本署檔號
OUR REF: ( ) in EP1201/2-45/EP2101
來函檔號
YOUR REF:
電話
TEL. NO.: 3741 1427
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Environmental Protection Department
Waste Infrastructure Division

Room 1501-04, 15/F,
Chinachem Exchange Square,
1 Hoi Wan Street,
Quarry Bay, Hong Kong.

環境保護署
廢物基建科

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海灣街 1 號
華懋交易廣場 15 樓
1501-04 室

Director of Environmental Protection
EIA Ordinance Register Office
Environmental Protection Department
27th Floor, Southorn Centre,
130 Hennessy Road,
Wanchai, Hong Kong
(Attn : Mr. Keith Lam)

21 Jul 2025
By Hand

Dear Mr. Lam,

Environmental Permit No. EP-226/2005/G
Paper Pulping Plant in EcoPark
at Lot P1, P5-7 at EcoPark in Tuen Mun Area 38
Condition 4.4 – Operation outside the 0700hours to 1900hours period and Annex F(i)(a) – Use of Fuel Combustion

I refer to the approved Environmental Permit (EP-226/2005/G) granted to us under EIA Ordinance on 18 March 2021 for the Development of an EcoPark in Tuen Mun Area 38.

We submitted herewith an application for operation of the paper pulping plant and wastewater treatment plant outside the 0700hours to 1900hours period beyond Q3 2025 as required in the Condition 4.4 and the use of fuel combustion as required in the Annex F(i)(a) of the approved EP-226/2005/G.

The letters of certification and verification by the ET Leader and IEC respectively are also enclosed for your reference.

Yours faithfully,

(Bernard Lam)
for Director of Environmental Protection

Encl.

Our Ref. 2075/25-0004

Organic Waste Infrastructure Group
Environmental Protection Department
Rm.1501-04,15/F., Chinachem Exchange Square,
1 Hoi Wan Street, Quarry Bay, Hong Kong

27/F, Overseas Trust Bank Building
160 Gloucester Road
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F: +852 2815 5399

www.asecg.com

Attn: Mr. Kevin. K.M WONG,

23 June 2025

By Email

Dear Sir,

RE: CONTRACT NO.: EP/SP/102/17
PROVISION OF MANAGEMENT SERVICES FOR ECOPARK 2022
TECHNICAL NOTE FOR PAPER PULPING PLANT IN ECOPARK [CONDITION 4.4 OF EP-226/2005/G]

Reference is made to the submission of Technical Note of the captioned under Condition 4.4 and Annex F (i)(a) of Environmental Permit (EP) (No.: EP-226/2005/G) received on 17 June 2025.

Please be informed that we have no adverse comment on the captioned submission, and hereby certify the submission in accordance with the requirement stipulated in Condition 4.4 and Annex F (i)(a) of the EP.

Should you have any queries, please contact the undersigned at 2815 7028.

If you require any further information, please do not hesitate to contact the undersigned.

Yours sincerely,

Grace M. H. KWOK
Environmental Team Leader

GK/tw
Encl.

c.c.	AECOM	Attn: Mr. Jackel C.H. LAW	(By Email)
	UPML	Attn: Ms. Raindy P. Y. YIP / Ms. Eunice Y.H. WONG	(By Email)

AECOM
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Your Ref:
Our Ref: 60693014/C/hpyk20250626_1

By email

Organic Waste Infrastructure Group
Environmental Protection Department
Rm.1501-04,15/F., Chinachem Exchange Square,
1 Hoi Wan Street, Quarry Bay, Hong Kong

Attn: Mr. K. M. Wong

26 June 2025

Dear Sir

Contract No. EP/SP/102/17
RE: PROVISION OF MANAGEMENT SERVICES FOR ECOPARK 2022
TECHNICAL NOTE FOR PAPER PULPING PLANT IN ECOPARK [CONDITION 4.4 OF EP-226/2005/G]

Independent Environmental Checker Verification Letter

We refer to ET's email 2075/25-0004 dated 23 June 2025 on the above subject and hereby verify the submission.

Should you have any queries, please do not hesitate to contact undersigned at 38565312.

Yours faithfully,
For and on behalf of
AECOM Asia Co. Ltd.

Law Cheuk Ho Jackel
Executive Director
Environment

Encl.

c.c. AEC Attn: Ms. Grace M. H. KWOK (By Email)
UPML Attn: Ms. Raindy P. Y. YIP / Ms. Eunice Y.H. WONG (By Email)

TECHNICAL NOTE

FOR

PAPER PULPING PLANT IN ECOPARK

Prepared by:

Ir. Dr. Dicken Wu

Approved by:

Lead Consultant

Spence Robinson L T Limited

Lemon M.V. Leung (Managing Director)

24 June 2025

TABLE OF CONTENTS

1. INTRODUCTION

1.1 BACKGROUND

1.1.1 EcoPark has been developed in Tuen Mun Area 38 in two phases (Phase 1 and Phase 2) with a total area of around 20 hectares, of which 14 hectares of land can be rented to tenants to carry out recycling and related activities. EcoPark is a Designated Project (DP) under Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) and an Environmental Impact Assessment (EIA) Report together with an Environmental Monitoring and Audit (EM&A) Manual were prepared for EcoPark in 2005. EcoPark is governed under Environmental Permit (EP) No. EP226/2005/G, which was issued to the Director of Environmental Protection (the Director, or the Permit Holder). Therefore, all recycling facilities in EcoPark are subject to this EcoPark EP.

1.1.2 Hong Kong Zhou Ji Paper Industrial Limited (Zhou Ji) was awarded a 20-year lease for EcoPark Lots P1, P5, P6 and P7, with total area of about 14,000 square metres, to develop a local paper pulping plant by Environmental Protection Department (EPD) in 2022. The paper pulping plant will be able to process about 630,000 tonnes of local waste paper per year. A 3-storey paper pulping plant is situated in Lots P5, P6 and P7, while the wastewater treatment plant is situated in Lot P1. Layout plan of Lots P1, P5, P6 and P7 is illustrated by Figure 1.1 below.

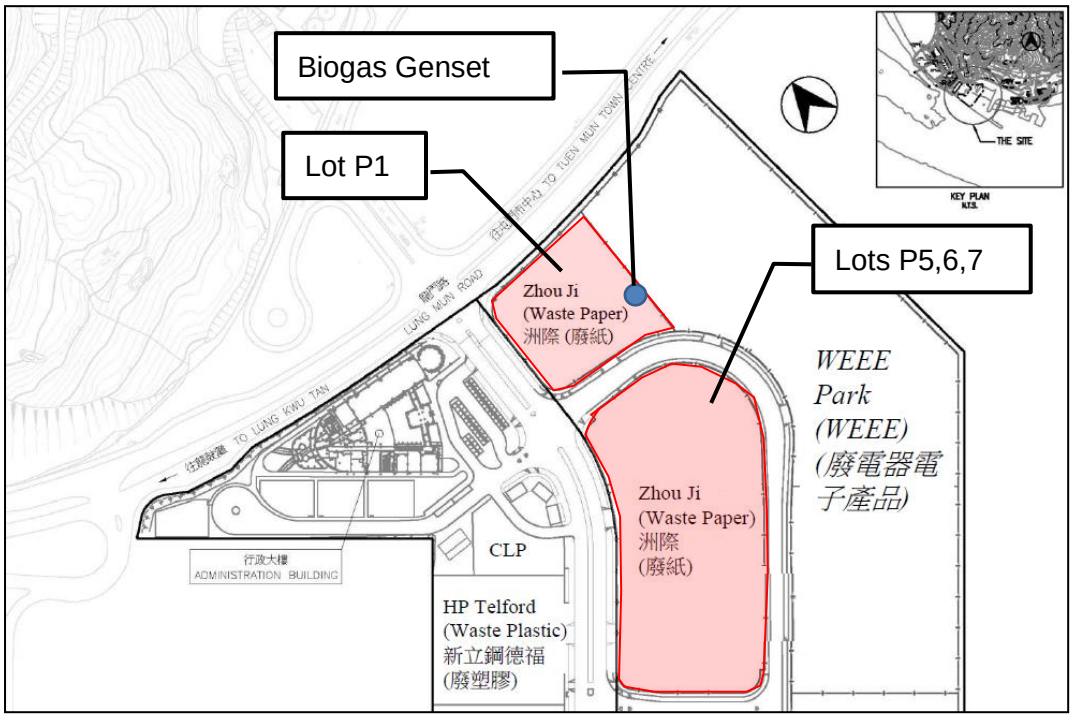


Figure 1.1 – Layout Plan for Paper Pulping Plant and Waste Water Treatment Plant in Tuen Mun EcoPark

1.1.3 Two sets of biogas gensets will be installed at Lot P1 to generate electricity for the waste paper recycling and wastewater treatment processes being carried out at the paper pulping plant and the wastewater treatment plant respectively. The paper pulping plant and the wastewater treatment plant will operate for 24-hour, 7 days a week.

1.1.4 According to Condition 4.4 and Annex F(i)(a) of the current EP (i.e. EP226/2005/G), a detailed proposal is required to be submitted to EPD for approval, for any chimney emissions outside the period of 0700 hours to 1900 hours, and for fuel combustion, i.e. the by-product, biogas,

for the waste paper recycling process respectively. In order to enable the paper pulping plant and the wastewater treatment plant to operate for 24 hours per day, 7 days week beyond Q3 2025 (i.e. the tentative commissioning date of the paper pulping plant and the waste water treatment plant) and to adopt biogas combustion, this Technical Note (TN) is required to be submitted to EPD for approval to demonstrate that using biogas combustion and the 24-hour operation of paper pulping plant and wastewater treatment plant would not cause adverse air quality impact to nearby Air Sensitive Receivers (ASRs).

1.2 PUPORSE OF THIS REPORT

1.2.1 The purpose of this TN is to evaluate the air quality impact from the operation of the paper pulping plant and wastewater treatment plant outside the 0700hours to 1900hours period beyond Q3 2025 as required in the Condition 4.4 and the use of fuel combustion as required in the Annex F(i)(a) of the current EP (i.e. EP-226/2005/G).

1.3 STRUCTURE OF THE TECHNICAL NOTE

1.3.1 This TN is set out as follows:

- Section 1 provides background and the purpose of this TN;
- Section 2 provides an overview of paper pulping plant operation;
- Section 3 provides details of proposed biogas gensets and;
- Section 4 provides details of proposed measures of wastewater treatment plant and the event and action plan for odour;
- Section 5 provides conclusion of this TN.

2. OVERVIEW OF THE PROPOSED PAPER PULPING PLANT AND WASTEWATER TREATMENT PLANT OPERATION

2.1 BASIC INFORMATION

2.1.1 The paper pulping plant is situated in Lots P5, P6 and P7, and the associated wastewater treatment plant is situated in Lot P1, covering an approximate area of 14,000m^2. The paper pulping plant is specifically designed to recycle local waste paper collected, and transform them into pulp products through mechanical pulping process, including screening, sorting, pulping.

2.1.2 The tentative commissioning date of the paper pulping plant and the wastewater treatment plant is in Q3 2025, i.e. the tentative commissioning date of the paper pulping plant and the waste water treatment plant. The processing capacity of the paper pulping plant per annum (measured in a 12-consecutive-month period) is about 630,000 tonnes, which will be less than 1,000,000 tonnes of waste paper according to Condition 4.17 of the current EP.

2.2 PULP PRODUCTION PROCESS

2.2.1 The paper pulping plant comprises of various equipment that is essential for the pulping process, including chain conveyor, hydraulic pulper, ragger, hydraulic cutter, detrasher, high density cleaner, drum screen, dump tower, coarse/fine screening system, disc thickener. The

process flow diagram of paper pulping plant is provided in Appendix A.

2.2.2 The process begins by introducing waste paper into the hydropulper via chain conveyor. Waste paper is dissolved and homogenized in the pulper and the contaminants, such as adhesive tapes, plastics and wires, will be sorted out. The pulp slurry will be pumped to high density cleaners in order to remove the metal, sand and other heavy impurities by centrifugal force. During coarse screening and fractionating, coarse impurities will be separated from the fibres. The pulp slurry will then be fed into the vacuum thickener to remove water from the pulp. The thickened pulp will be stored in the pulp storage tank, and transported to the pulp machine to produce pulp. Bleaching process will not be involved in the pulp production process according to Condition 4.5(iv) of the current EP.

2.2.3 Electricity is the main source of energy in producing mechanical pulp. Biogas gensets will be used for electricity generation for wastewater treatment plant operation. The EIA Report of EcoPark assumed and assessed the recycling processes involving on-site combustion of fossil fuels. Nevertheless, no fossil fuel will be required for such operation with a view for betterment of air quality performance. Based on the biogas genset technical data, the resulting gaseous pollutants will primarily be small amount of nitrogen oxides (NO_x), sulphur dioxide (SO_2) and Particulates (PM) as RSP and FSP.

2.2.4 When comparing to the emission rate of burning fossil fuel, biogas gensets would result in emission of lower level of greenhouse gas emissions and more environmentally friendly, and biogas gensets are therefore adopted in the paper pulping plant. Key parameters of the pulping process are summarized in Table 2.1 below.

Table 2.1 Parameters of the Pulp Process

PARAMETER	DESCRIPTION
Initial Recyclable	Waste Paper
Final Product	Paper Pulp
Product Process	Mechanical pulping
Fuel	Electricity
Operating Hours	0000 to 2400, 7 days per week
Air Pollution Control Equipment	Selective Catalytic Reduction (SCR)
Processing Capacity	630,000 tonnes per year
Pulping Medium	In water

3. OVERVIEW OF THE PROPOSED BIOGAS GENSETS

3.1 BASIC INFORMATION

3.1.1 Wastewater generated in the pulp production process would be treated in the waste water treatment plant, which adopts anaerobic digestion. Biogas generated as byproduct, from the anaerobic digestion process, in the Internal Circulation Reactor will be transferred to a biogas holder as buffer storage of biogas in order to maintain a constant and controlled gas supply to the biogas gensets. The stored biogas will pass through the washing towers to remove the hydrogen sulphide (H_2S) before passing to the biogas gensets. Biogas will be combusted in

the gensets to produce electricity and heat for treatment process use. The piping and instrumentation diagram (P&ID) of biogas gensets is in Appendix B.

3.1.2 Biogas gas gensets, are located within the west side of the Chimney Restricted Area as shown in Figure 3.1. The fume exhaust pipes from biogas internal combustion engines are part of the biogas gas genset. The biogas gensets are shown in the layout plan of Lot P1 in Appendix C.

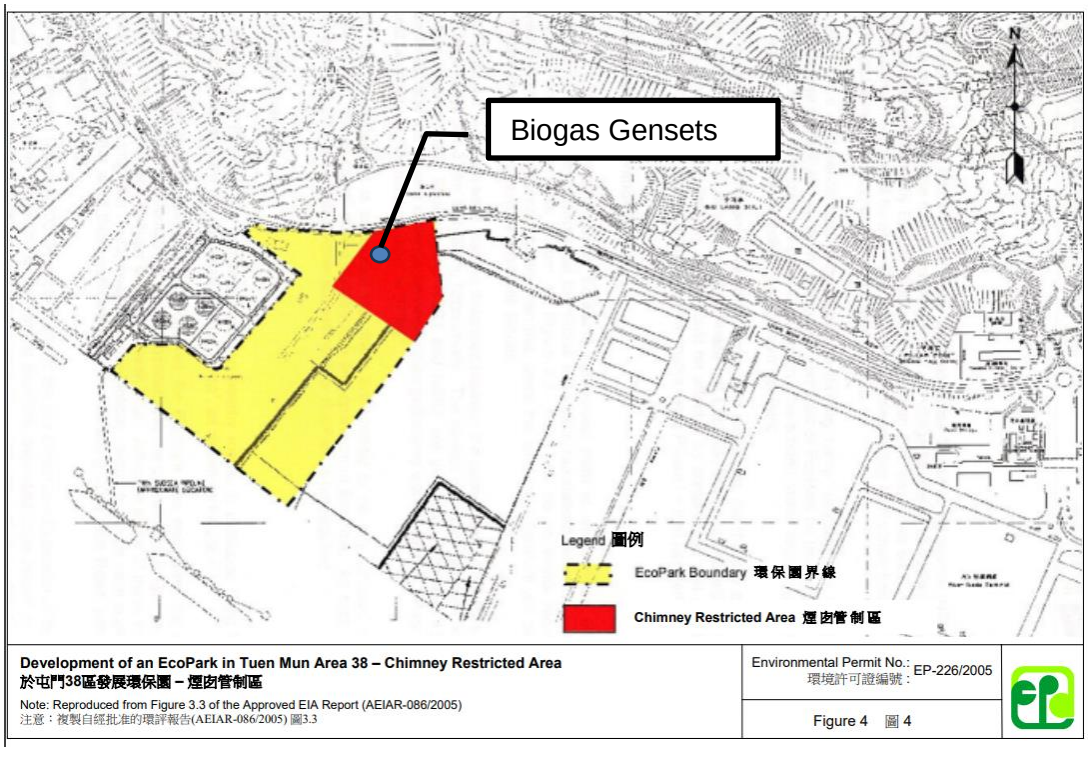


Figure 3.1 – Chimney Restricted Area of EcoPark

3.1.3 In view of the high operational reliability of the gensets, residual biogas for flaring would only be occurred under emergency situation. Selective Catalytic Reduction (SCR) unit will be used to remove nitrogen oxides (NOx) before discharging to the atmosphere via fume exhaust pipes. The SCR is designed to remove 60% of the targeted air pollutants, NOx. The specification of two biogas gensets, exhaust pipe parameters, and emission rates for NOx, SO_2, FSP and RSP (after control) are included in the Appendix D. The use of biogas gensets would have notably less gaseous pollutants than other genset options, e.g. biogas plus other fuel and totally running on fossil fuel.

3.1.4 In relation to Condition 4.4 of the current EP, the pollutants specified in Table 3.12 of the final EIA report for Development of an EcoPark in Tuen Mun Area 38 related to the 19:00 to 07:00 chimney emission include PM, SO2, NOx, CO, TAPs, VOC and Hg. However, the operation of the gensets does not emit CO, TAPs, VOC and Hg.

3.2 FUME GAS EXHAUST ARRANGEMENT FOR BIOGAS GENSETS

3.2.1 The fume exhaust pipe will be diverted and extended to outside the Chimney Restricted Area. Figures 3.2 to 3.4 outline the Chimney Restricted Area and the location of fume exhaust pipe outside it.

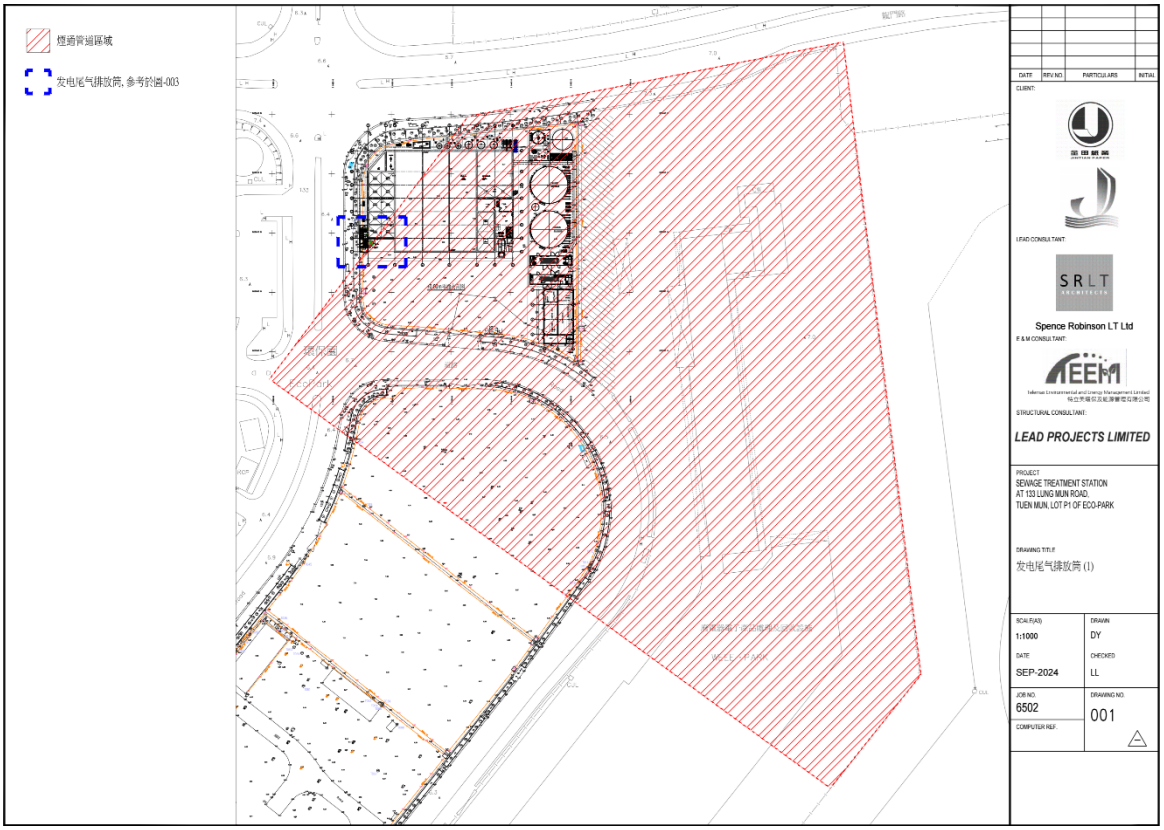


Figure 3.2 – Keyplan for Fume Exhaust Pipe, Biogas Gensets & Chimney Restricted Area of EcoPark

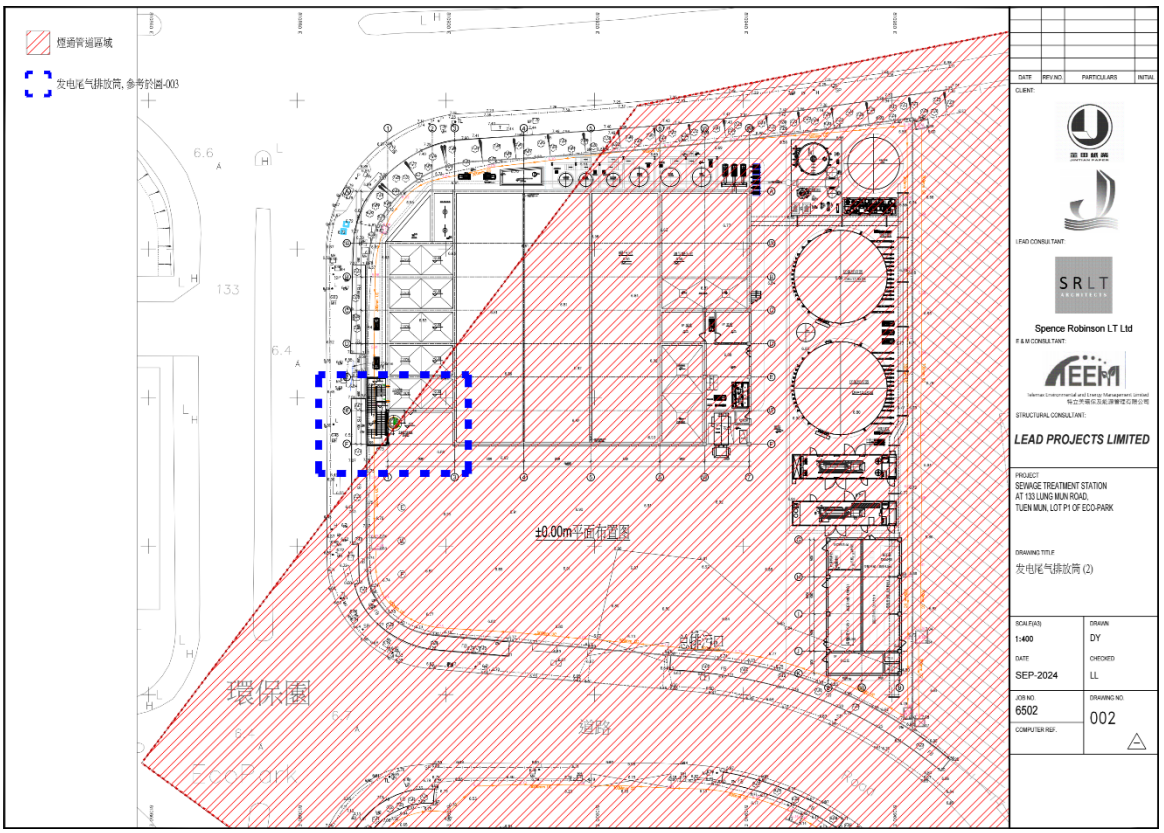


Figure 3.3 – Keyplan for Fume Exhaust Pipe, Biogas Gensets & Chimney Restricted Area of EcoPark (Closeup View)

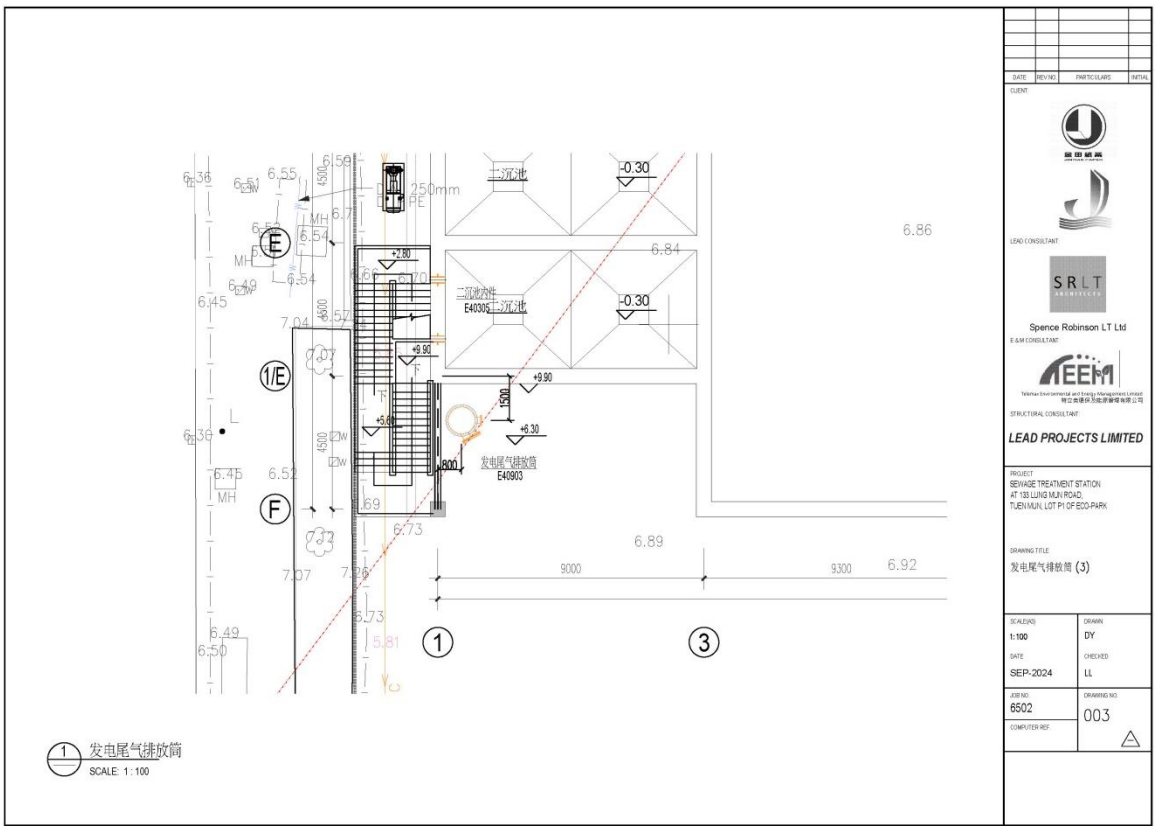


Figure 3.4 – Fume Exhaust Pipe on Roof Level & outside Chimney Restricted Area

3.3 AIR POLLUTION CONTROL MEASURES

AIR SENSITIVE RECEIVERS (ASRs)

3.3.1 Several industrial ASRs are located in close proximity to the paper pulping plant, including Goodman Westlink, PAFF office, Shiu Wing Steel Mill and Green Island Cement. The local air quality of the paper pulping plant is primarily influenced by the industrial emissions from the aforementioned industrial sites. It is noted that the nearest residential ASRs are the village houses in Lung Tsai located about 2km away from the paper pulping plant.

MITIGATION MEASURES

3.3.2 To control air pollutants emitted at the exhausts, the exhaust gas will be treated by the SCR units before discharging to the atmosphere through fume exhaust pipes.

3.3.3 In order to control NO_2 emission during operational phase, biogas gensets will be equipped with SCR unit will be used for removing NO_2 from the exhaust gas. In the SCR process, a nitrogen-based chemical reagent in the form of ammonia (NH_3) is injected into the flue gas upstream of the SCR catalyst. The ammonia will be generated from an urea-to-ammonia conversion system and will selectively react with nitrogen oxides (NO_x) in the presence of a catalyst to form nitrogen (N_2) and water vapour (H_2O). The reactions are essentially converting nitrogen oxides in the flue gas to non-harmful gases. The oxygen removed from the nitrogen oxides will combine with hydrogen to form water (H_2O). The implementation schedule of air quality mitigation measures is in Appendix E.

3.3.4 In addition, as revealed in Environmental Review Report for Extension of Operation of Fill Bank at Tuen Mun Area 38, the Tuen Mun Fill Bank (TMFB) operated by Civil Engineering and

Development Department (CEDD), are actively implementing additional air quality mitigation measures to further reduce air emissions associated with their operations, in particular NOx emissions. Therefore, actual emissions of EcoPark tenants are lower than the emission limit based on their existing operation.

3.3.5 In view of the above, it is concluded that the air quality impact is unlikely to be worsened during the paper pulping plant operation in future.

4. OVERVIEW OF THE PROPOSED MEASURES OF WASTEWATER TREATMENT PLANT AND THE EVENT AND ACTION PLAN FOR ODOUR

4.1 WASTEWATER TREATMENT PLANT OPERATION

4.1.1 A wastewater treatment plant is proposed to locate within Lot P1 of the EcoPark. The location of the wastewater treatment plant is shown in Appendix C. Wastewater generated in the pulp production process would be treated in the wastewater treatment plant, which is designed to treat 4,000m^3 of wastewater per day. The process flow diagram of the waste water treatment plant and sludge treatment plant is illustrated in Appendix F.

4.1.2 The wastewater treatment process begins with coagulation, where a chemical coagulant is added to the wastewater to cause the small particles in the wastewater to bind together and form slightly larger particles. The coagulated water then undergoes flocculation, which further encourages the small coagulated particles to clump together and form larger flocs. During sedimentation, the flocs settle to the bottom of the slant plate sedimentation tanks, allowing the suspended solids in the wastewater to be removed. The pH-value of the wastewater is then adjusted in a Hydrolytic and Acidification Tank for effective anaerobic digestion in next step. The pH-adjusted wastewater then enters the anaerobic digester. In the digester, organic matter is broken down by bacteria in the absence of oxygen, producing methane-rich biogas as a by-product, which will then be used by the biogas gensets.

4.1.3 The effluent from the anaerobic digester is directed to an aeration tank, where the chemical oxygen demand is reduced. The effluent and activated sludge from the aeration tank are then transferred to secondary sedimentation tanks, where the effluent is separated from the sludge for disposal. Finally, approximately 2,000 m^3 of the effluent will be returned to the pulp production process, while the remaining 2000 m^3 effluent will be discharged daily. Sludge from the slant plate sedimentation tank and aeration tank will be transported to the sludge concentration tank and remove water by passing the sludge through the dewatering plant.

4.2 POTENTIAL SOURCES OF ODOUR

4.2.1 The wastewater generates obnoxious hydrogen sulphide gas characterized by its rotten egg smell. Odour would be generated from the wastewater treatment process. The sources of the odour generated during wastewater treatment process are listed in Table 4.1.

Table 4.1 Potential Sources of the Odour generated during Wastewater Treatment Process

SOURCE	LOCATION
1	Coagulation Reaction tank
2	Slant Plate Sedimentation Tank
3	Hydrolytic and Acidification Tank
4	Activated Sludge Storage Tank
5	Aeration Tank
6	Sludge Treatment Tank
7	Sludge Concentration tank
8	Sludge Dewatering House
9	The Loft of Sludge Dewatering House
10	Sludge Conveyor Belt
11	Sludge Cake Silo

4.3 MITIGATION MEASURES FOR ODOUR

4.3.1 The potential sources of odour from the wastewater treatment plant of the paper pulping plant are identified. The odour control measures will be implemented to reduce odour nuisance from the wastewater treatment plant, including covering up of tanks which are likely to emit odour and installing an odour control system to clean up the collected foul gases from odour sources in the wastewater treatment plant and sludge treatment plant.

4.3.2 In order to minimize the odour emission during the operation phase of paper pulping plant, the facilities, including the coagulation reaction tank, slate plate sedimentation tank, hydrolytic and acidation tank, activated sludge storage tank, sludge treatment tank and sludge concertation tank will be fully enclosed and maintained at negative pressure by withdrawing the air out of the tanks. Also, the potential odour sources from the sludge dewatering facilities and the dewatering house will be kept indoors. The foul air generated from the above-mentioned sources will be collected, and a blower is used to send the foul air into three washing towers for treatment before discharging to the atmosphere.

Odour control system

4.3.3 At odour control system, operating in three stages of BIO-SCRUBBER in series, with an overall odour removal efficiency of 92%, will be provided to treat odorous air, particularly targeting hydrogen sulphide, VOC emissions,before releasing the cleaned air to the atmosphere. Appendix G is the technical note of the odour control system for reference.

4.3.4 When the foul air enters the 1st washing tower, BIO-SCRUBBER, through the gas inlet located at the bottom of the vessel. In the washing tower, packing media is irrigated with the scrubbing solution via spray nozzles. As the foul air rises through the packing media, the dissolved hydrogen sulphide is then oxidized, adsorped and absorbed by the microorganism present in the scrubbing solution, and becomes carbon dioxide, water and sulfuric acid. The

pre-treated gases will then pass through the 2nd washing tower, an alkaline scrubber, namely BIO-AO for further removal of odour. Sodium hydroxide (NaOH) is used as scrubbing liquid for removal of acidic pollutants in the pre-treated gases. When the pre-treated gas passes through a solution of sodium hydroxide, it reacts with sodium hydroxide to form salts, which remain dissolved in the solution or precipitate out. As a result, the gas stream exiting the scrubber is less polluted. For the 3rd washing tower, water will be used as solvent to capture and remove pollutants from the gas stream. When the treated air will be release into open atmosphere via a Ø900mm pipe exhaust pipe, which is 30m high from ground level.

4.3.5 The odour samples will be collected at the inlet and the outlet of the odour control system upon commissioning to verify the odour removal efficiency of the odour control system. To ensure that the odour control system is in proper working condition, Zhou Ji will closely monitor its performance and provides proper maintenance, like timely replacement of odour absorption media in the washing towers, and monitor the level of hydrogen sulphide at the outlet of the odour control system.

4.3.6 In addition, the operator of the paper pulping plant shall observe the occupational safety and health (OSH) requirements established by the Labour Department.

4.4 EVENT AND ACTION PLAN FOR ODOUR CONTROL

4.4.1 Apart from odour monitoring, Zhou Ji will also pay special attention to odour concerns reported by the public to the Environmental Protection Department. Prompt investigation will be carried out including contacting the complainants and taking odour measurements at the reported locations. Where appropriate, corrective and preventive measures will be carried out to rectify any identified deficiencies. If necessary, Zhou Ji will also consider enhancing the odour control measures.

4.4.2 Should a non-compliance of the odour criteria occur, the relevant parties should undertake the relevant actions in accordance with the Action and Limit Levels for Odour in Table 4.2 and the Event & Action Plan for Odour in Table 4.3.

Table 4.2 Action and Limit Levels for Odour

Parameter	Action Level	Limit Level
Number of odour Complaint	Receipt of any odour complaint	Receipt of two or more complaint in a month

Table 4.3 Event & Action Plan for Odour

Event	Action
	Person-in-charge of the Paper Pulping Plant
Action Level	
Receipt of one odour complaint	1. Carry out investigation to identify the source/reason of complaints. Investigation shall be completed within 1 week; 2. Rectify any unacceptable practices; 3. Amend working methods if appropriate; 4. Notify EcoPark Management Team , ET, IEC; 5. Modify or improve design of the odour control system as appropriate; 6. Correspond with the complainant within 10 days to inform the cause of the nuisance and action taken; 7. Implement amended working methods;

Limit Level	
Receipt of two or more complaint in a month	1. Carry out investigation to identify the source/reason of complaints. Investigation shall be completed within 1 week; 2. Rectify any unacceptable practices; 3. Amend working methods if appropriate; 4. Notify EcoPark Management Team , ET, IEC; 5. Formulate remedial actions; 6. Ensure amended working methods and remedial actions properly implemented; 7. If repeated complaints are received, consider what portion of the work is responsible for the complaints and stop that portion of the work until the complaint case is closed. 8. Correspond with the complainant within 10 days to inform the cause of the nuisance and action taken;

5. CONCLUSION

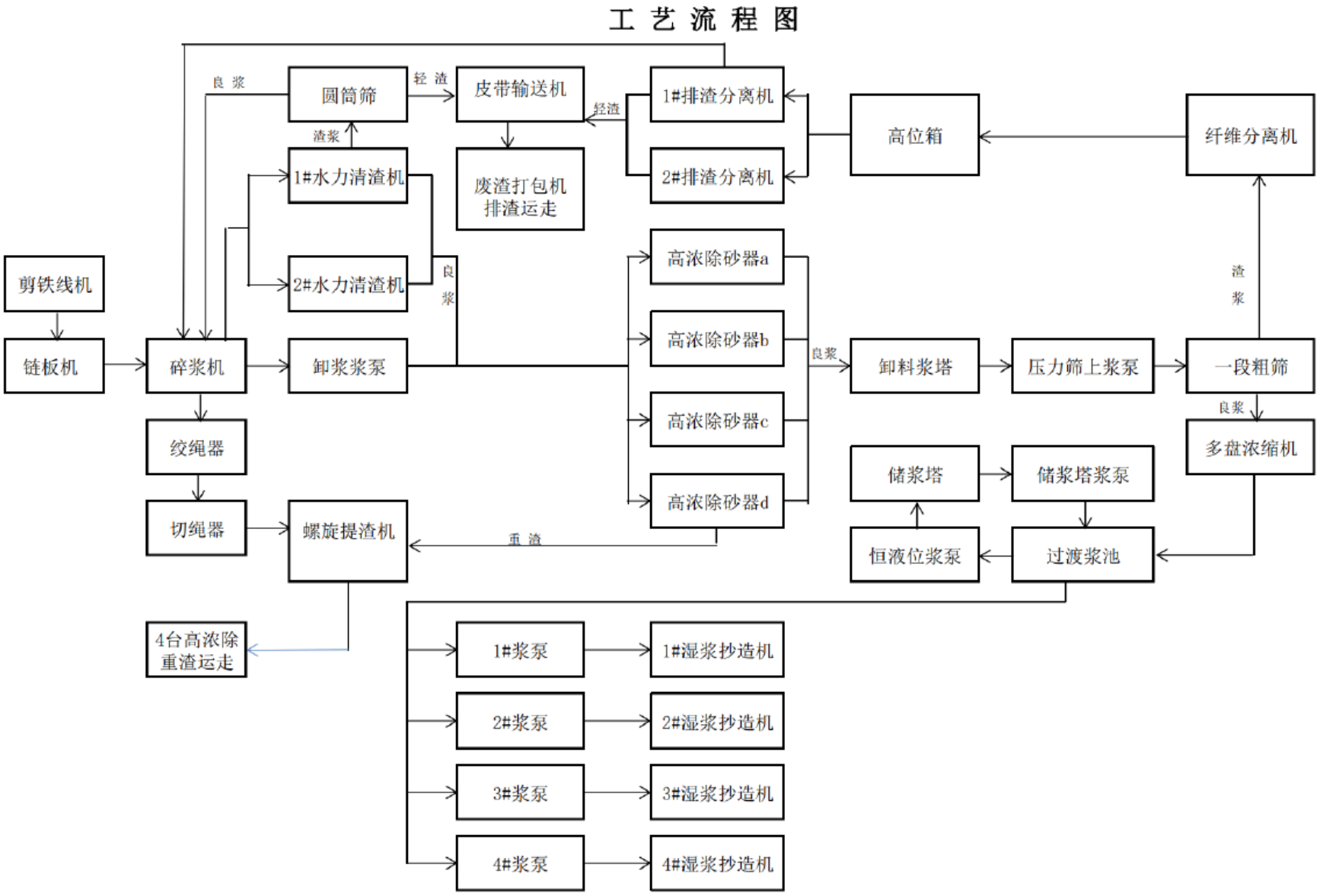
5.1 According to Condition 4.4 of the current EP for EcoPark (i.e. EP-226/2005/G), a detailed proposal has been prepared for seeking approval from the Director of the Environmental Protection (DEP) for any chimney emissions outside the 0700 hours to 1900 hours period. This TN serves as a supporting document to address the potential environmental impacts arising from the gensets, operating for 24 hours per day, 7 days a week starting from Q3 2025. Moreover, fume exhaust gas will be diverted to outside Chimney Restricted Area thus no genset discharge within.

5.2 After reviewing the air quality impacts and odour impacts, several mitigation measures are proposed to be implemented and listed in the implementation schedule. It has been concluded that there will be no unacceptable environmental impacts to the EcoPark project resulting from the chimney emissions outside the period of 0700 hours to 1900 hours and for fuel combustion (i.e. the by-product, biogas) for the waste paper recycling process.

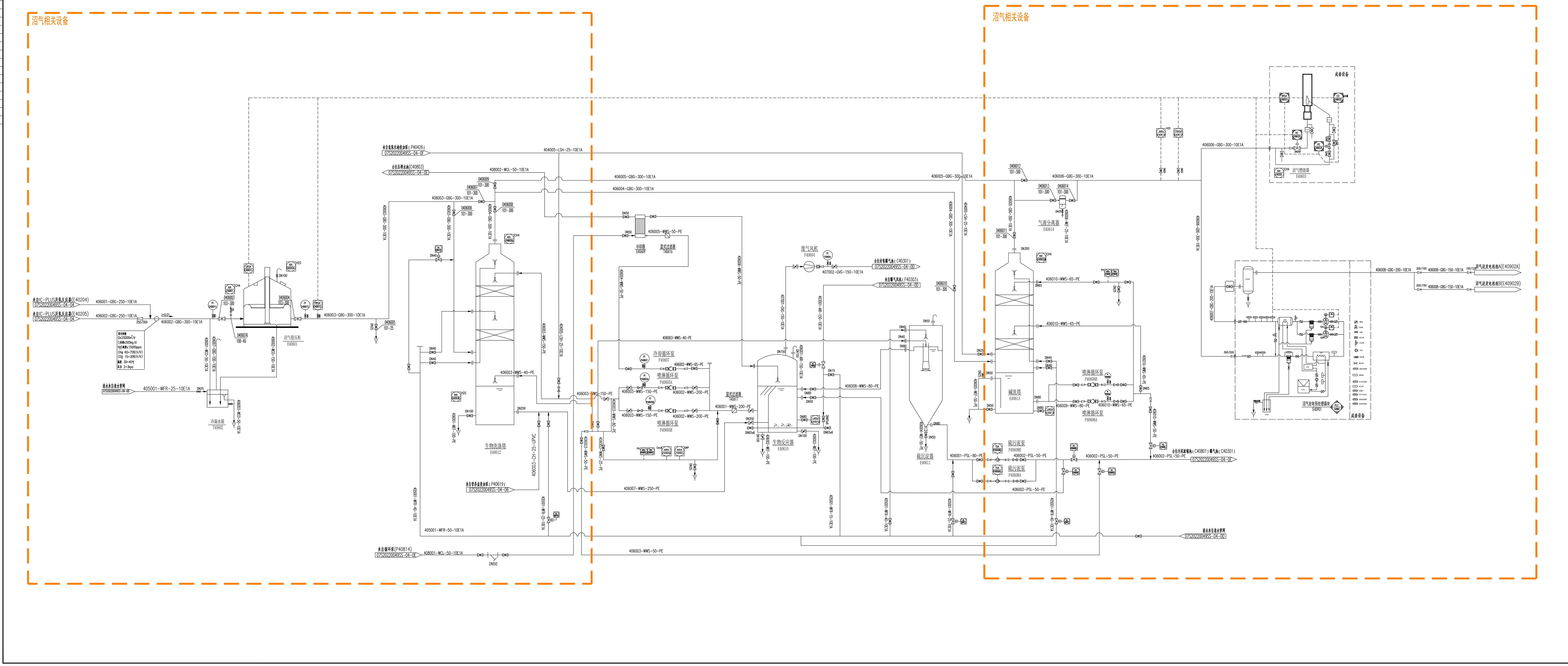
5.3 Should there be subsequent changes to the emission sources associated with the operation of the paper pulping plant and the wastewater treatment plant, the assessment results presented in this TN may need to be reviewed and updated. In case of any changes to other emission sources in the EcoPark, the project proponent of these other emission sources will conduct a separate air quality assessment.

5.4 In addition, all the relevant requirements as mentioned in the Environmental Monitoring and Audit (EM&A) manual (e.g. Process Review or Design Audit, if applicable) will be followed and complied with by Lot P1, P5, P6 and P7 of EcoPark if there are substantial changes that affect the emission inventory.

APPENDIX A - PROCESS FLOW DIAGRAM OF PAPER PULPING PLANT (IN CHINESE ONLY)



APPENDIX B - P&ID OF BIOGAS GENSETS



ALTERING INDEX 修改标识	MARK 标记	DATE 日期	NAME 修改人	ALTERNATION 主要修改内容
R01	R01	2024.05	唐维亮	根据厂家资料完善生物洗涤塔及碱洗塔内部细节。
R02	R02	2024.09	西纯	气柜进气口增加泄压阀0406076
R03	R03	2024.09	西纯	气柜进气口泄压阀0406076位置后移到闸阀与气柜进口之间

说明(非技术类) / NOTES:

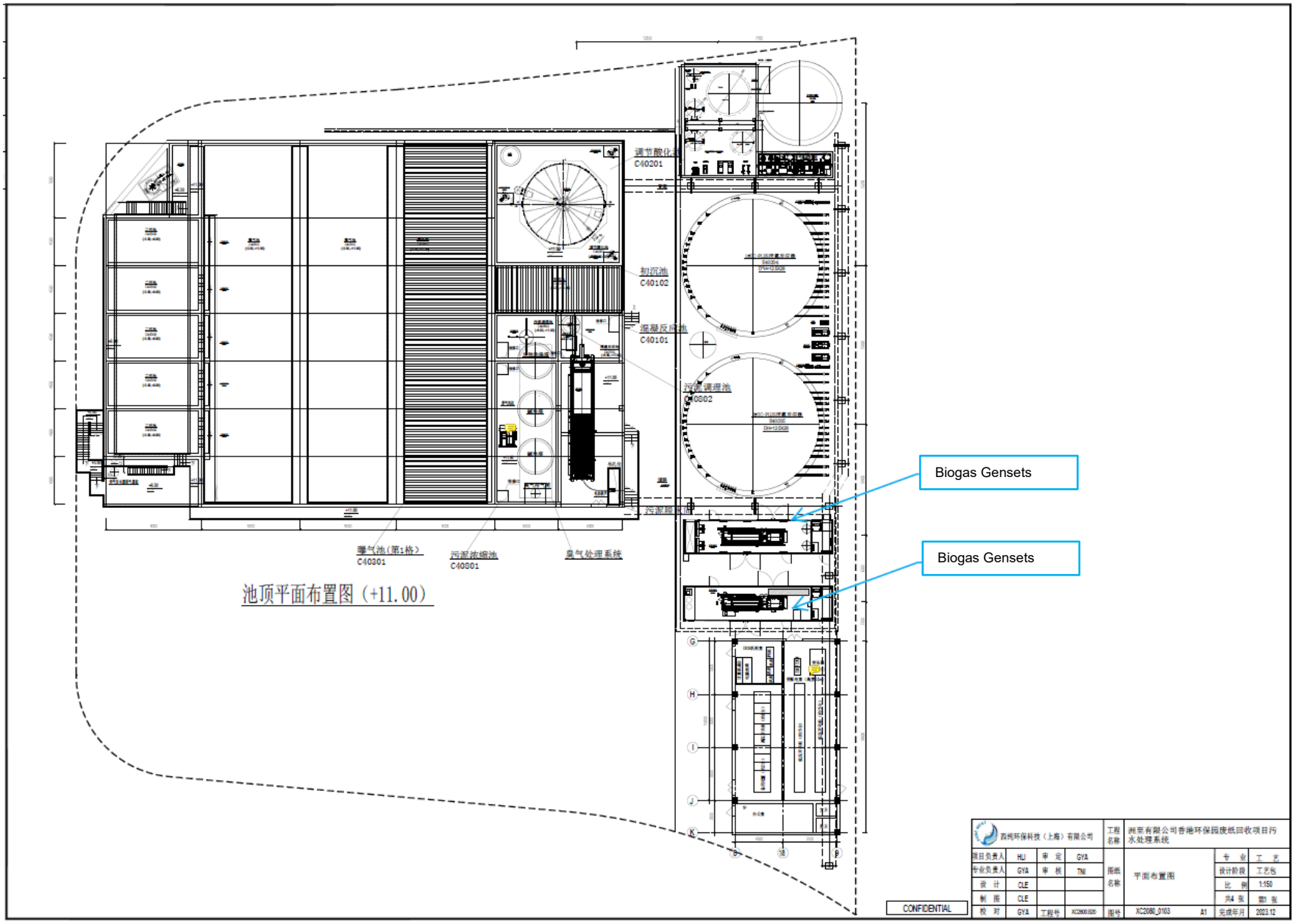
出图专用章 STAMP FOR DRAWING

中国轻工业成都设计工程有限公司
China CDE Engineering Co., Ltd.
设计证书编号: 甲级A151004909 CERTIFICATE NO. :A151004909 CLASS A

审定 APPROVER			工程号 PROJECT NO.	07S20220049
项目负责人 PROJECT MANAGER	杨小华		阶段 PHASE	方案
审核 VERIFIER	杨小华		专业 DISCIPLINE	工艺
专业负责人 DISCIPLINE LEADER	唐维亮		比例 SCALE	1:100
校核 CHECKER	唐维亮		版别 REVISION	
设计 DESIGNER	吴赵怡		日期 DATE	2024.07
项目名称 PROJECT NAME	东莞市金田纸业有限公司设立合资公司洲至有限公司项目			
子项名称 ITEM NAME	污水处理站			
图纸名称 DRAWING NAME	管道仪表流程图— 沼气处理/脱硫单元			
图号 DRAWING NO.	07S20220049FY-04-06(5)		标准图框2022	

A1+3/4

APPENDIX C - LAYOUT PLAN OF LOT P1



APPENDIX D - TECHNICAL DETAILS FOR SUBMITTED BIOGAS GENSETS

附表 1

废纸厂配有两台发电机组，每台1.56MW-v3.2 wastepaperplantwithtwogeneratorsetsat1.56MWeach-v3.2

名称	名称	FirstGenerator 1.56MW（1#发电机）	SecondGenerator 1.56MW（2#发电机）	Vent 排气口
FlowrateDry(Nm3/hr) 9.05%O2,273K	干燥流量	5818	5818	127.7
NOxemissionlimit(mg/m3)Dry,5%O2,273K	NOx 排放限值（干）	500	500	0.585
NOxemissionlimit(mg/m3),9.05%O2,708K,11.1%H2O	NOx 排放限值（湿）	127.7	127.7	
NOxemissionrate(g/s)uncontrolled	NOx 排放率-不受控制	0.585	0.585	
Noxcontrolefficiency	NOx 控制效率	60%	60%	
NOxemissionrate(g/s)controlled	NOx 排放率-受控制	0.234	0.234	
SO2emissionrate(g/s)fromApplicant	SO2 排放率-来自申请人	0.067	0.067	
RSPemissionrate(g/s)	RSP 排放率	0.0523	0.0523	
FSPemissionrate(g/s)	FSP 排放率	0.0523	0.0523	
chimneydiameter(m)	烟囱直径	0.5	0.5	
Effluxvelocity(m/s)	射流速度	23.34	23.34	
ExhaustTemperature(K)	排气温度	708	708	
Chimneyheight(mAG)	烟囱高度	30	30	

附表 2

附录 A	**Appendix A**		
洲至纸厂	**ZhouJi Paper Factory**		
RE:排放数据(NOx 500 mg/Nm3)和发动机数据	**RE:Emission Data (NOx 500 mg/Nm3) and Engine Data**		
技术数据	**Technical Data**		
根据金田资料，沼气产量为 25,000 Nm3/天(1,042Nm3/h)，CH4 浓度在 60 - 70%之间。CHP 的选择基于 CH4 浓度 65%	According to the ZhouJi information the biogas produce is 25,000 Nm3/day (1,042Nm^3/h) and the CH_4 concentration between 60 to 70% The CHP selection is based on CH_4 concentration **65%**		
型号	Type		
数量	Quantity	2	
每台输出功率	Electrical Output of each CHP	1,560	kW_e
总输出功率	Total Power output	3120	kW_e
每台热输出	Thermal Output of each CHP	1,512	kW_{th}
总热输出	Total Thermal Output	3,024	kW_{th}
	Input Power	3,651	kW
沼气浓度	Biogas Concentration	65	%
沼气消耗在 100%的功率输出	Biogas Consumption at 100% power output	562	Nm^3/h
2 台机组 100%功率输出时沼气总消耗量	Total Biogas Consumption at 100% power output for 2 sets	1,124	Nm^3/h
废气温度	Exhaust Gas Temperature	435	^oC
排气出口直径	Exhaust gas outlet diameter	250	DNmm
排气流量(干)	Exhaust Gas flow rate (Dry)	7639	kg/h

		5818	Nm^3/h
		14,650	m^3/h
排气流量(湿)	Exhaust Gas flow rate (wet)	8487	kg/h
		6548	Nm^3/h
		16,488	m^3/h
废气排放 NOx 浓度	Exhaust Gas Discharge NOx Concentration	500	mg/Nm3 @5% O_2
废气排放 CO 浓度	Exhaust Gas Discharge CO Concentration	650	mg/Nm3 @5% O_2
堆填气体过滤器尺寸	Landfill Gas Filter size	3	µm
燃烧空气过滤器尺寸	Combustion Air Filter Size	3	µm
燃烧空气体积	Combustion Air Volume	5,986	Nm^3/h
每个烟道的烟囱直径(m)[废气消声器后]	Stack diameter per flue (m) [after exhaust gas silencer]	500	mm
烟囱高度	Stack height	30.00	m (form G/F)
废气射流速度	Exhaust gas efflux velocity	23.34	m/s
假设 H2S 浓度(沼气预处理后)	Assume H_2S concentration (after pretreatment of biogas)	150.00	ppmv
		227.68	mg/Nm^3
H2S 分子量	Molecular Weight of H_2S	34.08	g/mol
S 分子量	Molecular Weight of S	32.07	g/mol
H2 的分子量	Molecular Weight of H_2	2.02	g/mol
S 的浓度	Concentration of S	214.21	mg/Nm^3
沼气中的总硫(硫浓度 x 沼气流量)	Total Sulphur in biogas (Sulphur Concentration x Biogas Flow Rate)	120,386	mg/h

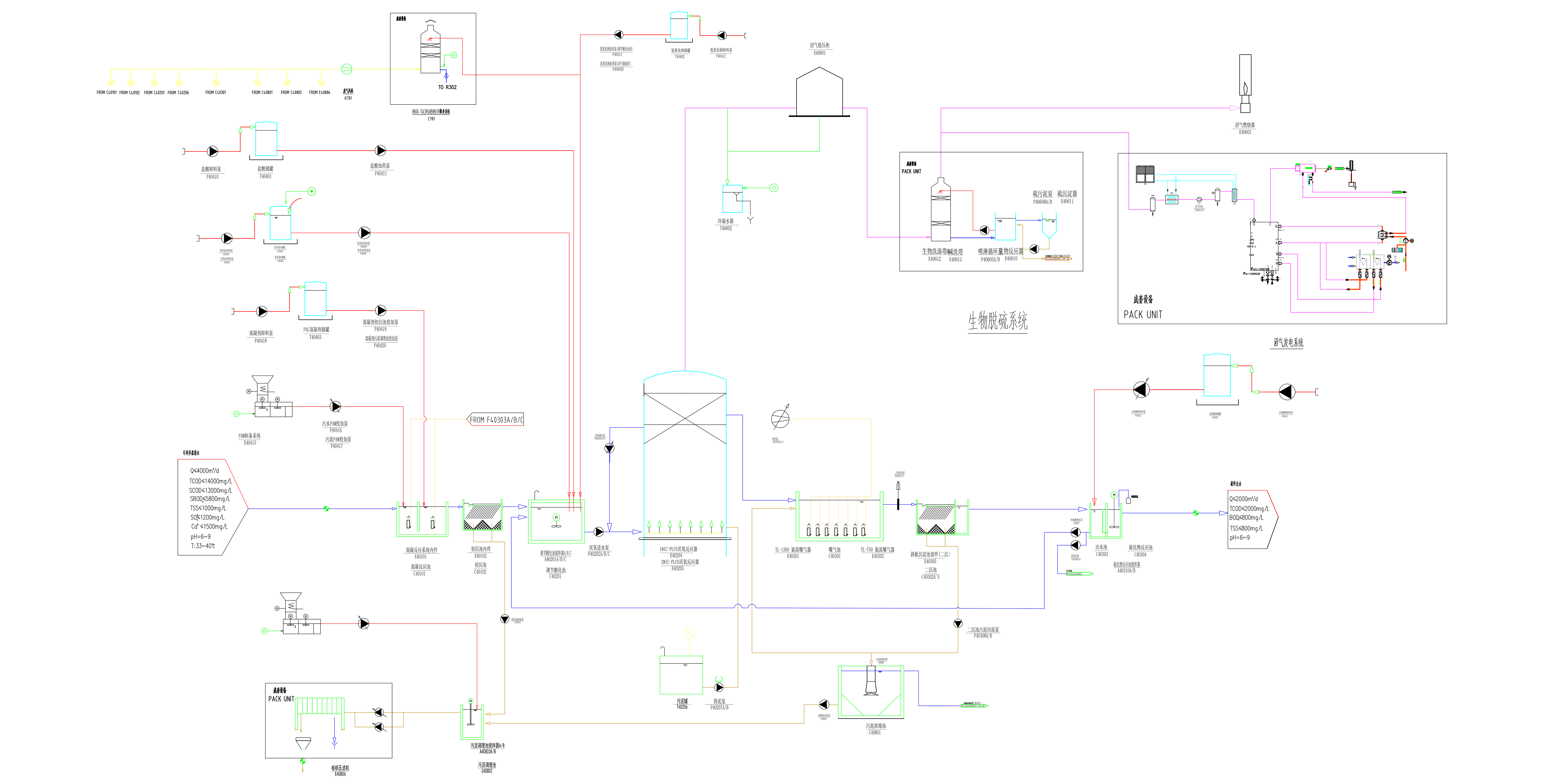
SO2 的分子量	Molecular Weight of SO_2	64.0638	g/mol
S 分子量	Molecular Weight of S	32.07	g/mol
O2 分子量	Molecular Weight of O_2	31.9988	g/mol
SO2 排放率	Emission Rate of SO_2	240,523.5	mg/h
		0.067	g/s
排放浓度(二氧化硫总量/废气量(干))	Emission Concentration (Total of SO_2 / Exhaust Gas Volume (Dry))	16.80	mg/m^3
废气排放 NOx 浓度	Exhaust Gas Discharge NOx Concentration	500	mg/Nm^3 @5% O_2
		127.67	~~mg/Nm^3 @9.05% O_2~~
Nox 排放率(排放浓度 x 废气流量(干))	Emission Rate of Nox (Emission concentration x Exhaust gas Flow Rate (Dry))	1,870,383	mg/h
		0.520	g/s @9.05% O_2
Nox 排放率(排放浓度 x 废气流量(湿))	Emission Rate of Nox (Emission concentration x Exhaust gas Flow Rate (Wet))	2,105,023	mg/h
		0.585	g/s @9.05% O_2
废气处理(SCR)效率	Exhaust Gas Treatment (SCR) efficiency	60	%
SCR 处理后废气排放 NOx 浓度	Exhaust Gas Discharge NOx Concentration after SCR Treatment	200	mg/Nm^3 @5% O_2
		51.07	~~mg/Nm^3 @9.05% O_2~~
SCR 处理后 Nox 排放率(排放浓度×废气流量(湿))	Emission Rate of Nox after SCR Treatment (Emission concentration x Exhaust gas Flow Rate (Wet))		
		0.234	g/s @9.05% O_2
RSP 排放率	PM10（RSP）emission rate (g/s)	0.00523	g/s @9.05% O_2
FSP 排放率	PM2.5（FSP）emission rate (g/s)	0.00523	g/s @9.05% O_2

APPENDIX E – IMPLEMENTATION SCHEDULE OF AIR QUALITY MITIGATION MEASURES

Reference	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Implementation Party	Location / Duration of the measures	Relevant Legislation & Guidelines
1	Bleaching process will not be involved in the pulp production process according to Condition 4.5(iv) of the current EP."	Air Quality Control during operation stage	Hong Kong Zhou Ji Paper Industrial Ltd.	Paper Pulping Plant at Lots P5,6,7 / Throughout operation stag	Condition 4.5(iv) of EP-226/2005/G
2	Biogas gensets will be used for electricity generation for wastewater treatment plant operation. No fossil fuel will be required for such operation with a view for betterment of air quality performance.	Air Quality Control during operation stage	Hong Kong Zhou Ji Paper Industrial Ltd.	The waste water treatment plant/ Throughout operation stage	Annex F(i)(a) of EP-226/2005/G
3	Biogas gensets will be equipped with Selective Catalytic Reduction (SCR) unit for removing 60% of the targeted pollutant, NO_x from the exhaust gas.	Air Quality Control during operation stage	Hong Kong Zhou Ji Paper Industrial Ltd.	SCR unit shall be installed adjacent to the biogas gensets / Throughout operation stage	Condition 4.4 and Annex F(i)(a) of EP-226/2005/G
4	The facilities, including the coagulation reaction tank, slate plate sedimentation tank, hydrolytic and acidation tank, activated sludge storage tank, sludge treatment tank and sludge concertation tank will be fully enclosed and maintained at negative pressure by withdrawing the air out of the tanks.	Odour control during operation phase	Hong Kong Zhou Ji Paper Industrial Ltd.	The wastewater treatment plant and sludge dewatering house at Lot P1/ Throughout operation stage	Annex 4 of EIAO-TM

5	Three stages of BIO-SCRUBBER in series, with an overall odour removal efficiency of 92%, will be provided to treat odorous air, particularly targeting hydrogen sulphide, VOC emissions, before discharging the cleaned air to the atmosphere.	Odour control during operation phase	Hong Kong Zhou Ji Paper Industrial Ltd.	The wastewater treatment plant at Lot P1/ Throughout operation stage	Annex 4 of EIAO-TM
6	The odour samples will be collected at the inlet and the outlet of the odour control system upon commissioning to verify the odour removal efficiency of the odour control system.	Odour control during operation phase	Hong Kong Zhou Ji Paper Industrial Ltd.	The wastewater treatment plant at Lot P1/ Throughout operation stage	Annex 4 of EIAO-TM
7	To ensure that the odour control system is in proper working condition, replacement of odour absorption media in the washing towers and monitoring of the level of hydrogen sulphide at the outlet of the odour control system should be carried out timely	Odour control during operation phase	Hong Kong Zhou Ji Paper Industrial Ltd.	The wastewater treatment plant at Lot P1/ Throughout operation stage	Annex 4 of EIAO-TM

APPENDIX F – PROCESS FLOW DIAGRAM OF WASTEWATER TREATMENT PLANT AND SLUDGE TREATMENT PLANT (IN CHINESE ONLY)



ALTERING INDEX 修改标识	MARK 标记	DATE 日期	NAME 修改人	ALTERNATION 主要修改内容

说明 (修改依据) / NOTES:

参考图纸编号 / DWG NO. | 参考图纸名称 / REFERENCE DWG

PHASE 阶段		PURPOSE 用途	
1 = 方案设计	SCHEME DESIGN	A = 对外提交	FOR INFORMATION
2 = 初步设计	BASIC DESIGN	B = 供采购	FOR PURCHASE
3 = 施工设计	DETAIL DESIGN	C = 外部审查	FOR APPROVAL
4 = 竣工设计	AS-BUILT	D = 成果文件	APPROVED DRAWING

PHASE/ALTERING INDEX 阶段/修改版 1 / R00
DATE 日期 2024.07.

索引图 / LAYOUT / LOCATION:

其它印章 OTHER STAMP

出图专用章 STAMP FOR DRAWING

中国轻工业成都设计工程有限公司
China CDE Engineering Co., Ltd.

设计证书编号:甲级A151004909 CERTIFICATE NO. :A151004909 CLASS A

审定 APPROVER			工程号 PROJECT NO.	07S20220049
项目负责人 PROJECT MANAGER			阶段 PHASE	方案
审核 VERIFIER			专业 DISCIPLINE	工艺
专业负责人 DISCIPLINE LEADER			比例 SCALE	1:100
校核 CHECKER			版别 REVISION	第一版
设计 DESIGNER			日期 DATE	2024.07
项目名称 PROJECT NAME	[illegible]			
子项名称 ITEM NAME	污水处理站			
图纸名称 DRAWING NAME	工艺流程图			
图号 DRAWING NO.	07S20220049FY-04-03		标准图框	2022

APPENDIX G - TECHNICAL NOTE OF ODOUR CONTROL SYSTEM (IN CHINESE ONLY)

污水站废气除臭系统
技术说明

目　录

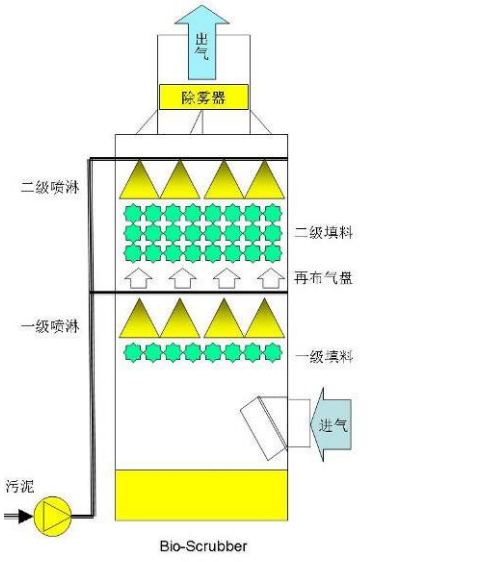
1　主要产品技术简介

1.1 BIO-SCRUBBER 废气生物除臭系统

BIO-SCRUBBER 废气生物除臭系统结合了碱洗塔及曝气生物滤池的优点，对于酸类、氨类、硫类有很好的去除效果，同时经济有效吸附和生物降解废气中的有机污染物，其巧妙地利用污水厂丰富的微生物资源，运行操作灵活，效能稳定有保障，非常适合于复杂成份异味的去除。

工作原理：

含产生异味的污染物废气经过加盖收集，通过废气风机送入生物洗涤系统，微生物除臭是利用微生物细胞对恶臭物质的吸附、吸收和降解功能，对臭气进行处理的一种工艺。BIO-SCRUBBER 生物除臭系统充分利用污水生化处理含有大量的微生物资源，其参与工作的微生物量是生物滤池的 200 倍，非常适合处于成分复杂的污染物废气，活性微生物将恶臭物质吸附后，结合污水站的生化系统将产生臭味有机物分解成 CO_2、H_2O、H_2SO_4、HNO_3 等简单无机物，从而确保达标排放。



BIO-SCRUBBER 废气除臭系统具有鲜明的优势特点：

- **运行成本低**

针对产生臭味的有机化合物，利用吸附和生物降解，相比昂贵的化学吸附和反应，

运行成本及其低廉；

- **广谱高效**

针对产生臭味的三大有机化合物，分别依靠：

针对酸类臭味物质，利用生物碱进行中和吸附降解；

针对氨类臭味物质，采用专用填料挂膜生长的硝化菌以及生化系统活性微生物进行专门降解；

针对硫类臭味物质，依靠高碱度的生物碱进行良好吸收。

所有难降解的复杂臭味物质还能够随喷淋后返回污水系统。

- **稳定可靠**

传统的生物滤池是一个固定生物床，传质效果差，生物调控困难，新陈代谢的物质从生物滤床的转移非常困难，必须停机检修。生物滤池只适合于低浓度臭味处理（H_2S ≤50ppm），高浓度的臭味会造成生物滤床堵塞、垮塌、处理效果差等问题。

而 BIO-SCRUBBER 生物除臭系统，传质效果好，物料输送和更新迅速，拥有丰富充足的健康微生物资源，完全能够保证其稳定运行。

- **确保达标**

在生物洗涤和降解的同时，高塔式的结构和特殊的顶部输送段能形成最终出气的高空排放，达到设计要求。

- **建设周期短**

BIO-SCRUBBER 生物洗涤塔完全设备化供货，不需要大量而复杂的土建，建设周期非常短。

- **使用寿命长**

针对废气的高腐蚀性，内部材料大量采用 PP/FRP 等非金属材料及 SS316L 的喷嘴，经久耐用。

喷淋装置采用进口专用喷头，充分考虑微生物特性，无堵塞，使用寿命长。

2 废气处理系统工艺描述

2.1 污水处理设施的恶臭源及其强度评价

由于在废水中含有硫、氮等有臭化合物，所以在污水处理的某些工段内都可能存有散发臭气的场所。恶臭气体主要产生在污水处理过程中的初沉池、调节预酸化池、厌氧塔、好氧系统 A 池、污泥储池等处。不同的处理设施及过程会产生各种不同的恶臭气体。污水处理厌氧过程中产生的臭气以硫化氢及其它含还原硫化物（二甲基硫醚、二甲基二硫醚、硫醇）为主，污泥及消化稳定过程中会产生氨气和其它易挥发性有机污染气体（VOC）。

按气体味道，臭味大致可分为：鱼腥臭[胺类 CH_3NH_2，$(CH_3)_3N$]，氨臭[氨 NH_3]，腐肉臭[二元胺类 $NH_2(CH_2)_4NH_2$]，腐蛋臭（硫化氢 H_2S），腐甘蓝臭[有机硫化物 $(CH_3)_2S$]，粪臭[$C_8H_5NHCH_3$]以及某些生产废水的特殊臭味。

表 3-1　主要恶臭气体的特性

名称	化学分子式	特征气味
硫化氢	H_2S	臭鸡蛋味
氨	NH_3	刺激性
甲基硫醇	CH_3SH	烂白菜味
二甲基硫醚	$(CH_3)_2S$	有硫化物异臭味
二甲基二硫醚	$(CH_3)_2S_2$	有硫化物异臭味
甲基胺	CH_3NH_2	腐烂、腥味
二甲基胺	$(CH_3)_2N$	鱼腥味
三甲基胺	$(CH_3)_3N$	刺激性、腥味
粪臭素	C_9H_9N	粪臭味

主要产生的废气源如下：

表 3-2　污水处理设施恶臭气体来源

源点	成因	臭气强度
厌氧塔	厌氧过程中产生的臭味，主要含硫化氢	高
初沉池	车间排水在池体内停留时间长导致腐化；溢流造成的紊流导致臭气释放	中高
调节预酸化池	溶解态的有机物在产酸菌的作用下，生成有机酸、游离氨和硫化氢，主要含有硫化氢	高
曝气池 A 段（厌氧出水口）	厌氧废水排出的臭气积累，主要含有硫化氢	中
厌氧污泥罐	厌氧污泥储存过程中产生的废气	高

2.2设计进出废气参数

根据目前香港环保园的实际情况及各池体参数，针对集中污染源采取生物洗涤+碱洗的工艺处理废气。废气除臭系统设计参数如表 3-1。

表 3-1 各废气源气量及成分统计

序号	废气源	长(m)	宽(m)	上层空间(m)	换气次数	废气量 m^3/h	H2S 浓度 mg/m3	臭气浓度（预估）
1	混凝反应池	3.5	2.00	1	15	105	≤80	10000
2	斜板沉淀池	10.0	4.00	2	15	900	≤80	12000
3	调节酸化池	12.5	11.50	2	20	4313	≤350	25000
4	厌氧污泥池	直径：7m		2.5	20	962	≤350	22000
5	好氧池	28.0	9.30	2.5	10	6510	≤30	4500
6	污泥调理池	6.5	3.50	1	10	455	≤30	6000
7	污泥脱水机房隔层	11.5	5.50	3.5	6	1771	≤20	6000
8	污泥转运间	11.5	5.50	9.5	8	4807	≤30	6000
9	污泥浓缩池	7.0	8.00	0.5	10	560	≤30	6000
10	污泥脱水机	16.0	6.00	7.8	6	4493	≤30	6000
					合计	24876		

制浆造纸废水产生的废气中异味物质主要为 H_2S，并含有少量其余造成异味的小分子化合物。表中 H_2S 浓度为同类项目的参考值。废气处理系统总共按照 25,000m^3/h 考虑。

因此，设计的废气处理系统成分情况预计如表 3-2。

表 3-2　废气成分情况表

来源	臭气源废气进口参数（区域 1#）
废气量;m^3/h	25,000
H_2S;mg/m^3	≤100
NH_3;mg/m^3	≤50
臭气浓度（无量纲）	10000

废气处理系统各污染物实际处理效果及去除率预计如下：

处理单元	项目	H_2S;mg/m3	NH_3;mg/m3	臭气浓度（无量纲）
进气		100	50	10000
生物洗涤塔（一级）	出气	50	35	5000
	去除率%	50.0%	30.0%	50.0%
碱洗塔（二级）	出气	**12**	**30**	**1500**
	去除率%	76.0%	14.3%	70.0%
水（碱）洗塔（ 三级）	出气	**5**	**25**	**800**
	去除率%	**58.3%**	**16.7%**	**46.7%**
总去除率%		**95.0%**	**50.0%**	**92.0%**
经处理后的气体在 61 米处达到 5ou 排放标准				

通过统一收集处理后的气体经除臭系统的排气筒排出，排气筒直径 900mm，末端排气口距离地面 30 米。

排气筒位于厂区平面的位置如下图所示，其中红色实线圆圈的半径为 61 米：

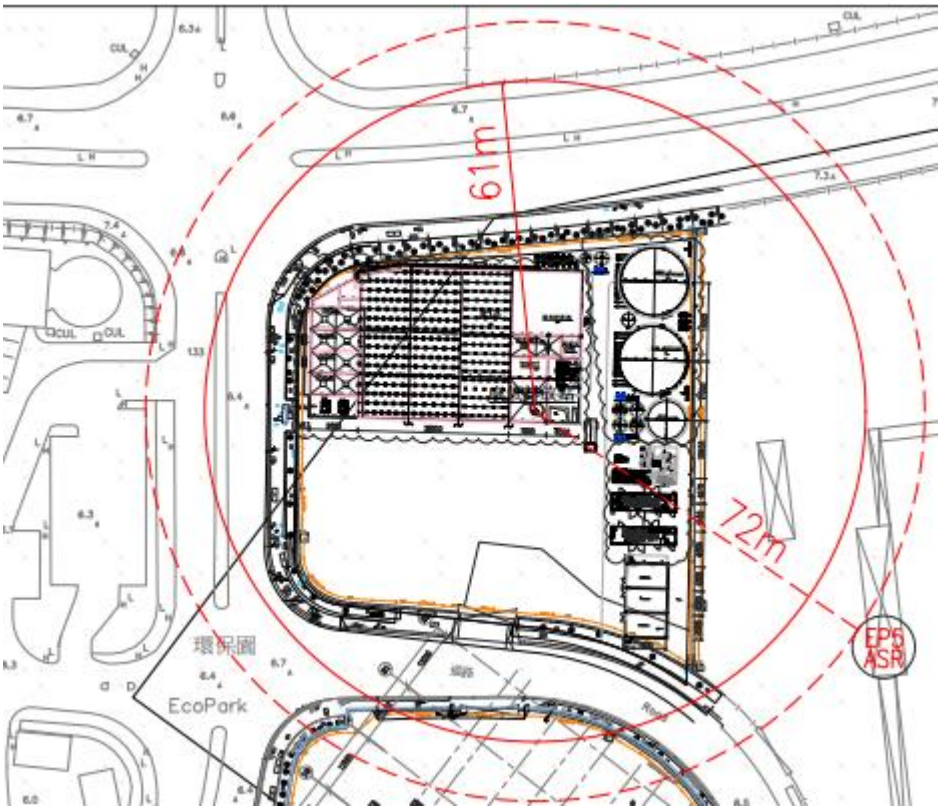


表 3-1 各废气源气量及成分统计

2.3 废气处理系统设计

2.4.1 收集系统

废气收集系统中，初沉池采用固定式玻璃钢加盖，好氧池前 1/3 采用固定式玻璃钢加盖，其余池体池采用混凝土盖板。具体如下表：

序号	名称	规格参数	数量	收集方式	材质
1	调节酸化池	尺寸：12.5×11.5m	1	钢筋混凝土顶盖	
2	混凝反应池	尺寸：6×4.5m	1	钢筋混凝土顶盖	
3	初沉池	尺寸：12×4.5m	1	玻璃钢盖板密封	拱形玻璃钢，含斜板模块冲洗口
4	厌氧污泥罐	尺寸：Ø7x24 m	1	钢制顶盖	
5	污泥调理池	尺寸：6.5×4.5m	1	钢筋混凝土顶盖	
6	污泥浓缩池	尺寸：13.5×6m	1	钢筋混凝土顶盖	
7	好氧池第一格	尺寸：34×9.2m	1	玻璃钢盖板密封	拱形玻璃钢，可移动，满足旋流曝气器检修作业的需求
8	污泥脱水机房	尺寸：18×6x7.8m	1	砖混结构房间	
9	污泥脱水皮带间	尺寸：13.5×6x3.5m	1	砖混结构房间	
10	污泥转运间隔层	尺寸：6.5×4.5x3m	1	砖混结构房间	
11	出泥间	尺寸：6.5×4.5x4.5m	1	砖混结构房间	

注：1）以上加盖尺寸需设备方后期详细设计时到现场测量，以现场测量尺寸为准。

2.4.2 除臭玻璃钢盖板

（1）总体要求

1）臭气源加盖时应能满足污水厂正常的操作运行管理要求，应符合下列规定：

应设置必要的检修通道，加盖不应妨碍构筑物和设备的操作维护检修；

应采取防止雨水在盖板上累积的措施。

2）构筑物加盖采用轻型结构的强度，应考核下列荷载：

施工时临时附加荷载；风荷载；

抽吸负压产生的附加荷载。为防御台风，盖板设置锚链固定装置，乙方提供锚链和固装置。

3）罩盖须与池形完全匹配。如盖板与池体的配合不能保证紧密性，则应找平池体并设置基座。

4）所有锚固地脚螺栓应采用不锈钢，且不低于 AISI304。乙方提供地脚螺栓。

5）玻璃钢盖板具有阻火、阻燃、抗紫外线照射、耐候性强等性能。

玻璃钢结构强度安全系数不小于 8。允许挠度小于等于盖板跨度的 1/200，且小于 5mm。

2.4.3 排气筒

排气筒的高度为距地面 30 米。采用玻璃钢材质，玻璃钢排气筒的壁厚不小于 6mm。

排气筒美观，外型平直、明亮、洁净，与除臭装置协调配套。并具有气密性好、耐腐蚀、阻力小等特点。无凹陷、划痕、锈蚀等任何缺陷。使用寿命不小于 20 年。

排气筒的设计、制造及安装能够抵御 16 级大风。

排气筒底部设置冷凝水排放口。

排气筒设气体取样口。配置 H_2S 在线检测仪。设置取样平台和爬梯。排气筒支架爬梯及平台碳钢热热浸锌材料。排气筒支架由甲方进行二次详细设计，由甲方安装单位统一供货安装。

设有避雷措施（防雷和接地预埋设施由甲方土建方实施）。

2.4.4 输送系统

输送系统设置总原则抽吸口、换风口的位置，保证密封空间内空气流动，风口数量足够，均匀布置，气流组织满足相关通风规范要求。收集风管采用玻璃钢，风管采用角钢支架架空设置，管道流速 10~15m/s。收集管道的要求：

A. 收集风管采用玻璃钢材料（《通风与空调工程施工质量验收规范》GB50243-2002）；

B. 整个管路系统压力损失≤500Pa；

C. 支管设计流速 9～13m/s，主管设计流速 11~15m/s，总管道或烟囱最大管道设计流速 15m/s；

D. 风管架空铺设，管道支架采用碳钢防腐，过路行架材质碳钢防腐；

E. 根据构筑物收集空间尺寸布置风口，风口数量应足够，均匀布置；

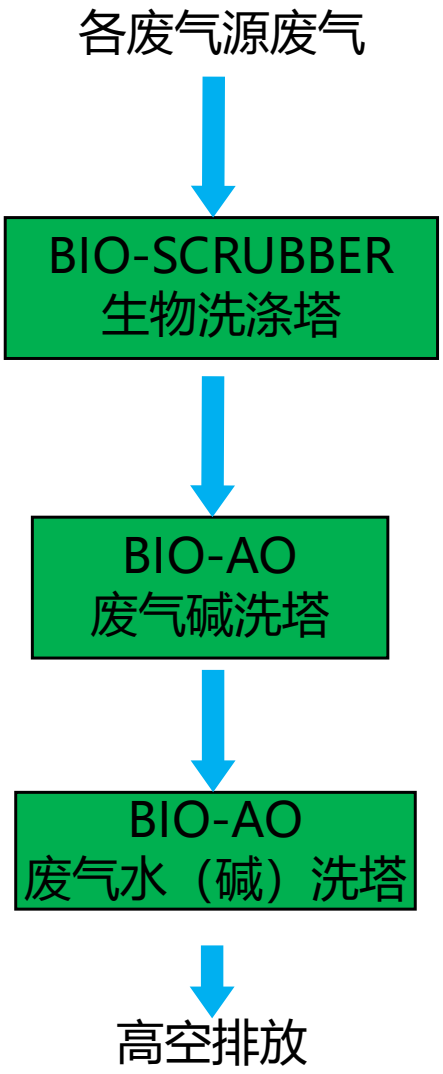
F. 管道厚度：DN100~200（含 200），厚度≥3mm；DN 200~400（含 400），厚度≥4 mm；DN 400~630（含 630），厚度≥5 mm；DN 630~1000，厚度≥6 mm；＞DN 1000 的管道厚度≥8 mm，所有连接管道均需满足气量与流速要求，同时管道参数等必须符合国标。

G. 根据各废气源气量分析，各管径设计最低要求汇总如下表：

序号	废气源	废气量 m^3/h	流速 m/s	公称直径
1	混凝反应池	540	14	DN125
2	斜板沉淀池	1620	12	DN250
3	调节酸化池	4140	12	DN400
4	厌氧污泥罐	770	12	DN200
5	好氧池	7905	14	DN450
6	污泥调理池	293	14	DN100
7	污泥脱水机房隔层	486	14	DN200
8	出泥间	729	14	DN200
9	污泥皮带间	1701	14	DN200
10	污泥浓缩池	1215	14	DN200
11	污泥脱水机	5054	14	DN400
		25000	13	DN900

2.4.5 处理系统

根据现场情况及以往工程经验，拟定本废气工程的处理工艺流程示意图如下：



针对厌氧出水高浓度的硫化氢，单独设置 BIO-JET 废气除臭装置进行混合处理，并接入好氧曝气池。

由于废气成分复杂且标准要求高，需要设计三级废气除臭，废气统一收集后送至 BIO-SCRUBBER 生物洗涤塔（一级）进行预处理，将废气中大部分臭气因子通过生物降解和吸附作用去除之后，再分别进入后续的废气碱洗塔进行处理，进一步降低气体中的臭味浓度，最后通过水（也可将碱洗塔的废碱洗再次利用节省运行成本）洗处理达标后的废气通过末端高空排放。

BIO-SCRUBBER 生物洗涤塔结合了污水处理系统的微生物资源，巧妙地利用生物系统具有较高的碱度及 pH，同时具有良好的吸附性能，经济有效生物吸附和中和废气

中的硫化氢及甲硫醇酸性气体，喷淋下来后，与空气进行有效的接触，能够大量溶氧，同时完成对吸附下来有机污染物（VOC）及氨的沿程生物降解，未完全降解的有机污染物，会随这喷淋下来流回污水系统继续进行生物降解，最终变成无害化的 CO_2 和 H_2O。

整个 BIO-SCRUBBER 生物洗涤塔的洗涤液采用有活力的微生物，对有机污染吸附能力强，经过专业喷口，既防止堵塞，又能有效地喷淋均匀。填料采用折板水幕形式，特殊水力结构，充分利用喷淋水力的冲刷，防止结垢堵塞，通过性良好，有效解决堵塞问题。

3 主要核心设备描述及技术规格

以下仅列出核心设备的详细技术规格及描述，其余通用设备详见设备清单。

（1）厌氧出水废气处理装置

设备名称	BIO-JET 厌氧出水废气处理装置
数量	1 套
材质	FRP
尺寸	¢1000mm

（2）BIO-SCRUBBER 生物洗涤塔

设备名称	BIO-SCRUBBER 生物洗涤塔
处理风量	25000m^3/h
材质	PP/FRP
尺寸	¢2800mm×12000mm
数量	1 座
支撑件	玻璃钢型钢
数量	1 座
支撑件	玻璃钢型钢
填料	材质：PP/FRP 折板水幕形式
喷嘴	大通道喷头设计
内部喷淋管	FRP
平台、直爬梯	碳钢镀锌

（2）BIO-AO 碱洗塔（二级）

设备名称	BIO-AO 碱洗塔
处理风量	25000m^3/h
材质	PP/FRP
直径	2.8m
高度	7m
数量	1 座
支撑件	玻璃钢型钢

喷嘴	螺旋喷头设计
填料	材质：PP/FRP
内部喷淋管	PP/FRP
平台、直爬梯	碳钢镀锌

（3）BIO-AO 水（碱）洗塔（三级）

设备名称	BIO-AO 碱洗塔
处理风量	25000m^3/h
材质	PP/FRP
直径	2.8m
高度	7m
数量	1 座
支撑件	玻璃钢型钢
喷嘴	螺旋喷头设计
填料	材质：PP/FRP
内部喷淋管	PP/FRP
平台、直爬梯	碳钢镀锌

附件1 工艺流程图