump trucks, road rollers, compactors, excavators, etc. also make significant noise. Each source has a different vibration frequency and intensity.

Vibration characteristics of some equipment and vehicles commonly used in the Project area are as follows:

Table 2.11. Vibration characteristics of vehicles and equipment

No.	Type of vehicles/source	Intensity (dB)	Vibration impact properties	Area
1	Transportation vehicles	**70**	Continued, Intermittent	Transportation road, Project area
2	The equipment for reinforcing the foundation, driving piles.	**75**	Intermittent	Project area

Note: Classified according to TCVN 7378:2004 Vibrations and quakes - Vibrations for buildings - Limits of vibration levels and assessment methods.

The operation of construction machinery and equipment in the project area also causes vibrations but has a small impact area and the operator of machinery and equipment is directly affected, the surrounding area is not affected.

c) Heat

Sources: heat generated during construction due to the use of heating equipment (welding and cutting) and from solar radiation due to long time working in the sun during the construction of the Project.

Impact due to heat: The effects of heat from solar radiation due to working for a long time in the sun will make workers feel quickly tired, thirsty, have headache, feel dizzy... thereby leading to reduced energy, productivity and the increased likelihood of accidents.

d) Impact on security and social order

The local socio-economic impacts mainly cause insecurity and increase social evils in the area. This is a source of impacts unrelated to waste and has a negative nature. However, these are completely controllable effects.

The project will affect the socio-economic development of the area, because the concentration of a large number of construction workers and the stay of workers in their huts may increase the pressure on local society management, regional disorder and insecurity. In addition, it increases the likelihood of infectious diseases. These are the effects that are likely to occur without

precautions and isolation. However, the workers working in the Project are mainly local people, so this impact is not significant.

e) Impact on the traffic

Impact on traffic (road) in the area: increase in the density of vehicles participating in traffic on D2, Le Van Viet roads due to transportation of construction materials and workers' transportation vehicles (an increase of about 74 car trips/day and about 80 motorbike trips/day).

As noted by the consulting unit when surveying the traffic density of vehicles at D2 road (near the project area) at 11:00 a.m. on March 10, 2020, the number of motorbikes circulating at the area is about 100 turns/minute, the number of cars/trucks is 30 turns/minute. Because D2 road is the main road in the High-Tech Park, it has a relatively stable infrastructure, so it is possible to ensure normal operation of vehicles when the project goes into construction. In addition, as noted, traffic congestion does not happen often, but the transportation of materials of the Project will increase traffic density, leading to many serious consequences such as: air pollution, construction material spillage, road damage, etc. The main objects that can be affected by these consequences are the activities of neighboring factories that often occur along the transportation route.

f) Possibility of flooding

Before construction, the project's land is leveled for the drainage in accordance with the elevation and a ditch for rainwater drainage is dug before raising the ground level of the project land, so there will be no difficulties in the drainage or no possibility of flooding of the Project.

However, in the project area, as the ground is concreted, the drainage capacity in the land is reduced, increasing the possibility of flooding in the area when it rains heavily. At the same time, if construction materials are not well managed, solid waste is generated, washed away by rainwater, blocks the regional drainage system, or the drainage ditch system are not regularly renovated and dredged, there is a high change of flooding, especially on heavy rainy days.

g) Impact on the area's environmental sanitation

The project construction process will generate some sources of pollution to the environment. When this process is carried out, one of the issues that the Investor as well as the construction contractor needs to pay attention to is environmental sanitation inside and outside the Project. The process of transporting construction materials, machinery and equipment, etc. into and out of the Project area not only pollutes the surrounding air environment, but also affect negatively the surrounding landscape of the Project area. When the scattered materials are not collected when it rains, the rainwater will wash away the dirt into the drainage system of the area, affecting the drainage of the area. In addition, the process of entering and leaving the Project of transport vehicles will carry sand and soil, if they are not cleaned before leaving the construction site, they will affect environmental sanitation on the roads around the Project within a radius of 200m.

In summary, the project construction process not only directly affects the air, water and soil environment inside and outside the project area, but also affects the health of workers working on the construction site. In addition, the construction process of the Project also partly affects the activities of neighboring factories near the Project area and on the transportation route. However, the degree of change is not very large, the impact time is long (360 days) and the impacts are almost only local in the Project area.

2.1.2. Environmental protection works and measures proposed to be implemented during the project construction stage

2.1.2.1. Measures to reduce sources of pollution related to waste

2.1.2.1.1. Measures to reduce air pollution

a) For exhaust gas dust, dust from leveling, transporting and gathering of materials

As assessed in the previous section, during the construction and equipment installation stage of the Project, dust will be generated from the activities of leveling, transporting and gathering materials. In order to control dust pollution from these sources, the investor will require construction units to take the following measures:

- Build construction plan: carry out the construction according to the successive method, build items in stages to limit dust generated at the same time.
- Comply with the set construction schedule.
- Arrange fence around the Project planning and construction area with a height of 3m.
- Vehicles carrying construction materials to the construction site, vehicles leaving the construction site must be tightly closed, covered, and cleaned under the vehicle's chassis and wheels before rolling onto the public road to avoid spilling sand, soil and dust on the road.
- Do not use old transport vehicles (more than 20 years old) and do not carry bulk materials that are too full to ensure safety when transporting.
- Drivers transporting materials need to comply with traffic safety rules and laws to avoid possible accidents and minimize congestion on the transportation route.
- Water the parking areas, load and unload construction materials with sprinklers. Watering frequency: Twice a day (morning from 9-10:00, afternoon from 14-15:00).
- During the leveling process, water regularly to create favorable conditions for soil compaction and dust prevention and limit dust dispersion into the surrounding area. Frequency depends on the moisture content of the leveling material and weather conditions.
- Water the ground in the mixing areas. Watering frequency: Twice a day (morning from 9-10:00, afternoon from 14-15:00).
- Irrigate materials such as stone and sand in the material gathering area to limit dust dispersion into the environment.
- Thoroughly solve the cleaning stage at the construction site by arranging workers to clean up some soil and stone scattered due to sticking to the wheel when pouring soil for leveling after each working session.
- In addition, workers will be equipped with dust protection masks and goggles.
- During the construction and installation, the investor will regularly supervise to urge and remind the construction unit to take measures to control dust and ensure that the concentration in the air meets QCVN 05:2013/BTNMT.

b) Control pollution from transportation vehicles and construction equipment

Exhaust gas from vehicles and motorized construction machines operating in the project area is a dispersed, discontinuous and very difficult source of pollution to control. In order to limit the impact of dust and exhaust gas from vehicles on the environment, the investor requires the construction unit to carry out a series of general control measures as follows:

- Transportation vehicles and motorized construction machines must be used correctly with the design of the motor, they should not be operated beyond the design capacity.

- Build a reasonable regime of driving in and out of the project area.
- Use a canvas to cover vehicles transporting soil, sand, stone, etc.
- Use anti-dust sprinkler on hot sunny days and strong winds in areas that generate a lot of dust.
- Equipment must be checked and maintained regularly.
- Use advanced, highly mechanized vehicles.
- The investor plans to coordinate with the construction contractor to arrange supervision, in order to promptly detect and overcome risks and materials scattered on the transportation route.

2.1.2.1.2. Measures to minimize the impact of wastewater

In order to minimize the impacts caused by wastewater generated during the construction process, the investor coordinates with the construction unit to carry out the following specific measures:

a) Pollution control of rainwater runoff

The pollution control of rainwater runoff and the flooding prevention during construction is very necessary to ensure no pollution to the environment, to ensure good drainage at the construction site and not to affect the surrounding area. Measures for pollution control of rainwater runoff and flooding prevention are applied as follows:

- Manage well construction materials and waste generated at the construction site, in order to limit the spillage into the drainage, causing flow blockage and environmental pollution.
- The flooding prevention during construction is very necessary to maintain the environment around the project area. Dig a drainage ditch around the construction area before proceeding with the construction of the Project. Rainwater is led into a (temporary) settling pit before flowing into the environment.
- Sedimentation is dredged regularly and the contractor hires a unit collecting and transporting it for treatment according to regulations.
- In case of flooding, the investor will send staff to the site to direct and fix the issue in time by mobilizing existing machinery and human resources at the site to create the flow and expand the flow appropriately.

b) For construction wastewater

- As mentioned above, the amount of construction wastewater includes vehicle cleaning, equipment rinsing, car washing water... However, the amount of water that is likely to have the most impact is the amount of water from the process of washing vehicles carrying construction materials before leaving the construction site.
- All vehicles before leaving the construction site must pass through the car wash bridge, where the vehicles are cleaned of sand and dirt that can affect the environment when leaving the construction site (contaminating the traffic road, dispersing dust into the environment ...). In order to limit the impact caused by this wastewater, during the construction stage, the Investor will build a wheel washing and wastewater settling system (including: 2 washing pits, 4 settling tanks and 1 clean water tank for reuse). According to the principle, wheel washing water will follow the ditch to 2 settling tanks respectively. In each tank, the solid residues in the wastewater will settle to the bottom of the tank and the clear wastewater will be drained out and led to the clean water tank for reuse.

c) Pollution control of domestic wastewater

- At the construction site, the construction management board will equip 02 portable toilets, specifically:

  + At the temporary office area, the Investor will install 01 portable toilet.

  + At the project construction area, the Investor will install 01 portable toilet.

- Periodically, wastewater and feces from portable toilets are transferred by contract to functional units to be transported to other places for treatment in accordance with regulations.

d) Minimizing the impact of Project construction activities on surface water quality

- Clean the construction site regularly to avoid rainwater carrying waste into the flow.
- Prepare a roof the material gathering area with a roof to ensure compliance with regulations in order to prevent the washing of materials and pollution of the surrounding environment.
- Limit soil and stone from the construction area carried with the wastewater into rivers and canals, causing bank erosion, sedimentation and increasing turbidity of surface water.
- Retrieve the grease, oil and lubricants from transportation vehicles.
- To limit pollution caused by workers' daily activities, measures to utilize local human resources for construction sites will be applied. In addition, the construction site will also be equipped with portable toilets for construction workers to avoid the situation that feces and urine are carried with rainwater, polluting the surface water environment.
- Wastewater generated during construction mainly contains residues and grease, so all wastewater will be collected and preliminarily treated by the method of settling and separating oil before being discharged to the receiving source, which is the sewer of the area.

2.1.2.1.3. Waste collection measures

a) Construction waste

- All kinds of SW such as sand, stone, and debris are collected and the Company contracts for the transportation and treatment with functional units.
- All kinds of formwork, iron, steel are completely reused.
- All kinds of packaging of building materials: Are collected and sold to recycling companies. For non-recyclable packaging, the construction contractor will contract with a functional unit to collect and treat according to regulations.
- The generated SWs are stored in temporary storage (the warehouse is covered with corrugated iron and is located in the North of the Project, with an area 5 m x 10 m = 50 m2) to avoid being swept by rainwater causing flow blockage and environment pollution.

b) Hazardous waste

- For HWs to be concentrated and stored in sealed containers labeled as HWs and stored in a temporary hazardous waste warehouse with an area of 15 m2, located next to the construction solid waste warehouse in the north of the Project, the Investor prepares 05 containers containing 60 liters corresponding to 05 types of HW generated.
- Contract with a functional unit to collect, transport and treat HWs in accordance with the provisions of law.

c) Domestic solid waste

- Establish site rules that prohibit workers from littering.

- Domestic solid waste generated during the construction of the Project is collected and classified according to Decision No. 44/2018/QD-UBND dated November 18, 2018 on the classification of domestic solid waste at sources in Ho Chi Minh City, domestic solid waste is divided into 3 groups: group of biodegradable organic waste (leftovers, leaves, vegetables, tubers, fruits, dead animals), group of wastes capable of reuse and recycling (paper, plastic, metal, rubber, nylon, glass) and the remaining waste group.
- All domestic waste from workers' huts is collected and concentrated into 03 240-liter containers with tight lids and classification labels located at the worker's hut area and on the construction site, the contractor contracted with a functional unit for daily collection and transportation to another place for treatment in accordance with regulations.

2.1.2.2. Measures to reduce sources of pollution not related to waste

a) Pollution control of noise and vibration

Measures to reduce the impact of noise and vibration during construction are applied as follows:

- In order to minimize the impact of noise and vibration of the construction site, the Project Construction Management Board has a reasonable construction plan, the transportation vehicle of construction materials and construction equipment operating at an appropriate time and reasonable distance, no centralized operation. Limit noise sources at night.
- Check the level of vibration noise during construction to set a suitable construction schedule so that the noise level reaches the permissible standard. Have a reasonable labor organization, aiming to create breaks without exposure to vibrations from 20 30 minutes and with the maximum time for one continuous work not exceeding 4 hours.
- Construction machinery and equipment have their records attached and are regularly checked, maintained, and monitored according to technical parameters.
- Construction units will use modern construction methods with low noise level to construct the foundation.

b) Minimize impact on security and social order

- Increase the use of local manpower to reduce the construction of many huts.
- Report to local authorities, apply for temporary accommodation for workers to stay at the construction site’s hut area.
- Ensure adequate sanitation facilities for construction workers such as portable toilets, and domestic solid waste will be collected and treated according to The investor will contract with a unit that has the function of collecting sludge from this dredging process and treating it in accordance with regulations.
- Develop adequate and clear living rules and organize worker management.
- Clear sewers, stagnant water puddles, kill larva and mosquitoes to prevent malaria, dengue fever.
- The investor will work closely with local authorities to easily control the security and social order situation in the area during the construction process.

c) Minimize impact on the traffic

In order to minimize the impacts from the Project's activities on traffic, the Investor and the construction unit continue to implement the mitigation measures mentioned in the preparation stage.

In addition, the following measures will be applied:

- Coordinate the transportation of construction materials to avoid the concentration of a large number of vehicles on the road at the same time.
- The investor arranges traffic regulators.
- Vehicles transported on the road must run at the prescribed speed.
- Coordinate the activities of transportation vehicles to avoid rush hours.
- Drivers must comply with the Traffic Law to avoid traffic jams and be safe when traveling.
- Collect and clean up spilled materials on traffic routes.
- The vehicles used in transportation and construction meet the standards of the Vietnam Register.

d) Measures to prevent flooding during construction

The implementation of flooding prevention works before going into construction is very necessary to maintain the safety of the project and the environment in the project area. According to the actual survey results, the project area has the ability to quickly drain water in the rainy season. Similar to the leveling phase, the Investor will create a drainage path to ensure that water quickly drains into the manhole before flowing into the environment. The drainage direction is determined as the current drainage direction of the Project.

When it rains, rainwater will follow the pre-made drainage route to the manhole and to the environment. During the process, the rain will carry soil, stones and garbage, easily causing sedimentation and blockage of drains. Therefore, in order to avoid this situation, all rainwater generated during construction will be concentrated in manholes to settle and collect garbage before being released into the environment.

e) Measures to maintain environmental sanitation and landscape in the project area during the construction stage

The investor and the construction unit commit to clean the area around the construction site every day, avoid the concentration of wastes generated from the construction site.

To maintain the beauty of the construction area, the Investor and the construction unit commit not to encroach on the roadside in front of the Project area to gather materials.

f) Measures to minimize the impact on the operation of neighboring factories

- Fully implement measures to prevent noise and vibration, minimize dust and exhaust gas from transportation vehicles, construction machinery and equipment. At the same time, well manage generated wastewater to avoid affecting the surrounding environment during the construction process.
- Collect and treat generated construction and domestic waste in accordance with current regulations;
- Ensure the collection and treatment of construction wastewater during construction;
- Ensure the cleanliness of the works where the works are carried out to avoid causing flooding and affecting the environment around the project area.
- Ensure labor safety at the place of construction to avoid fire, explosion, electric shock during the implementation of the Project;
- Carry out good management of social order and security with the workers staying at the

construction site during the implementation process;

- Wash trucks/cars 2 times/day to limit dust and SW from the vehicle to the surrounding environment.
- Gather construction materials in the East of the Project to avoid dust and noise impact on neighboring factories (Southwest of the Project).

2.2. Forecast impacts and propose measures and works to protect the environment during the project operation phase

2.2.1. Forecast impacts

When the Project is put into operation, the Project's activities may cause adverse effects on people and the environment. On the basis of the analysis of the project's activities, the sources of pollution can be summarized as follows:

Table 2.12. Main pollution problems and sources during the project operation stage

Main pollutants	Sources
Sources of impacts related to waste	
Air pollution	
SO_2, NO_2, CO, VOC, dust...	- From the operation of transportation vehicles to deliver and carry raw materials and finished products to and from the Project area.
Exhaust gas	- From the operation of LPG boilers - From the waste storage area
Water pollution	
Rainwater	- Rainwater runoff in the area
Domestic wastewater (BOD, COD, TSS, Ammonium, Coliform, vegetable and animal fats, etc.)	- During daily activities of employees
Production wastewater (TSS, COD, Total N, Total P, mineral oil, grease, Coliforms, ...)	- From the cleaning of machinery, equipment and factories. - From the washing of protective clothing when entering aseptic room. - From Lab activities.
Pollution due to solid waste	
Non-hazardous waste	- During daily activities of workers - From the production process, product packaging, material weighing, boxing, packing in block, labeling and printing.
Hazardous waste	- During equipment maintenance. - From the production process, to labeling and printing.
Sources of impacts not related to waste	

Noise, vibration, heat	- Noise: from the transportation vehicles coming in and out of the Project area and from the operation of machinery and equipment. - Vibration: from the operation of production machinery. - Heat: arising from the operation of machinery and equipment in the production process, most of the equipment and machinery generate heat during their operation and from solar radiation.
Odor	Activities of staff and odors from toilets and garbage areas: Mainly NH_3, H_2S, CH_4,…
Security, social order, traffic	The construction of the Project requires the concentration of workers and the transportation of construction materials.

2.2.1.1. Sources of impacts related to waste

2.2.1.1.1. Assess and forecast the impact of dust and exhaust gas

a) Dust and exhaust gas from the operation of transportation vehicles

During the operation of the factory, there are a number of vehicles entering and leaving the factory every day to transport materials, products or hazardous and non-hazardous solid waste arising from the operation of the factory. The fuel used in this operation is gasoline or Diesel, so the exhaust smokes contain a lot of dust and SO_2, NO_2, CO, VOC. This is also one of the sources of air pollution.

To calculate the pollutant load due to the transportation vehicles like cars, trucks, motorbikes, we can estimate the maximum total number of vehicles circulating as:

- Number of motorbikes: 136 vehicles (1 for each employee in average) equivalent to 272 turns/day.
- Number of cars: approximately 10 turns/day (passenger bus to factory, garbage collection vehicle).
- Number of vehicles transporting raw materials and finished products: The factory is expected to use 3 ton trucks for transportation, estimated at 10 turns/day.

Thus, the total number of motorbikes is 272 turns/day and 20 turns/day for cars.

Composition: Exhaust gas from the combustion of fuel during the operation of transportation vehicles, mainly include: CO, SO_2, NO_x, VOC and dust.

Load: Based on the pollution coefficient established by the World Health Organization (WHO) for DO oil trucks with a load of 3.5 - 16 tons, the load of air pollutants due to construction activities are shown in the following table.

Table 2.13. Pollution coefficient and load due to the operation of automobiles and motorcycles in the production process reaching the designed capacity

Pollutant	Pollution coefficient (1)(kg/1,000 km)	Total length (km/day.vehicle)	Total number of vehicles (vehicle/day)	Load (kg/day)

Car				
Dust	0.8	10	20	0.16
SO_2	0,6S	10	20	0.06
NO_x	3.15	10	20	0.63
CO_2	8.7	10	20	1.74
VOC	0.34	10	20	0.068
Motorbike:				
Dust	0.032	10	272	0.0871
SO_2	0,76S	10	272	0.103
NO_x	0.3	10	272	0.816
CO	20	10	272	54.4
VOC	3.9	10	272	10.61

(Source: Atmospheric Brown Clouds Emission Inventory Manual– ABC EIM, 2013)

Note: The sulfur (S) content in DO oil is 0.05%.

Comment:

- Amount of dust and exhaust gas generated by the transportation vehicles of materials during construction is not high. Besides, as the space is large, the travel distance is quite long, combined with the time of a trip, the concentration of pollutants generated will not be too great.
- However, in case the transportation vehicles of raw materials are not carefully covered, dust, soil and sand will be scattered along the transportation route, which may cause certain impacts on the environment around the project area and on the transportation routes of these vehicles.
- Pollution sources from vehicle emissions are scattered and difficult to manage. In addition, during the vehicle's operation, emissions are dispersed along the road, not concentrated in place, so the level of impact is also minimized.

b) Diffuse dust from material transportation

The forecast of the possibility of dust collection due to wheels during transportation by a team of experts based on an empirical formula proposed by the *US Department of the Environment* takes into account real conditions in Vietnam.

According to the mine design textbook - Hanoi University of Mining and Geology, the load in the transportation process is calculated as follows:

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

Where:

L: dust load (kg/km/vehicle/year).

k: particle size; k = 0.2.

s: the amount of soil on the road; s = 8.9%

S: average speed of the vehicle; S = 10km/h

W: the loaded weight of the vehicle; W = 3 tons

w: number of wheels; w = 6 wheels

With these number we get: 0.069 kg/km/turn of vehicle/year.

Dust pollution is dispersed during the transportation of materials and products, however, it is calculated for the average affected area, which is 20 km.

Dust load during the transportation of finished products (360 days):

0.069 (kg/km/turn/year) x 2 (trip/day) x 20 (km) / 360 (day) = 0.0076 kg/day.

Dust load during the transportation of materials for production (360 days):

0.069 (kg/km/turn/year) x 3 (trip/day) x 20 (km) / 360 (day) = 0.0115 kg/day.

Hence, dust load during the transportation of materials for production and finished products: 0.0191 kg/day.

Dust pollution has an impact on the whole transportation route. However, as the construction dust has a large particle size (0.2mm), the ability to deposit quickly, the range of dispersion in the air is narrow, it can also be noticed that dust only arises when it is windy and dry. The project needs to pay special attention to measures to minimize dust pollution, cover the trunk when transporting materials.

c) Dust and exhaust gas from loading and unloading, receiving materials

Goods delivered and received at the Project are mainly materials for the project and products are packed in cartons or sealed packages, so the transportation of goods and materials is almost free of dust arising from this activity.

Thus, dust pollution generated by received materials is not significant, mainly due to manual loading and unloading of raw materials to the warehouse.

d) Exhaust gas from the operation of LPG boilers

The project is equipped with 02 boilers, with a capacity of 3 tons/h, burning LPG gas. During operation, the boiler will generate polluted exhaust gas containing dust, SO_2, NO_X, CO. The amount of LPG used is about 146,160 kg/year, equivalent to 406 kg/day.

Based on the pollution coefficient from gas combustion of WHO (1993), the pollutant load in the exhaust gas from LPG fuel combustion from boiler operation is specifically calculated as follows:

Table 2.14. Pollution load due to the operation of LPG boiler

No.	Pollutant	Pollution coefficient (kg/ tons)	Pollution load (kg/day)
1	TSP	0.061	0.025
2	SO_2	20S	0.114
3	NOx	2.05	0.832
4	CO	0.41	0.166

(Source: WHO (1993))

Note: S: Sulfur content in gas. According to the basic standard of Vietnam Oil and Gas Group S ≤0.014%

Comment: LPG is a fuel, which is a clean form of natural gas that is compressed at a pressure of 200 ÷ 250 bar at ambient temperature. Compared to other traditional fuels (gasoline, oil...), LPG is the most environmentally friendly fuel, so the exhaust gas from the combustion of LPG gas when released into the environment meets QCVN 19:2009/BTNMT without any treatment.

e) Exhaust gas from other sources: exhaust gas generated from landfills, toilets

This source of pollution does not affect workers because the waste gathering area is far from the production area. However, the investor also proposes measures to collect it. Thoroughly treat waste, avoid long-term decomposition causing odors, maintain general hygiene to avoid affecting the company's beauty.

2.2.1.1.2. Assess and forecast the impact of wastewater generation sources

a) Rainwater runoff

- *Sources:* As a rule, rainwater is conventionally considered clean water if it is not exposed to pollution sources: wastewater, exhaust gas, contaminated soil, etc. When flowing through areas containing pollutants, rainwater will carry pollutant compositions to the receiving source, creating favorable conditions for the rapid spread of pollutants.

  During the operation of the Project, if the sources of environmental pollution are not controlled according to regulations, when rainwater falls on the project site, it will carry pollutants in the exhaust gas, wastewater, SW causing the pollution. Depending on the local rainwater control plan, the composition and concentration of rainwater change significantly.

- *Flow:* Maximum flow of rainwater runoff:

  Q_{max} = 0.278 KIA (m^3/s) (*)

  + A: land area = 25,008 m^2.

+ I: The highest average rainfall intensity = 574.6 mm/month = 14.37 mm/h = 0.01437 m/h (the highest rainfall in the period 2013 - 2017 was in October 2017, the average estimated rainy day number in a month is 20 days (in the rainy season), 2 hours per day).

+ K: Runoff coefficient = 0.9 (applied to paved and concrete road areas).

Q_{max} = 0.278 x K x I x A = 0.278 x 0.9 x 0.01437 x 25,008 = 89.91 m^3/hour = 0.025 m^3/s

((*): Source: Le Trinh, Water pollution monitoring and control, Science and Technology Publishing House, 1997)

b) Domestic wastewater

Based on *Table 1.7. Project's demand for water*, the amount of wastewater generated during the project's operation are calculated as follows:

Table 2.15. Generated wastewater flow

No.	Water users	Q supply (m^3/day and night)	Q waste (m^3/day and night)	Note
1	Employee activities (Q_{sh})	7.3	7.3	Q_{tsh} = 100% Q_{sh}
2	Pharmaceutical production and	5	0	All are used to prepare products, no wastewater is

	preparation activities (Q_{sx})			generated
3	Washing protective clothing when entering aseptic room ($Q_{washing}$)	4.8	4.8	$Q_{twashing}$ = 100% $Q_{washing}$
4	Boiler Operation (Q_{lh})	3	0	None
5	Floor cleaning water	14	11.2	Q_{tvvs} = 80% Q_{vss}
6	Water to clean machinery and equipment (Q_{vsmm})	1	1	Q_{tvsmm} = 100% Q_{vsmm}
7	Activities of the Lab (Q_{lab})	1	0.8	Q_{tlab} = 80% Q_{lab}
8	Plant watering (Qtc)	0.73	0	None
Total		**36.83**	**25.1**	

- *Sources:* Domestic wastewater is generated from the daily and hygiene activities of employees.
- *Wastewater generated:* Average demand for domestic water use per employee (TCXDVN 33:2006), norm of domestic water supply for employees is 45 l/person.day, (unbalanced coefficient K=1.2):

The amount of water needed for employee at the time of highest concentration is: 136 people x 45 l/person.day x 1.2= 7.3 m^3/day

Generated wastewater flow: about 7.3 m^3/day (estimated wastewater volume is equal to 100% of water supply).

- *Load, concentration:* Many suspended solids, easily biodegradable organic matter; high nutrient content (N, P), containing many pathogenic microorganisms, especially *Coliform, Fecal Streptococci, Salmonella typhosa* and some other pathogenic bacteria. The daily load of pollutants released into the environment per person (if not treated) is as shown in the following table:

Table 2.16. Load and concentration of pollutants in domestic wastewater during the operation stage of the Project

No.	Pollutant	Coefficient (g/person/ day)	Load (kg/day)	Concentration of pollutants (mg/l)			
				Untreated	Treated by septic tank	Connection standards of HTP	Efficiency
1	Suspended solids (SS)	60 – 65	8.16 – 8.84	1,888 – 2,046	189 – 204	**300**	90
2	BOD_5	30 – 35	4.08 – 4.76	904 – 1,102	189 – 220	**250**	80
3	Surfactants	3.3	0.449	104	93.5	**-**	10
4	Grease	2 – 2.5	0.72 – 0.34	63 – 78.7	37.8 – 47.2	**100**	40
5	Cl-	10	1.36	314.8	78.7	**-**	75

Note: Pollution coefficient according to TCVN 7957:2008 Drainage – network and external

works – Design standard)

Comment: Based on the above table, the concentrations of pollutants in domestic wastewater after passing through the septic tank meet the standards for wastewater reception of the High-Tech Park.

If the wastewater generated from the Project's activities is not treated up to the prescribed standards before being discharged into the receiving source, it will cause some impacts as follows:

Organic substances: High organic matter content will cause dissolved oxygen (DO) concentration in water to decrease rapidly because microorganisms need to take dissolved oxygen in water to convert the above organic substances into CO_2, N_2, H_2O, CH_4 … If the DO concentration is below 3 mg/l, it will inhibit the growth of aquatic organisms and affect the development of aquatic ecosystems. If this type of wastewater is stagnant in the environment, it will cause an unpleasant stench due to the decomposition of organic. On the other hand, since the decomposition of organic compounds causes nitrogen and phosphorus compounds to diffuse back into the water, an increase in the concentration of these nutrients in the water can lead to eutrophication.

Suspended solids: Suspended solids when discharged into the aquatic environment will float to the surface of the water to form a thick layer. Over time that layer turns gray, it not only affects negatively the beauty but more importantly, this layer of floating objects will prevent the process of oxygen exchange and light transmission, leading to an anaerobic state. On the other hand, a part of the sediment deposited at the bottom will be decomposed under anaerobic conditions, which will create a bad smell for the surrounding area. Suspended solids will reduce photosynthesis, and at the same time reduce the growth and development of plants in the water.

Nutrients (N, P): An excess of nutrients leads to an explosion of algae. The decomposition of algae absorbs a lot of oxygen. Without oxygen, the components in the water will ferment and give off a foul odor. In addition, the process of floating on the surface of the water of algae forms a membrane causing no light and lack of oxygen at the lower water layer. At this time, the photosynthesis of the lower water layer's plants is reduced. Nitrogen concentrations higher than 1 (mg/l) and phosphorus higher than 0.01 (mg/l) at slow flows are conditions that cause algae blooms and eutrophication. Eutrophication degrades water quality by increasing turbidity, increasing organic content and may contain toxins secreted by algae that interfere with aquatic life.

Microorganism: Spread diseases, endanger human and animal health when using water contaminated with pathogenic microorganisms. Water containing pathogenic bacteria is often the cause of typhoid, paratyphoid, dysentery, and cholera. Depending on the conditions, bacteria have strong or weak tolerance. Natural water sources often have some species of bacteria that live in the water or contaminated with some bacteria from the soil. Coliforms are a group of facultative aerobic or anaerobic rod-shaped intestinal bacteria and especially Escherichia Coli (E. Coli). E. Coli is a bacterium that is found in abundance in human and warm-blooded animal feces. It is estimated that up to 70% of infectious diseases are transmitted through water contaminated with pathogens.

Therefore, if this wastewater is not well controlled and treated, it will spread pollution in the water source such as groundwater, causing epidemics in the infected area, causing great damage to the health of people living in and around the Project area.

c) Production wastewater

The production wastewater generated during the operation of the Project includes wastewater from the washing of protective clothing when entering the sterile room, floor cleaning, cleaning of machinery and equipment, and laboratory activities. The maximum amount of domestic and

production wastewater generated regularly from the project is 25.1 m^3/day.

The generated wastewater mainly contains many inorganic components including TSS, COD and very little organic solvents from the lab such as disinfectants and antibiotics.

Table 2.17. Characteristics of wastewater from pharmaceutical manufacturing industry

No.	Indicator	Unit	Quality of untreated input wastewater	Standards for wastewater reception the High-Tech Park
1	pH	mg/l	5.1 – 6.2	**5 - 9**
2	TSS	mg/l	144 – 193	**300**
3	BOD_5	mg/l	162 – 199	**250**
4	COD	mg/l	553 – 576	**600**
5	Total N	mg/l	6.7 – 9.5	**60**
6	Total P	mg/l	1.3 – 2.1	**14**

Comment: Based on the above table, the concentrations of pollutants in production wastewater meet the standards for wastewater reception of the High-Tech Park.

2.2.1.1.3. Assess and forecast the impact of solid waste generation sources

a) Domestic waste

Domestic waste is generated from the daily activities of employees.

The number of employees of the Project is 136 people, the volume of domestic waste generated from employee's activities is about 68 kg/day (about 0.5 kg/person.day on average).

Domestic solid waste mainly contains organic compounds such as leftovers, fruit peels and cans, canned goods, packaging, paper, etc. These are easily decomposed substances that cause stench if no proper management measures are taken.

In addition, in the rainy season, garbage can be carried away by rainwater runoff causing pollution and blockage of the flow of surface water sources, or seeped into the ground, polluting groundwater. Therefore, the Project will implement management and collection measures to avoid the impact on the surrounding environment.

b) Non-hazardous solid waste

The amount of non-hazardous industrial solid waste arises from the process of weighting materials, packaging and labeling. Referring to the Samil Factory Project in Korea, the estimated production solid waste arising from the project's activities includes:

- Materials and chemicals scattered are about 10 kg/day. The volume of materials and *chemicals* is very low, because the weighting of materials is carried out accurately and in accordance with a certain process.
- Cartons, labels removed are about 10 kg/day. The volume of cartons and labels is very low because the packaging and labeling process is done by automated machinery and in a closed process.

c) Hazardous waste

Hazardous waste at the Project arises from storage of raw materials, printing of

pharmaceutical codes, maintenance of machinery and equipment, lighting, and laboratory activities. Referring to the Samil Factory Project in Korea, the estimated weight of HW arising from the project's activities includes:

Table 2.18. Hazardous waste generated during the operation stage of the Project

No.	Waste name	Status of existence	HW code	Sources	Quantity (kg/year)
1	Waste fluorescent lamps and activated glass	Solid	16 01 06	Lighting	10
2	Absorbent, filter material (including oil filter material not covered by other codes), rags, waste protection cloth contaminated with hazardous components	Solid	18 02 01	Rags contaminated with hazardous ingredients during machine maintenance	30
3	Waste synthetic engine, transmission and lubricating oils	Liquid	17 02 03	Machine maintenance	50
4	Waste batteries and accumulators	Solid	16 01 12	Office	5
5	Waste ink cartridges containing hazardous components	Solid	08 02 04	Office, printing of pharmacy code	5
6	Waste soft packaging	Solid	18 01 01	Chemical packaging	20
7	Plastic waste hard packaging	Solid	18 01 03	Chemical packaging	100
8	Other waste products from extraction, cleaning solutions and waste organic solvents	Solid	03 05 03	Laboratory	50
Total					**270**

The Company will take measures to collect, transfer for the treatment of hazardous wastes to functional units to minimize the impact of hazardous wastes on people and the environment.

2.2.1.2. Assess and forecast sources of impacts not related to waste

a) Noise

Noise is generated mainly from the operation of machinery, equipment and vehicles, transportation of materials and products in and out of the Project.

Due to the characteristics of the pharmaceutical industry, the production stages must be

placed in a closed process with modern machinery and equipment, so the noise generated is quite low. In general, the project area is very airy, the noise emitted is conditioned to spread quickly, with little reflection, so the possibility of noise resonance is also minimized.

Harmful effects of noise:

- Noise affects the ears, then the central nervous system, then the cardiovascular system, stomach and other organs.
- The impact of noise depends on the frequency and intensity of the sound, the frequency of repetition of the noise.
- Impact on sensory organs: Noise reduces sensitivity, increases hearing threshold, affects working process and safety.
- Impact on other organs:

+ Central nervous system: Noise stimulates the central nervous system, affects the brain and causes headaches, dizziness, fear, anger without reason.

+ Cardiovascular system: Disturb the heart rhythm, affect the normal functioning of blood circulation, increase blood pressure.

+ Stomach: disrupt the secretion, increase acid in the stomach, disrupt contractions, cause stomach ulcers

+ The long-term impact of noise on people will be insomnia, nervous depression, as well as exacerbation of cardiovascular diseases and high blood pressure.

b) Vibration

Sources of vibration include: operation of machinery, equipment and vehicles, transportation of materials and products in and out of the Project.

Vibration can cause harmful effects:

- For construction works: Vibration can damage construction works: reduce the sustainability of structures, foundations, etc.
- For humans: Vibration and noise caused by vibration can cause headaches, dizziness, nausea like motion sickness due to unstable standing, thereby affecting employee health and work performance.

Due to the characteristics of the pharmaceutical industry, the production stages must be placed in a closed process with modern machinery and equipment, so the vibration generated is quite low.

c) Heat

Heat is generated mainly by solar radiation, the operation of machinery and equipment and boilers.

According to QCVN 26/2016/BYT – National Technical Regulation on Microclimate –

The permissible value for microclimate at the workplace, the temperature value from 18 – 32^{o}C is appropriate. However, according to measurements, the background temperature can be higher than 32^{o}C, along with the heat effect from the machinery and vehicles can make the temperature higher, affecting the health of workers.

Employees working in areas with high temperatures often have higher rates of illness than other groups: digestive diseases 15% versus 7.5%; skin diseases 6.3% versus 1.6%; cardiovascular disease 1% versus 0.6%; neurasthenia 17% versus 5.6%.

d) Impact on traffic activities

During the operation of the Project, there will be an additional 5 trips per day in the area (including 2 trucks carrying finished products to the place of consumption; 3 trucks transporting raw materials) transporting raw materials and finished products in and out of the Project. In addition, there are transportation vehicles for officials and employees: 136 employees, if each person rides a motorbike, there are about 136 arrivals and 136 departures a day.

As noted by the consulting unit when surveying the traffic density of vehicles at D2 road (near the project area) at 11:00 a.m. on March 10, 2020, the number of motorbikes circulating at the area is about 100 turns/minute, the number of cars/trucks is 30 turns/minute. Because D2 road is the main road in the High-Tech Park, it has a relatively stable infrastructure, so it is possible to ensure normal operation of vehicles when the project goes into operation.

However, the operation of the Project may hinder traffic activities, traffic accidents, affect the quality of roads for a long time, and cause subsidence.

e) Impact on neighboring factories

Around the Project, other factories are operating in the High-Tech Park. Therefore, the impact from the project's production activities such as noise, dust, boiler exhaust gas may affect them, but not significantly due to the large project land area (25,008 m^2), while the construction area is only about 49.96%, so the possibility of spreading pollutants to neighboring factories is relatively low.

In addition, when the project comes into operation, it contributes to a significant increase in traffic density in the area, leading to many serious consequences such as: air pollution, construction material spillage, road damage, etc. Furthermore, the concentration of a large number of employees at the Project (136 people) can cause problems of insecurity and disorder - society in the area due to conflicts, disputes between employees and neighboring factories.

2.2.1.3. Assess and forecast sources of impacts caused by incidents and risks of the Project

During the operation of the Project, despite the application of many preventive measures, there is still the possibility of environmental risks and incidents causing great damage to people and property of the Investor and strong impacts on the environmental components in the area and vicinity.

a) Labor accident

In the exploration stages, labor accidents may occur when using machinery, equipment, and transportation that do not comply with labor safety procedures.

- Transmission and movement parts: shafts, gears, belts and other types of transmission mechanisms; the movement of the machine itself such as: automobiles, cranes, etc., creating the risk of rolling, clamping, cutting…; Accidents can cause injury to workers.
- Power supply: Each voltage level and amperage creates the risk of electric shock, electric discharge, electromagnetic field, fire due to electric short...; paralyze the respiratory and cardiovascular systems.

Assessment: Construction machines are heavy industrial machines, with large capacity using high voltage power, hence the consequences of accidents are great, even endangering the lives of many people.

b) Fire and explosion incidents

One of the problems that may arise during the operation of the Project is a fire and explosion incident. Fire and explosion risks related to the Project's activities include the following groups:

- Group 1: fire due to leakage or spillage of flammable chemicals or fuels that meet fire;
- Group 2: fire caused by flammable solid materials being ignited such as paper packaging, wood, garbage...;
- Group 3: fire caused by electrical equipment;
- Group 4: fire and explosion caused by lightning;

Fire and explosion is one of the top priorities of the Project during the operation stage. When there is a fire and explosion incident, the employees' lives will be in danger. Therefore, the Investor pays special attention to this issue and will apply appropriate prevention, control and response measures.

2.2.2. Proposed environmental protection works and measures

2.2.2.1. Minimize waste-related impacts

2.2.2.1.1. Pollution control of dust and exhaust gas

a) Plans to minimize dust and exhaust gas from the operation of transportation vehicles, material transportation and loading and unloading, receiving materials

- Pave asphalt concrete for internal roads, for sidewalks, pave bricks, plant trees along internal roads in order to create a landscape of the area while improving the surrounding air environment.
- Traffic planning ensures to meet the number of vehicles transporting materials and products in and out to avoid traffic congestion at peak hours.
- Establish an environmental sanitation team. The environmental sanitation team will regularly sweep to minimize dust from the road that is likely to rise.
- In the dry season, spraying water on the yard reduces dust and heat caused by vehicles moving in and out of the area.
- Plant trees to prevent dust from spreading too much into the air. Thick green canopy can absorb smoke and gas mixtures such as: SO2, CO2, compounds containing nitrogen, phosphorus, other toxic trace elements such as Pb, Cu, Fe...
- The speed limit of traffic vehicles when entering and leaving the project is below 5km/h.
- Vehicles transporting children must turn off their engines during the gathering of materials and products.
- Provide masks and protective gear for employees.
- Materials for the project must be packed in cartons or sealed packages for the transportation of goods.
- Vehicles transport materials and products with the correct load to avoid overloading.
- The production area is built separately from the external environment. This room ensures the equipment is always in the cleanest condition. All walls and ceilings are painted against chemical corrosion. Surface air and environmental quality is regularly monitored by RODAC panels, air separators and particle counters.
- Install a HEPA filter (high efficiency particulate air filter) to capture very small dust particles to the maximum extent. HEPA filters, according to US Department of Energy (DOE) standards adopted by most US energy industries, remove at least 99.97% of dust particles of 0.3 micrometers (μm) diameter.

b) Plans to minimize exhaust gas from the operation of LPG boilers

- The boiler uses LPG as a fuel, which is a clean form of natural gas that is compressed at a pressure of 200 ÷ 250 bar at ambient temperature. Compared to other traditional fuels (gasoline, oil...), LPG is the most environmentally friendly fuel, so the exhaust gas from the combustion of LPG gas when released into the environment meets QCVN 19:2009/BTNMT without any treatment. At the Project, exhaust gas from the operation of LPG boilers is released into the environment without any treatment.
- Operate the boiler in accordance with the manufacturer's instructions.

c) Plans to minimize exhaust gas from domestic waste storage areas and toilets

- For odors arising from waste containers, garbage storage areas:

+ Garbage is stored in closed bins, so the smell is limited to the surrounding area.

+ Garbage is collected daily to limit the decomposition of garbage, thus limiting the odor generated.

+ Clean garbage collection tools daily to limit odor generation.

- For odors arising from the sewage system:

+ The wastewater drainage system is built closed and underground, so it also limits the odor generated.

+ Regularly check to detect and promptly repair leaks, avoid gas escaping into the environment causing odors.

2.2.2.1.2. Pollution control of wastewater

a) Domestic wastewater

With the maximum number of employees about 136 people, the amount of domestic wastewater generated is about 7.3 m^3/day. All wastewater is collected and preliminarily treated by septic tanks. The structure diagram of a 3-compartment septic tank is shown as follows:

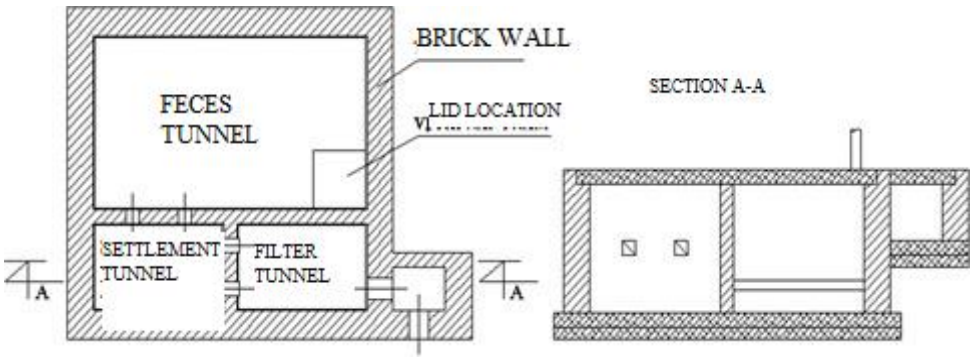

Figure 2.1. Diagram of a 3-compartment septic tank

A septic tank is a work that simultaneously performs two functions: sedimentation and decomposition. Sediment is kept in the tank for 3 ÷ 6 months, under the influence of anaerobic microorganisms, organic matter is decomposed, a part of it forms dissolved substances. Wastewater settles in the tank for a long time to ensure high settling efficiency. The septic tank is a rectangular surface tank, with a retention time of 1 day, 90% ÷ 92% of the suspended substances settle to the bottom of the tank, over a period of time, the sediment will decompose anaerobically in the settling compartment, the wastewater then passes through the filter compartment and exits through the pipe. In the filter compartment, the filter material is 4x6 stones at the bottom, and 1x2 stones at the top.

In each tank, there is a vent hole to release the gas generated during anaerobic fermentation

and the second function of this tube is to open the inlet and outlet pipes when clogged.

According to article 7.3.1, note section (TCXD 7957:2008 Drainage of external network and works). The 3-compartment septic tank is calculated as follows:

Wastewater flow: Q_{tsh} = 7.3 m^3/day.

Determine septic tank capacity based on water volume of the tank and sediment volume.

$$W_{bth} = W_n + W_c$$

Where:

W_n: water volume of the tank, m^3. $W_n = Q_{tsh}$ = 7.3 m^3/day.

W_c: Sediment volume of the tank, m^3.

$$Wc = \frac{\{a * T * (100 - W_1) * b * c\} * N}{\{(100 - W_2) * 1000\}} (m^3)$$

W_c = (0.5*180*(100 – 95)*0.7*1,2)*136/((100 – 90)*1000)) ≈ 5 (m^3)

Where:

a: average amount of sediment discharged by 1 person in a day, 0.5 - 0.8l/day (choose a=0.5)

b: factor that takes into account the reduction of sediment volume during fermentation, b = 0.7

c: factor refers to the fact that leaving a part of the fermented residue when sucking the residue to retain microorganisms so that the fermentation process of the residue is quick and easy, choose c=1.2

T: time between 2 times of descaling, depending on the condition to ensure the complete fermentation of the residue and the management condition (descaling) T = 180 days

W1: moisture of fresh sediment into the tank, 95%

W2: moisture of sediment during fermentation, 90%

N: number of people the tank serves = 136 people

Septic tank volume:

$W_{bth} = W_n + W_c$ = 7.3 + 5 = 12.3 m^3

3-compartment septic tank: The volume of the compartment is 50% of the tank volume, the volumes of the other two compartments are equal and equal to 25% of the tank volume.

All domestic wastewater after the septic tank and production wastewater according to the wastewater drainage system of the Project is led to the wastewater collection system of the High-Tech Park on D2 street at 01 manhole.

b) Production wastewater

Domestic wastewater is preliminarily treated through a septic tank along with wastewater from the washing of protective clothing when entering the sterile room, floor cleaning, cleaning of machinery and equipment, and laboratory activities, collected into a storage tank, and then led to the wastewater collection system of the High-Tech Park on D2 street at 01 manhole, then treated at the Wastewater Treatment Station of the High-Tech Park, with a capacity of 5,000 m^3/day before being discharged into the environment.

c) Rainwater runoff

Rainwater runoff

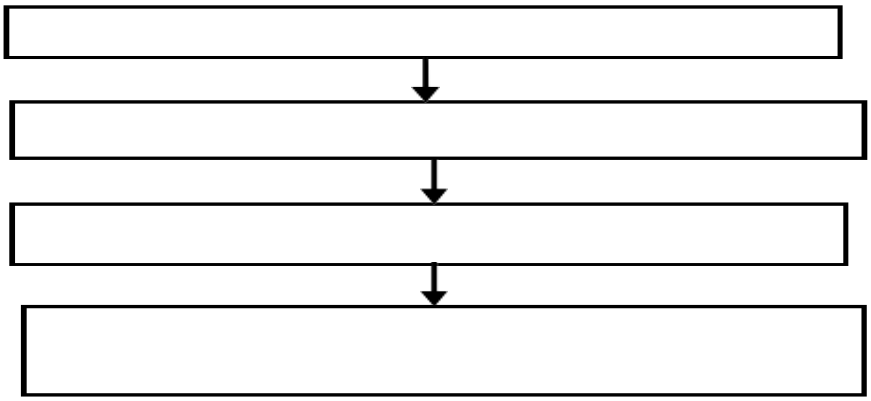

Figure 2.2. Diagram of pollution control of rainwater runoff

Rainwater collection system and wastewater collection system are built separately.

The project arranges a rainwater collection network including HUME pipes, PE pipes, U-shaped box culverts, ditches along the internal roads of the area, to ensure the collection of rainwater runoff and discharge to the rainwater collection system of High-Tech Park on D15 road at 02 manholes.

During the process, the rain will carry soil, stones and garbage, easily causing sedimentation and blockage of drainage ditches. Therefore, to limit this situation, the entire rainwater ditch is concreted and dredged regularly. The investor will contract with a functional unit to collect sludge from this dredging process and treat it in accordance with regulations.

2.2.2.1.3. Pollution control of solid waste

a) Domestic solid waste

Domestic solid waste generated during the operation of the Project is collected and classified according to Decision No. 44/2018/QD-UBND dated November 18, 2018 on the classification of domestic solid waste at sources in Ho Chi Minh City, domestic solid waste is divided into 3 groups: group of biodegradable organic waste (leftovers, leaves, vegetables, tubers, fruits, dead animals), group of wastes capable of reuse and recycling (paper, plastic, metal, rubber, nylon, glass) and the remaining waste group.

To collect this amount of waste, the Project arranged 03 240-liter plastic trash cans with lids and classification labels at the gate area and 18 small 60-liter trash cans with classification labels in toilet areas, internal roads, offices and in the factory area.

All kinds of SW at the small 60-liter bin will be collected at the end of the day and concentrated in 03 240-liter plastic trash cans with lids and classification labels at the normal waste storage area located in the factory 1 with an area of 50.4 m^2, then transferred to a functional unit to collect, transport and treat.

The amount of domestic waste generated is always thoroughly collected, the Investor will sign a contract to collect domestic waste for regular transportation and treatment (1 time per day), avoiding the situation of waste being stored for a long time, stinking and unsightly.

b) Non-hazardous industrial solid waste

Non-hazardous industrial solid waste will be collected, classified and gathered in a normal waste storage area located in factory 1 with an area of 50.4 m^2;

Non-hazardous industrial solid waste will be sold to scrap collectors.

c) Hazardous waste

Hazardous waste will be collected, classified and stored at the Project in plastic containers with lids, without leakage, in a covered storage area, with a waterproof foundation. Containers are labeled to distinguish different types of hazardous waste in accordance with Circular 36/2015/TT-BTNMT. The hazardous waste storage house has an area of 59.19 m^2.

The company commits to sign a collection contract with the collection functional unit in accordance with Circular No. 36/2015/TT-BTNMT dated June 30, 2015 of the Ministry of Natural Resources and Environment on hazardous waste management after the project comes into operation.

2.2.2.2. Minimize non-waste impacts

a) Pollution control of noise and vibration

Noise and vibration arising from activities in areas are difficult to control. However, the noise level is not too high, which is acceptable. Therefore, in order to minimize the impacts caused by noise and vibration, the Investor will set rules on production activities and implement plans to ensure the quietness of the neighboring factories. Specifically:

- Set deceleration points to limit traffic speed in the Project area.
- Put up signs regulating the speed of traffic in the project area below 5km/h.
- Regularly check the detailed wear and repair it if there is a problem, and replace the equipment if its useful life has ended;
- Vehicles when gathering materials and products need to turn off their engines while waiting.
- Periodically lubricate or replace damaged parts:

b) Pollution control of heat

- The purpose of heat pollution control is to cool the air, clean dust and some toxic gases in the air… The project will design a suitable floor plan to ensure ventilation according to the principle of natural ventilation.
- In the workshop, arrange and install a HEPA filter (high efficiency particulate air filter) to capture very small dust particles to the maximum extent. HEPA filters, according to US Department of Energy (DOE) standards adopted by most US energy industries, remove at least 99.97% of dust particles of 0.3 micrometers (µm) diameter.
- The tree system is an effective way to control heat pollution and create a pleasant feeling for employees working at the project.

c) Measures to minimize impacts on traffic, security and order

- Limit transportation during peak hours to avoid increasing traffic volume in the area.
- Ensure the quality of roads in the Project area.
- Construct speed barriers on internal roads.
- On all roads, there will be signs, guide signs, traffic speed signs for the Project

d) Measures to minimize the impact on neighboring factories

- Fully implement measures to prevent noise and vibration, minimize dust and exhaust gas from transportation vehicles, production machinery and equipment. At the same time, well manage generated wastewater to avoid affecting the operation of neighboring factories during the production process.
- Collect and treat generated waste in accordance with current regulations;

- Prioritize the recruitment of local factory workers, this is an effective and feasible solution that both creates jobs for local workers and helps to minimize the impact of worker concentration.
- The investor will coordinate with local authorities in ensuring security and order and be responsible for the management of factory workers.
- Arrange transportation time for materials and products appropriately to avoid rush hour.

2.2.2.3. Measures to manage, prevent and respond to risks and incidents of the Project

a) Labor safety

The Investor takes the following measures to ensure the safety of employees working at the Project:

- Carry out labor safety training for workers
- Comply with regulations on labor safety when organizing the production, arrangement of machinery and equipment, and measures to prevent electrical accidents.
- Arrange signboards at dangerous places such as boilers, material gathering areas, etc. for vehicles and passersby to watch out.
- Machinery and equipment have their records attached and are regularly checked and monitored according to technical parameters.
- Workers directly operating machinery must be trained and practiced to operate properly when there is a problem and always be present at their position, manipulate, check and operate correctly.
- Equip employees with means of labor protection according to current regulations of the Ministry of Labor, War Invalids and Social Affairs.
- Ensure the good conditions of medical facilities.
- Ensure workers' working conditions to meet QCVN 26:2016/BYT and TCVSLD according to Decision 3733/2002/BYT by following measures:

+ Periodically organize the measurement and test of microclimate at the workplace at least once a year and in accordance with the provisions of the Labor Law, the Law on labor safety and hygiene.

+ Workers are fully equipped with labor protection equipment in accordance with the working environment as prescribed by law.

- The establishment shall arrange at least 01 person to do the labor safety and hygiene work under the part-time regime.
- The facility shall arrange at least 01 person to perform intermediate-level medical work, or sign a contract with a qualified medical examination and treatment facility.
- Organize first-aid forces according to regulations (Circular 19/2016/TT-BYT guiding the management of labor hygiene and health of workers).

b) Fire prevention and fighting

- Prepare fire prevention and fighting plans and submit them to competent authorities for approval, comply with the approved fire prevention and fighting plans. The investor will comply with Vietnam's standards on fire prevention and fighting.
- Fully equipped with fire prevention and fighting equipment according to regulations of the

fire protection and fighting police. Fire fighting facilities (CO2 fire extinguishers, sand, shovels, power poles...) will be checked regularly and always in a state of readiness.

- Strictly manage and safely use combustibles, explosives, flame sources, heat sources, fire-generating equipment and tools, heat-generating substances, fire-generating substances; ensure safety conditions on fire prevention and fighting
- Regularly and periodically check to detect weakness and shortcomings in fire prevention and fighting and take timely remedial measures.
- Prepare forces, means, plans and other conditions so that when a fire occurs, it will be extinguished promptly and effectively.
- Establish a firefighting team Inspect, urge and observe the regulations and safety rules on fire prevention and fighting. Organize the training of fire prevention and fighting skills. The fire prevention and fighting team is trained and fostered professionally, under the direction, inspection and professional guidance of the fire prevention and fighting police agency, subject to the mobilization of competent authorities to participate in fire prevention and fighting activities.
- Install lightning protection system at the roofs and high-rise buildings, high and medium voltage poles and transformer stations... of the Project.
- Train fire prevention and fighting skills for officers and fire prevention teams.
- Stick the necessary phone numbers (hospitals, firefighting teams, etc.) at emergency exits and entrances.
- Organize periodic fire drills.

c) Environmental incident control

For portable toilets:

Regularly monitor the operation of the portable toilet, maintain it periodically to avoid possible problems such as:

- Blocked toilet or pipes causing feces, urine to be stuck. Therefore, it is necessary to unclog toilets and pipes to drain feces and urine.
- Blocked exhaust pipes cause bad odors in the toilet or can cause an explosion in the septic tank. In this case, it is necessary to clear the air duct to limit odors as well as ensure the safety of the toilet.
- Periodically, the septic tank must be cleaned.

Leaked, broken water supply and drainage pipes:

- Water supply and drainage pipes must have safe isolation lines.
- Regularly check and maintain the joints, locking valves on the pipeline system to ensure that all pipelines have enough durability and the safest tightness.
- There aren't any construction works on the water supply pipeline.

2.3. Completion progress of environmental protection works, measures

The environmental protection works will be carried out in the time shown in the following table:

Table 2.19. Completion progress and cost of environmental protection works

No.	Item	Implementation progress	Implementation cost (VND)
I	**Construction stage**		**85,000,000**
1	Dig a temporary rainwater drainage ditch	November 2020	50,000,000
2	Temporary waste storage	November 2020	20,000,000
3	Solid waste container	August 2020	5,000,000
4	Portable toilets	August 2019	10,000,000
II	**Operation stage**		**310,000,000**
1	Solid waste container	October 2021	10,000,000
2	Rainwater drainage system	June 2021	100,000,000
3	Wastewater drainage system	June 2021	150,000,000
4	Solid waste and HW storage	June 2021	50,000,000
Total			**395,000,000**

CHAPTER 3: ORGANIZE THE IMPLEMENTATION OF ENVIRONMENTAL PROTECTION MEASURES

3.1. Plan for organizing the implementation of environmental protection measures

The plan for organizing the implementation of environmental protection measures is presented in the following table:

Table 3.1. Plan for organizing the implementation of environmental protection measures

No.	Item	Implementation progress	Implementation plan
I	**Construction stage**		
1	Dig a temporary rainwater drainage ditch	November 2020	Hire a professional contractor to do it. The investor arranges supervisory staff
2	Temporary waste storage	November 2020	Hire a professional contractor to do it. The investor arranges supervisory staff
3	Solid waste container	August 2020	The investor implements the plan
4	Portable toilets	August 2019	Hire a professional contractor to do it. The investor arranges supervisory staff
II	**Operation stage**		
1	Solid waste container	October 2021	The investor implements the plan
2	Rainwater drainage system	June 2021	Hire a professional contractor to do it. The investor arranges supervisory staff
3	Wastewater drainage and production wastewater settling system	June 2021	Hire a professional contractor to do it. The investor arranges supervisory staff
4	Solid waste and HW storage	June 2021	Hire a professional contractor to do it. The investor arranges supervisory staff
5	Factory air dust filter system	September 2020	

3.2. Environmental monitoring plan

The Investor only conducts environmental monitoring during the construction and operation stage of the Project. The environmental monitoring plan is shown in detail in the following table:

Table 3.2. Environmental monitoring plan

No.	Sample Type	Location	Monitoring parameters	Monitoring frequency	Standard of comparison
I	**Construction stage**				
1	Air	01 position at the Project construction area	Noise, Vibration, Dust, SO_2, NO_2, CO	6 months/time	QCVN 05:2013/BTNMT, QCVN 26:2010/BTNMT, QCVN 27:2010/BTNMT
2	Wastewater	01 position of manhole to connect wastewater to HTP	pH, TSS, COD, BOD5, Total N, Total P, mineral grease	6 months/time	Acceptance standards of HTP
II	**Operation stage**				
1	Emissions	02 locations at 02 chimneys that release boiler exhaust gas	Dust, SO_2, NO_x, CO, flow of	06 months/time	QCVN 19:2009/BTNMT
2	Wastewater	01 position of manhole to connect wastewater to HTP	pH, TSS, COD, BOD_5, Total N, Total P, animal and vegetable fats and oils, Coliform	06 months/time	Acceptance standards of HTP

Commitment

We commit to the roadmap to implement measures and works to minimize adverse impacts on the environment stated in the environmental protection plan.

We enclose the Appendix below with documents and papers related to the project and establishment.

APPENDIX

APPENDIX 1 - LEGAL DOCUMENTS OF THE PROJECT

APPENDIX 2 - PROJECT DRAWINGS