

FORM 5
ENVIRONMENTAL IMPACT ASSESSMENT ORDINANCE
(CHAPTER 499)
SECTION 13(1)

Application for Variation of an Environmental Permit

PART A PREVIOUS APPLICATIONS

- ☐ No previous application for variation of an environmental permit.
☒ The environmental permit was previously amended.

Application No. : VEP-548/2018

PART B DETAILS OF APPLICANT

B1. Name : (person or company)

.....Director of Environmental Protection

.....[Note : In accordance with section 13(1) of the Ordinance, the person holding an environmental permit or a person who assumes responsibility for the designated project may apply for variation of the environmental permit.]

B2. Business Registration No. :

(if applicable)

□ □ □ □ □ □ □ □ — □ □ □ — □ □ — □ □ — □

B3. Correspondence Address :

B4. Name of Contact Person :

B5. Position of Contact Person :

B6. Telephone No. :

B7. Fax No. :

B8. E-mail Address : (if any)

PART C DETAILS OF CURRENT ENVIRONMENTAL PERMIT

C1. Name of the Current Environmental Permit Holder :

.....ENVIRONMENTAL PROTECTION DEPARTMENT - Waste Reduction and Recycling Group.

C2. Application No. of the Current Environmental Permit : VEP-548/2018

C3. The Current Environmental Permit was Issued in : month / year

09 / 2018

Important Notes :

Please submit the application together with

(a) 3 copies of this completed form; and

(b) appropriate fee as stipulated in the Environmental Impact Assessment (Fees) Regulation to the Environmental Protection Department at the following address :

The EIA Ordinance Register Office,
 27th floor, Southorn Centre, 130 Hennessy Road,
 Wan Chai, Hong Kong.

☐ Tick (✓) the appropriate box



PART D PROPOSED VARIATIONS TO THE CONDITIONS IN CURRENT ENVIRONMENTAL PERMIT

D1. Condition(s) in the Current Environmental Permit :	D2. Proposed Variation(s) :	D3. Reason for Variation(s) :	D4. Describe the environmental changes arising from the proposed variation(s) :	D5. Describe how the environment and the community might be affected by the proposed variation(s) :	D6. Describe how and to what extent the environmental performance requirements set out in the EIA report previously approved or project profile previously submitted for this project may be affected :	D7. Describe any additional measures proposed to eliminate, reduce or control any adverse environmental impact arising from the proposed variation(s) and to meet the requirements in the Technical Memorandum on Environmental Impact Assessment Process :
1. Annex B - Building Height Restrictions within the Project Site	Replace the building height restrictions with that approved in the PAFF EIA.	To align the building height restrictions stated in PAFF EIA.	Environmental impacts were compared to the EIA Report No. AEIAR-086/2005 and no significant environmental changes are identified. Please refer to the ERR.	Environmental impacts were compared to the EIA Report No. AEIAR-086/2005 and no significant environmental changes are identified. Please refer to the ERR.	No significant environmental changes are identified. Please refer to the ERR.	The mitigation measures recommended in the EIA Report No. AEIAR-086/2005 are considered to be sufficient and no additional measures are recommended.
2. Annex E - Total Annual Throughput Limits of Paper	Increase from 507,590 tpa to 1,000,000 tpa with conditions. A footnote summarizes the paper pulping plant operation will be added.	To facilitate the planning of development of a paper pulping plant.	Environmental impacts were compared to the EIA Report No. AEIAR-086/2005 and no significant environmental changes are identified. Please refer to the ERR.	Environmental impacts were compared to the EIA Report No. AEIAR-086/2005 and no significant environmental changes are identified. Please refer to the ERR.	No significant environmental changes are identified. Please refer to the ERR.	No adverse environmental impacts are anticipated and no additional measures are recommended.

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D1. Condition(s) in the Current Environmental Permit :	D2. Proposed Variation(s) :	D3. Reason for Variation(s) :	D4. Describe the environmental changes arising from the proposed variation(s) :	D5. Describe how the environment and the community might be affected by the proposed variation(s) :	D6. Describe how and to what extent the environmental performance requirements set out in the EIA report previously approved or project profile previously submitted for this project may be affected :	D7. Describe any additional measures proposed to eliminate, reduce or control any adverse environmental impact arising from the proposed variation(s) and to meet the requirements in the Technical Memorandum on Environmental Impact Assessment Process :
3. Figure 3 - Conceptual Internal Layout - Landscaping and Infrastructure	Deletion of the "Wastewater Treatment Facility".	The construction plan of wastewater treatment facility was not proceeded as planned.	Environmental impacts were compared to the EIA Report No. AEIAR-086/2005 and no significant environmental changes are identified. Please refer to the ERR.	Environmental impacts were compared to the EIA Report No. AEIAR-086/2005 and no significant environmental changes are identified. Please refer to the ERR.	Environmental impacts were compared to the EIA Report No. AEIAR-086/2005 and no significant environmental changes are identified. Please refer to the ERR.	No adverse environmental impacts are anticipated and no additional measures are recommended.

PART E DECLARATION BY APPLICANT

E1. I hereby certify that the particulars given above are correct and true to the best of my knowledge and belief. I understand the environmental permit may be suspended, varied or cancelled if any information given above is false, misleading, wrong or incomplete.



Signature of Applicant



Full Name in Block Letters



Position



on behalf of EPD - Waste Reduction and Recycling Group
Company Name and Chop (as appropriate)

24 February 2021
Date

NOTES :

1. A person who constructs or operates a designated project in Part I of Schedule 2 of the Ordinance or decommissions a designated project listed in Part II of Schedule 2 of the Ordinance without an environmental permit or contrary to the permit conditions commits an offence under the Ordinance and is liable to a maximum fine of \$5,000,000 and to a maximum imprisonment for 2 years.
2. A person for whom a designated project is constructed, operated or decommissioned and who permits the carrying out of the designated project in contravention of the Ordinance commits an offence and is liable to a maximum fine of \$5,000,000 and to a maximum imprisonment for 2 years.

Environmental Review Report

Planning for Development of a Paper Pulping Plant at EcoPark



24 February 2021

DOCUMENT CONTROL

Pages	Date	Issue No.	Description
All	21 December 2020	1	For review by SAG
All	13 January 2021	1.1	Revision to SAG's comments
All	2 February 2021	1.2	Revision to SAG's comments
All	10 February 2021	1.3	Revision to SAG's comments
All	18 February 2021	1.4	Revision to SAG's comments
All	22 February 2021	1.5	Revision to SAG's comments
All	22 February 2021	1.6	Revision to SAG's comments
All	24 February 2021	1.7	Revision to SAG's comments

Table of Contents

1	INTRODUCTION
1.1	Background and Purpose
1.2	Objectives of this Environmental Review
2	PROJECT DESCRIPTION
2.1	Background
2.2	Tentative Schedule of the Paper Pulping Plant Delivery
2.3	Proposed Operations of the Paper Pulping Plant
2.4	Review of Environmental Impacts
2.5	Conditions of Current Environmental Permit
2.6	Proposed Variations
2.7	Reasons for Variations
3	ENVIRONMENTAL REVIEW
3.1	Air Quality Impact
3.2	Water Quality Impact
3.3	Hazard to Life
3.4	Waste Management Implications
3.5	Noise Issues
3.6	Land Contamination Impact
3.7	Landfill Gas Hazard
3.8	Landscape and Visual Issues
4	CONCLUSIONS
5	APPENDICES
5.1	Appendix A – Further details of the Part D of Form 5
5.2	Appendix B – Updated Figure 3 in the EP
5.3	Appendix C – Siu Lang Shui Landfill Gas Monitoring Results

1 INTRODUCTION

1.1 Background and Purpose

1.1.1 EcoPark, situated in Lung Mun Road, Tuen Mun, is Hong Kong's first recycling business park with a site area of approximately 20 hectares. Developed in two phases, it provides a rentable area of 14 hectares long term land at affordable costs for the recycling industry with a view to alleviating the expenditure of recyclers on infrastructure and thereby encouraging their investment in advanced technologies and recycling processes.

1.1.2 Since its operation in 2007, currently, there are 12 tenants and two operators carrying out the recycling of waste cooking oil, waste metals, waste wood, waste electrical and electronic equipment, waste plastics, waste lead acid batteries, construction & demolition waste, waste glass and waste rubber tyres.

1.1.3 The quantity of waste paper disposed of at landfills in 2018 was 2,702 tpd (0.99 million tonnes) and constituted approximately 24% of Municipal Solid Waste. To diversify outlets for local waste paper, the Policy Address 2020 has announced the plan to tender for the development of a modern paper pulping plant in EcoPark. To increase the land use efficiency and decrease substantially the energy consumption and operating costs, paper pulping technology is a more suitable option of which that pulp products are generally not subject to import restrictions and will suit the local situation better and transform waste to resources more effectively.

1.1.4 The development of a paper pulping plant, in a 2 to 3 storeys building, will be in vacant adjacent lots of total area of approximately 10,000 square meters (m²). The lots will be tendered for 20-year Lease in 2021 and the paper pulping plant will be solely owned by the future tenant.

1.2 Objectives of this Environmental Review

1.2.1 EcoPark is a Designated Project (DP) under Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO). The Environmental Impact Assessment Report was approved in 2005 with the Environmental Permit (EP) first granted on 9 September 2005. Since then, amendments of the EP were subsequently applied under EIAO to cope with the changes of the EcoPark design at the EIA stage.

1.2.2 A range of recycling processes was assumed in the EcoPark EIA and the EP. Recycling of Paper has been covered in the EcoPark EIA and the EP.

1.2.3 As per condition 5.2 of the EP of the EcoPark (EP-226/2015/F), Process Review (PR) will be carried out in accordance with the EM&A Manual for the proposed paper pulping plant. If the result of the PR indicates that the proposed paper pulping plant deviates from the development parameters listed in the EcoPark EIA or the subsequent environmental review reports approved by EPD, Design Audit (DA) shall be carried out in accordance with the EM&A Manual with a view to assessing the potential environmental impacts and recommending additional mitigation measures as appropriate. The PR and/or DA will be carried out by the EcoPark Environmental Team (ET) and verified by the Independent Environmental Checker (IEC) in accordance with the EM&A Manual. The objectives of this ERR include principally:

- (i) Evaluate the environmental impacts arisen from operation of the paper pulping plant with assumptions and where necessary, recommend additional mitigation measures to achieve compliance with the requirement of the EcoPark EIA and current EP (EP-226/2005/F); and
- (ii) Demonstrate the paper pulping plant will not constitute material change to the environmental impact of the EcoPark with the implementation of mitigation measures and in compliance with the Technical Memorandum on EIA Process (EIAO-TM).

1.2.4 It is proposed that the paper pulping plant will be a 2 to 3-storey

building with a maximum processing capacity of waste paper throughput of 1,000,000 tonnes per annum (tpa), operating 24 hours daily mechanical pulping on solely electricity.

1.2.5 This ERR is submitted with the intention to request for approval of increase of waste paper throughput with condition and relax the building height restrictions to facilitate the plant design and operational planning during operational phase and acts a supporting document for the application for variation of an environmental permit.

2 PROJECT DESCRIPTION

2.1 Background

2.1.1 A land with a total area of approximately 10,000 m² will be tendered for Lease for a multi-storey paper pulping plant, with a maximum processing capacity of waste paper throughput of 1,000,000 tonnes per annum (tpa). The paper pulping plant is assumed to adopt the common practices and recycling technologies in the local waste paper recycling trade. The plant will use electricity as the sole energy source, apply mechanical pulping and operate 24 hours daily, 7 days per week. In addition, an in-house wastewater regeneration system will be installed to treat the waste water and feed the treated slurry back into the inflow for pulp preparation. A small portion of water input to the plant will be discharged into the communal foul sewer as waste water. Solid residues will be disposed at landfill. The target commencement of operation of the paper pulping plant is by late 2023 or 2024.

2.1.2 Waste paper recycling processes was previously assessed in the EIA Report. Throughput of pulping was reduced due to the air quality impacts brought by the fuel combustion. The EcoPark EIA also recommended that the wastewater generated should be treated by process-specific pre-treatment water. Impacts of air quality and water quality were found acceptable upon controls on implementation of mitigation measures as mentioned in the report. However, the throughput as stipulated in Annex E of the EP limits the processing capacity of the plant. Furthermore, the building height restrictions as stipulated in Annex B of the EP impose restrictions to the civil construction work of the plant.

2.1.3 In order to facilitate the planning development of the paper pulping plant and ensure the proposed operation is in accordance with EcoPark and EP, WRD I, as the Permit Holder, wish to apply for a variation of the conditions of the EP under Section 13(1) of the EIAO to increase the maximum throughput of waste paper from the currently stated 507,590 tpa to 1,000,000 tpa, in condition that the paper pulping plant will be operated in 100% electricity and mechanical pulping will be applied.

2.2 Tentative Schedule of the Paper Pulping Plant Delivery

2.2.1 The vacant adjacent lots will be tendered for Lease for the paper pulping plant in mid 2021. It is anticipated that the plant design, construction, application of licences / permits and testing and commissioning would take another 24 months for completion.

2.3 Proposed Operations of the Paper Pulping plant

2.3.1 The proposed paper pulping plant will be located at Lots T2 – T3 or P5 – P7 within EcoPark. The locations of the vacant lots (T2 – T3 or P5 – P7) are shown on Figure 2.1. The plant has a nominal capacity of 1,000,000 tpa. The proposed paper pulping plant will handle the waste paper collected by the contractors who are engaged in the “Waste Paper Collection & Recycling Services” programme launched by EPD. The contractors will collect waste paper (including carboards, newspapers and office papers) from the street corner recycling shops/ mobile recyclers/ frontline collectors across the territory. After collecting the waste paper, the contractors would carry out processing work, including screening, sorting and baling, etc. locally. Contaminants such as staples, string and plastics of the waste paper will be removed during the sorting state by the Contractors engaged for the Services before sending the waste paper to the proposed paper pulping plant at EcoPark. The recycling process adopted by the proposed paper pulping plant generally follows the flow for secondary fibre processing in Figure A.15 the EcoPark EIA Report and the key parameters of the pulping process are summarized in Table 2.1 below.

Figure 2.1 Layout Plan of EcoPark



Table 2.1 Parameters of the Pulp Process

PARAMETER	DESCRIPTION
Initial Recyclable	Waste paper
Final Product	Paper pulp
Pulping Process	Mechanical pulping
Fuel	Electricity only
Electricity Required	max. 26 MVA
Operating Hours	0000 to 2400, 7 days per week
Air Pollution Control Equipment	if applicable upon implementation of PR / DA
Pulping Medium	In water
Daily Water Consumption	Max. 3,800 m ³
Wastewater Treatment System	In-house regeneration system
Daily Industrial Wastewater Discharge	Max. 3,800 m ³
Solid Waste Generation	150,000 tpa

2.4 Review of Environmental Impacts

2.4.1 A number of environmental impacts were assessed in the approved EcoPark EIA Report in 2005 (AEIAR-086/2005), including air quality impact, noise impact, water quality impact, waste management, land contamination impact, landfill gas hazard assessment, landscape and visual issues and hazard to life assessment. As assessed in the EcoPark EIA, the environmental impacts brought by pulping may pose concerns on air quality, water quality, hazard to life and waste management implications. However, the modern technology adopted by the proposed paper pulping plant will minimize substantially the environmental impacts and would not cause additional adverse impacts. These will be examined in detail in this ERR.

2.5 Relevant Conditions of Current Environmental Permit for Variation

2.5.1 Under the current EP, the building height of building from the western boundary of the EcoPark is stipulated in Annex B of the EP as in below Table 2.2.

Table 2.2 Building Height Restrictions in EcoPark EP

Distance (D) of Building from the Western Boundary of the Project Site (m)	Maximum Height (H) of Building (where people work at elevated levels) (m)
0	0.0
10	5.8
20	11.5
30	17.3
40	23.1
50	28.9

2.5.2 The maximum total annual throughput limit of paper is stipulated in Annex E of the EP at 507,580 tpa.

2.5.3 The location of wastewater treatment facility is proposed in the EIA report and drawn on the Figure 3 of the EP.

2.6 Proposed Variations

2.6.1 It is proposed to replace the Building Height Restrictions in Annex B of the EP with the building height restrictions as approved in the EIA report of the adjacent Permanent Aviation Fuel Facility (PAFF) (AEIAR-107/2007), and is presented below Table 2.3:

Table 2.3 Building Height Restrictions within the Project Site

Distance (D) of Building from the Western Boundary of the Project Site (m)	Maximum Height (H) of Building (where people work at elevated levels) (m)
0	0
5	6
10	13
20	26
30	39
40	52
50	66

2.6.2 It is proposed to increase the Total Annual Throughput Limits of paper to 1,000,000 tpa in Annex E of the EP in condition that the proposed paper pulp processing facility will be driven solely by electricity and adopt only mechanical pulping.

2.6.3 It is proposed to delete the “Wastewater Treatment Facility” from the Conceptual Internal Layout – Landscaping and Infrastructure in Figure 3 of the EP.

2.6.4 The proposed variations were provided in the Part D of Form 5 for Application for Variation of an Environmental Permit in Appendix A.

2.7 Reasons for Variations

2.7.1 As mentioned above, to avoid causing ambiguity for the building height restriction applied to buildings in the vicinity of the PAFF, the building height restriction in the current EP should be updated to that approved

in EIA report of PAFF.

2.7.2 In addition, given the proposed paper pulping plant will not have air emissions and therefore no adverse impact on the air quality, the total annual throughput limits of paper should be relaxed to meet the total amount of waste paper disposed at the landfill at 1,000,000 tpa.

2.7.3 Furthermore, the *Preliminary Study on the Development of a Recovery Park in Tuen Mun Area 38* proposed a Wastewater Treatment Facility shall be provided to handle the effluent generated from recycling processes. However, the plan of centralization of waste water generated from tenants of EcoPark before discharge is not proceeded as tenant-specific discharge licences are found to be more effective in handling various types of wastewater. The figure was updated in Appendix B to reflect the current development of the EcoPark.

3 ENVIRONMENTAL REVIEW

3.1 Air Quality Impact

3.1.1 Introduction

Review of Air Quality Impact during Construction Phase

3.1.1.1 The construction dust impact arisen from site clearance, site formation, construction of foundation and superstructures work, road transport and stockpiling of dusty materials during the construction phase had been assessed in the EcoPark EIA. With the implementation of control measures as stipulated in Air Pollution Control (Construction Dust) Regulation, together with proper site management and good housekeeping, no adverse fugitive dust emission is anticipated.

Review of Air Quality Impact during Operational Phase

3.1.1.2 The throughput of pulping of waste paper assessed in the EcoPark EIA was limited at 200,000 tpa due to the significant NO₂ emission from fuel combustion process.

3.1.1.3 To mitigate the air quality impacts from fuel combustion and with the advancement of pulp production technology, the proposed paper pulping plant will be solely driven by electricity and no combustion process will be employed and hence no emission produced and no impact to the air quality.

3.1.1.4 The air quality impact arisen from the operation of the paper pulping plant is assessed based on 1,000,000 tpa throughput of waste paper with mechanical pulping and the processing equipment will be operated 24 hours daily, 7 days per week.

3.1.1.5 A summary of the key assumptions is provided below:

Fuel Combustion

- (a) The paper pulp processing equipment will be solely driven by electricity supplied by CLP and no emissions related to fuel combustion will be emitted.

Odour Impact

- (b) Mechanical pulping will be adopted for processing waste paper to paper pulp for exports. No hydrogen sulfide (H₂S) will be generated from pulping process.

De-inking

- (c) No chlorine bleaching will be adopted. For non-chlorine de-inking processes, impacts of emission of volatile organic compounds was identified negligible in the EcoPark EIA.

Control of Fugitive Emissions

- (d) Waste paper collected from various local collection points will be baled before transporting to EcoPark for recycling. The equipment will be installed in an enclosed building structure, with suitable dust-tight structures and dust control units at the ventilation exhaust to prevent fugitive dust emissions as necessary.

Mixing of Raw Materials

- (e) Mixing of raw materials will only be performed inside a fully enclosed dust-tight structure that no emission will be emitted to the open air during processing of materials inside the building.

Vehicle and Marine Vessel Emissions from Transportation

- 3.1.2 According to the EcoPark EIA, it was estimated that 344 pcu/hr (all local traffic) and 48 vessel movements / day would be associated with EcoPark.

3.1.3 It is estimated that the local traffic and vessel movement of the EcoPark after the commencement of operation of the paper pulping plant will not exceed the estimates in the EcoPark EIA, i.e. no more than 344 pcu/hr and 48 vessel movements / day. Therefore, the contributions to the local traffic and marine vessel traffic are negligible.

3.1.4 Summary

3.1.4.1 In summary, no adverse air quality impact is anticipated from the increase in throughput of waste paper from 200,000 tpa to 1,000,000 tpa.

3.2 Water Quality Impact

3.2.1 Introduction

3.2.1.1 EcoPark lies within the North Western Water Control Zone. The evaluation of water quality impacts in the EcoPark EIA remains valid and applicable to the paper pulping plant.

3.2.1.2 A wastewater treatment facility (WTF) was proposed in the EcoPark EIA to treat all industrial wastewater centrally in the EcoPark to the WPCO-TM standard. The discharge of domestic wastewater as assessed in the EcoPark EIA was estimated for a working population of 10,000 persons. Together with the domestic wastewater, all the wastewater will flow to Pillar Point Sewerage Treatment Works (PPSTW) via the Tuen Mun Sewage Pumping Station (TMSPS) and finally discharge through the Pillar Point Outfall.

3.2.1.3 The latest development of the recycling businesses operated by EcoPark tenants are diverse in nature and each of them will have the specific limitations of the quantity and composition of their discharge. The operational cost of treating diversified industrial wastewater centrally by the WTF may be high and not cost effective. As per the established practice, tenants will treat their

industrial wastewater discharge with their in-house wastewater treatment system to the standard as stipulated in their respective Discharge Licence before discharge to the communal foul sewer. As a result, the construction plan of the WTF is proposed to be cancelled.

3.2.1.4 Currently, only one tenant in the EcoPark produced industrial wastewater and has been granted with Discharge Licence. Champway Technology Limited, occupied at Lot T5, is granted with Discharge Licence and the discharge into communal foul sewer is capped at 50 m³/day.

3.2.1.5 The following sections will review the water quality impacts arisen from the cancellation of construction plan of the WTF and from the proposed paper pulping plant.

A. Overall Review of Water Quality Impact without the WTF

3.2.1.6 The EcoPark EIA has already demonstrated the adequacy of capacity of sewerage system serving Tuen Mun Area 38. Treated effluent from the WTF will flow to TMSPS, then to PPSTW and subsequently discharge at Pillar Point Outfall. As assessed in the EcoPark EIA, the industrial wastewater flow from EcoPark WTF had been estimated at 4,666 m³/day. Compared to the design capacity of TMSPS and PPSTW at 108,864 m³/day, no capacity problems of flows of treated industrial effluent from the WTF were envisaged at the preparation of EcoPark EIA .

3.2.1.7 The pollution load inventory on the quantities and characteristics of all likely future water pollution sources have also been assessed in the EcoPark EIA.

3.2.1.8 In case of any additional discharge of tenant-specific industrial wastewater into discharge points, including both communal foul sewer and communal storm drain, as per the established practice, the quantity and composition will be governed by the specific conditions in the Discharge Licence. In addition, requirements on

the flow measurement, treatment, disposal, monitoring, records and reporting and operation manual will be stipulated in the specific conditions in the Discharge Licence.

3.2.1.9 Therefore, no adverse water quality impact is anticipated from the cancellation of the WTF.

B. Overall Review of Water Quality Impact arisen from the paper pulping plant

Review of Water Quality Impact during Construction Phase

3.2.1.10 The potential water quality impacts arisen from construction site runoff and sewage effluents from construction workforce had been assessed in the EcoPark EIA. Surface runoff will be mitigated with the implementation of good site practices outlined in the Practical Note for Professional Persons on Construction Site Drainage (ProPECC PN 1/94). Portable toilets provided by licensed contractor will serve the construction workforce and no direct disposal of sewage into the environment will be allowed. No adverse water quality impact during construction phase is anticipated.

Review of Water Quality Impact during Operational Phase

3.2.1.11 Generation of wastewater in paper recycling processes including pulping/ cleaning/ de-inking/ non-chlorine bleaching/ additives/ pressing/ drying was assessed in the EcoPark EIA.

3.2.1.12 The water quality impact arisen during operational phase is assessed based on the water consumption of 3,800 m³ at maximum. In the proposed operation for the paper pulping plant, majority of water is used as one of the raw materials for pulping process and wastewater discharge is minimal. The water content of the finished paper pulp and the mechanism and effectiveness of the in-house regeneration system have not been finalised. Hence, volume of the industrial wastewater discharge cannot be

determined.

3.2.1.13 To review the water quality impacts arisen from the operational phase of the paper pulping plant, the discharge of industrial wastewater was assumed to 100% of water consumption in the worst scenario, which is very unlikely to happen. In that case, 3,800 m³/day of industrial wastewater will be discharged into the communal foul sewer. Since the production of industrial wastewater assessed in the EcoPark EIA was at 4,666 m³/day, the industrial wastewater discharge from the proposed paper pulping plant and Champway will amount to 3,850 m³/day. The industrial discharge was summarized in Table 3.1. Therefore, the total industrial wastewater currently will not exceed the estimate in the EcoPark EIA.

Table 3.1 Summary of Industrial Effluent Discharge by EcoPark Tenants after the Commencement of the Proposed Paper Pulping Plant

Tenants	Maximum industrial discharge to communal foul sewer (m ³ /day)	Reference
Champway Technology Limited	50	Discharge Licence
Proposed Paper Pulping Plant	3,800	Refer to the plant design and planning when preparing the ERR
Total:	<u>3,850</u>	

3.2.1.14 The design of the in-house regeneration system will follow the good practices outlined in Section 6 and 7 in the Practical Note for Professional Persons on Drainage Plans subject to Comment by the Environmental Protection Department (ProPECC PN5/93). Handling of chemical wastes will be in compliance of Waste Disposal (Chemical Waste) (General) Regulation and other necessary legal requirements.

3.2.1.15 Sewage arising from site staff will be discharged to the communal foul sewer. The working population in EcoPark was estimated at

approximately 360 persons in August 2020. It is assumed that the number of construction worker for the proposed paper pulping plant will be at 100 during construction phase and the working population will become the number of site staff of the paper pulping plant after the commencement. Assuming the flow at maximum of 80 L/ person/ day, the total flow from working population is estimated at 36.8 m³/day and the calculation of domestic discharge was shown in Table 3.2. As assessed in the EcoPark EIA of working population at 10,000, no capacity problems are envisaged to the communal foul sewer.

Table 3.2 Calculation of Domestic Discharge from Industrial Employee during the Construction and Operational Phases

Phase	Unit	No. of employee in the EcoPark	Industrial Flow (m ³ /day)	Total Flow (m ³ /day)
During the construction phase	Employee	460	0.080	<u>36.8</u>
During the operational phase	Employee	460	0.080	<u>36.8</u>

3.2.2 Summary

3.2.2.1 No adverse water quality impact is anticipated due to the cancellation of WTF construction plan and the Paper Pulping Plant.

3.3 Hazard to Life

3.3.1 Introduction

3.3.1.1 The hazard to life is assessed on the stored or transported Dangerous Goods (DGs) substances within EcoPark and building height restriction based on the paper pulping plant.

Dangerous Goods (DGs)

3.3.1.2 Various DGs had been assessed in the approved EIA report, including battery fluid, oxygen & acetylene, zinc dust, hydrogen peroxide, rubber tyres, sludge or spent acid and ultra low Sulphur diesel. The paper pulping plant will adopt mechanical pulping and no aforementioned DGs will be used.

Building Height Restriction

3.3.1.3 The paper pulping plant will locate on the vacant adjacent lots of the area of approximately 10,000 m² in the EcoPark and may lie next to the western boundary of the EcoPark. The building height restriction proposed in the EIA report of EcoPark is stipulated in Annex B of the EP.

3.3.1.4 In 2007, the adjacent PAFF revised the building height restrictions in its EIA report and that the identified heights are greater than those identified in the EcoPark EIA. Assumptions have been made on future buildings immediately opposite to the site boundary of PAFF will not be high rise to avoid the impact of any smoke ingress into buildings. Furthermore, for buildings which are specifically designed against smoke ingress (by effective sealing and automatically actuated fire dampers in the air intakes, etc), escape at ground level would be expected to be practical, even in the event of such a smoke impact.

3.3.1.5 Based on the above approach, the proposed building height limit is now revised as Table 2.3, and will only be applied to structures within which people will work at elevated levels on a regular basis. Emergency escape area, maintenance area and warehouse with restricted access are not bound by the building height limit.

3.3.2 Summary

3.3.2.1 The building height restriction for the buildings lie next to the western boundary of the EcoPark is now revised. The part of

building premises of the paper pulping plant, if exceeded the specified height restriction, will not be used as offices, resting places nor venues where workers will be stationed. If necessary, the part of the buildings will be completed with effective sealing and automatically actuated fire dampers in the air intakes, etc.

3.4 Waste Management Implications

3.4.1 Introduction

3.4.1.1 The waste management implications are assessed according to the framework set out in the EcoPark EIA.

Review of Waste Management Implications during Construction Phase

3.4.1.2 The waste generated during construction phase includes construction and demolition (C&D) materials, general refuse from daily activities and chemical waste from maintenance of plant and equipment.

Construction and Demolition Materials

3.4.1.3 The C&D materials comprise of inert and non-inert materials. The inert C&D material would be generated from excavation works for the foundation of the proposed paper pulping plant and is mostly soil and rock. The proposed paper pulping plant will comprise of a superstructure and substructure and most of the equipment will be housed within the superstructure. The best means to estimate the amount of C&D materials will be to base the estimate on the Gross Floor Area (GFA). The plot ratio of EcoPark is at 2.5 and hence the GFA would be of 25,000 m². In accordance with the *Reduction of Construction Waste Final Report*, the C&D materials generation rate of 0.1 m³ per 1 m² of GFA is adopted for assessing the C&D materials from construction of the proposed paper pulping plant. It is estimated that approximately 2,500 m³ of C&D materials will be generated from the proposed paper pulping

plant. Calculations are shown below.

$$\begin{aligned}\text{Gross Floor Area (m}^2\text{)} &= \text{Lot Size (m}^2\text{)} \times \text{Plot Ratio} \\ &= 10000 \times 2.5 \\ &= 25000 \text{ (m}^2\text{)}\end{aligned}$$

$$\begin{aligned}\text{Volume of C\&D waste (m}^3\text{)} &= 0.1 \times \text{Gross Floor Area (m}^2\text{)} \\ &= 0.1 \times 25000 \\ &= 2500 \text{ (m}^3\text{)}\end{aligned}$$

3.4.1.4 According to the *Monitoring of Solid Waste in Hong Kong – Statistics for 2019*, the inert C&D materials constituted 92% of total C&D waste and is estimated at 2,300m³. The non-inert C&D materials is estimated at 200 m³. The reduction, reuse and recycling strategies for C&D materials will follow the waste management framework as set out in the EcoPark EIA.

General Refuse

3.4.1.5 The general refuse comprises of food scraps, waste paper, empty containers, etc. The quantity of general refuse arising is estimated with reference made to disposal rate of MSW stated in the *Monitoring of Solid Waste in Hong Kong – Statistics for 2019*, i.e. 1.47kg/person/day, and is slightly higher than the assumption of 1.39 kg/person/day adopted in the EcoPark EIA.

3.4.1.6 The estimated construction period for the paper pulping plant is 36 months and 100 construction workers will be working for the building work. The general refuse generated from the workers during the construction phase is estimated at 137 tonnes and the calculation is shown below.

$$\begin{aligned}\text{Waste arising (Plant only)} &= 36 \text{ months} \times 4.3 \text{ weeks/month} \times 6 \text{ days/week} \times 1.47 \text{ kg/person/day} \times 100 \text{ persons} \\ &= 137 \text{ tonnes}\end{aligned}$$

3.4.1.7 Nevertheless, with the implementation of good site practices, general refuse will be recycled as much as possible before disposal

at landfills and no adverse environmental impact is anticipated.

Chemical Waste

3.4.1.8 Maintenance of the plant and equipment may generate chemical wastes such as cleaning fluids, solvents, lubrication oil, fuel, etc. The amount of chemical waste generated from construction phase will depend on the Contractor's on-site practice. Nevertheless, the amount would be small and at around <50 L/month. The producers of chemical wastes shall be registered with EPD as chemical waste producers and the storage, collection and disposal of the chemical wastes will comply with the Waste Disposal (Chemical Waste) (General) Regulation. The reduction and recycling strategies for chemical waste will follow the waste management framework as set out in the EcoPark EIA and the quantity of waste will not exceed the amount estimated in the EcoPark EIA.

Review of Waste Management Implications during Operational Phase

3.4.1.9 Main sources of waste generation during operational phase were identified in the EcoPark EIA, including the waste from recycling activities, chemical waste arising from maintenance of plant and equipment and general refuse from daily activities.

General Refuse

3.4.1.10 It is estimated that 100 workers will be working for the proposed paper pulping plant during operational phase. The estimation of general refuse arising from the workers of paper pulping plant during the operational phase is more representable using the domestic disposal rate of 0.87 kg/person/day, according to the *Monitoring of Solid Waste in Hong Kong – Statistics for 2019* and is estimated at approximately 2 tonnes per month.

Waste arising (Plant only) = 4.3 weeks/month x 6 days/week x 0.87 kg/person/day x 100 persons

= 2 tonnes/month

- 3.4.1.11 Nevertheless, with the implementation of good site practices, general refuse will be recycled as much as possible before disposal at landfills and no adverse environmental impact is anticipated.

Chemical Waste

- 3.4.1.12 Maintenance of the plant and equipment may generate chemical wastes such as cleaning fluids, solvents, lubrication oil, fuel, etc. The amount of chemical waste generated from operational phase will depend on the tenant's on-site practice. Nevertheless, the amount would be small and estimated at around <50 L/month. The future tenants shall be registered with EPD as chemical waste producers and the storage, collection and disposal of the chemical wastes will comply with the Waste Disposal (Chemical Waste) (General) Regulation. The reduction and recycling strategies for chemical waste will follow the waste management framework as set out in the EcoPark EIA and the quantity of waste will not exceed the amount estimated in the EcoPark EIA.

Waste from Recycling Activities

- 3.4.1.13 For the paper recycling assessed in the EcoPark EIA, 20% of waste was estimated at the sorting stage for foreign substances (staples, string, plastics, etc.) while 15% of wastewater treatment sludge was estimated for subsequent recycling processes. The estimated quantity of waste arising from paper recycling amounted to 162,429 tpa (Table 6.1 of the EcoPark EIA).

- 3.4.1.14 The proposed paper pulping plant will handle the waste paper collected from the "Waste Paper Collection & Recycling Services" of the EPD. The Contractors of the Service will be responsible for removal of contaminants such as staples, string, plastics, etc. from the waste paper at the sorting and baling stage

before sending to the proposed paper pulping plant in the EcoPark. Only processing of secondary fibre will be carried out in the paper pulping plant.

3.4.1.15 As assessed in the EcoPark EIA, 15% of solid waste, in terms of sludge, will be arisen from the processing of secondary fibre. The total throughput of the paper pulping plant is at 1,000,000 tpa and the amount of sludge will be at 150,000 tpa. A 5% of contingency factor for additional waste arising is included and the amount of sludge is estimated at 157,500 tpa. The waste generated will be smaller than that assessed in the EcoPark EIA and will be recycled as much as possible before disposal at landfills.

Waste arising (with 5% of contingency factor)	= 150,000 tpa x (1 + 5%)
	= 157,500 tpa

3.4.2 Summary

3.4.2.1 With the implementation of good site practices, no adverse environmental impact is anticipated.

3.5 Noise Issues

Construction and Operational Noise

3.5.1 There are no Noise Sensitive Receivers (NSRs) within 300 m of the paper pulping plant and no adverse noise impact arisen from both construction and operational phase is anticipated.

Road Traffic Noise

3.5.2 The EcoPark EIA has estimated the total number of inbound and outbound truck trips associated with the operation of EcoPark in 2009 at 86 vehicles / hour during the peak hour.

3.5.3 It is estimated that the road traffic of the EcoPark after the

commencement of the operation of the proposed paper pulping plant will not exceed the estimate in the EcoPark EIA, i.e. at 86 vehicles / hour during the peak hour. Therefore, no adverse noise impact is anticipated.

3.6 Land Contamination Impact

3.6.1 The paper pulping plant will locate on an open ground on the reclaimed land at EcoPark. No possible sources of contaminants were identified for paper recycling in the EcoPark EIA. With the implementation of good site practices to prevent potential chemical spillage, there is no implication to land contamination impact from the paper pulping plant and no adverse land contamination impact is anticipated.

3.7 Landfill Gas Hazard

3.7.1 The proposed paper pulping plant will locate in vacant adjacent lots of area of approximately 10,000 m² in the EcoPark and fall within 250 m consultation zone of Siu Lang Shui Landfill (SLSL). Landfill gas hazard assessment was carried out for the Development of EcoPark and presented in Section 8 of the EIA Report.

Source

3.7.2 SLSL is an old and moderately sized landfill that was restored in 2000. Restoration works were carried out with the aim of minimizing the risks associated with off-site migration of LFG through a passive LFG management system. As part of the restoration contract, LFG monitoring has been carried out since completion of the restoration works.

3.7.3 Results of the LFG monitoring carried out under the restoration contract from 2019 to 2020 are presented in Appendix C and summarized in Table 3.3. From the data, the range of methane concentration in all monitoring wells fluctuated between <0.1% and 0.1%. The carbon dioxide concentration fluctuated between <0.1% and 17.8%. With

reference to the corresponding data from the EcoPark EIA, it is conservatively assumed that the potential for off-site migration of landfill gas cannot be eliminated.

Table 3.3 Summary of Siu Lang Shui Landfill Gas Monitoring Results from 2019 to 2020

Monitoring Locations	Methane (% v/v)		Carbon Dioxide (% v/v)	
	Range	Average (% of readings <0.1)	Range	Average (% of readings <0.1)
DH201	<0.1	<0.1	<0.1 – 9.4	5.1
DH203A	<0.1	<0.1	<0.1 – 6.9	1.4
DH204	<0.1	<0.1	<0.1 – 7.9	2.1
DP220	<0.1	<0.1	<0.1 – 0.2	0.1
DP221	<0.1	<0.1	0.3 – 11.4	3.7
DP223	<0.1 – 0.1	0.1	0.6 – 17.8	11.3
DP224	<0.1	<0.1	9.2 – 16.0	12.6

3.7.4 According to the approved EcoPark EIA, the Source term is classified as MEDIUM. In view that the size and age of the landfill, the nature of landfill gas control measures and the recent landfill gas monitoring results, as a conservative approach, the “MEDIUM” category is maintained.

Pathway

3.7.5 The geology surrounding SLSL provides a potential pathway for migration of LFG to EcoPark, primarily from the existence of the north-south trending fault associated with the Yuen Tau Shan Fault through the valley axis, and inter-granular movement through the reclamation fill that underlies EcoPark. Once leaving SLSL, there is approximately 150m of made ground where groundwater levels are within 1m to 2m below the surface. This will act to cut off any potential LFG migration pathways at deeper levels within the fill, and it would be unusual for any LFG at such a shallow depth to migrate over this distance without being oxidized or dissipating through the reclamation fill to the surface where it would naturally vent to the atmosphere.

3.7.6 A drainage culvert runs below the EcoPark. It is a contiguous water-tight concrete structure. Any LFG present in the culvert will vent to the atmosphere at the outfall of the culvert and not be able to migrate into the EcoPark. The risk of the culvert acting as a potential pathway is therefore low.

3.7.7 Therefore, potential pathways for migration of LFG from SLSL to EcoPark can be classified as MODERATELY SHORT/DIRECT.

Target

3.7.8 Based on the preliminary design and the mitigation measures as mentioned above, the proposed building will be raised clear of the ground with a clear separation distance of at least 500mm or apply low-gas permeability membrane with gravel-fill vent system and dense well-compacted concrete or steel shuttering building materials. Although below ground works (shallow excavation) will be required for the installation of drainage and other utilities during the construction phase of the proposed paper pulping plant, these will be carried out by appropriately trained staff. Therefore, the target is classified as “LOW SENSITIVITY”.

Qualitative Assessment of Landfill Gas Hazard

Table 3.4 Source-Pathway-Target Summary

Source	Pathway	Target	Qualitative Risk
Siu Lang Shui Landfill (<u>MEDIUM</u>)	150m from Siu Land Shui Landfill through reclamation fill (<u>MODERATELY SHORT/DIRECT</u>)	Construction Phase (<u>LOW</u>) Operation Phase: (<u>LOW</u>) The proposed paper pulping plant will follow the requirements as stated in Section 3.7.3 above.	(<u>LOW</u>)

3.7.9 To mitigate landfill gas hazard, all buildings and enclosed structures of the paper pulping plant will implement all measures as stipulated in clause 3.7 of the EP. The mitigation measures include the followings:

- (i) Building shall be raised clear of the ground with a clear separation distance (as measured from the highest point on the ground surface to the underside of the lowest floor joist) of at least 500 mm; or
- (ii) A low-gas permeability membrane shall be applied to the surface of any wall or floor slab that rest on or is below ground. A gravel-fill vent system shall be provided such that passive venting is achieved around the perimeter of the structure. In addition, other building materials, such as dense well-compacted concrete or steel shuttering which provide a measure of resistance to gas permeation, shall be used to achieve gas protection.

3.8 Landscape and Visual Issues

3.8.1 As stated in the engineering conditions for Government Land Allocation (GLA) for EcoPark, the total gross floor area of any structure or structures erected or to be erected on the site shall not exceed maximum plot ratio of 2.5. In addition, no part of any structure shall exceed a height of 35 metres above the mean formation level of the site.

3.8.2 Although the plant design has not been confirmed at the time when preparing the ERR, the factory will follow the engineering conditions for GLA for EcoPark.

3.8.3 Wide planting strips have been implemented in the EcoPark to provide a lush and green environment from users' and visitors' perspective. Examples of the wide planting strips such as boundary planting, media strip planting and roadside treatment have been implemented in accordance with Figure 3 of the EP. In addition, an eco-garden of an approximate size of 700 m² was built in the centre of the EcoPark Administration Building to provide an outdoor resting environment for our visitors to enrich their visiting experience. The location of the eco-

garden is shown in Figure 2.1. Vegetation with more than 40 plant species and an artificial fish pond were built in the eco-garden to simulate a natural scenic environment. Visitors can also sit on the benches during their visits. The environment of the eco-garden is shown in Figure 3.1.

Figure 3.1 Photo of the Eco-garden



3.8.4 In addition, the proposed paper pulping plant will locate on previously occupied lots (T2 – T3 or P5 – P7). While lots T2 – T3 is currently on a bare land, P5 – P7 is paved with concrete and there is no existing vegetation on the lots. Hence, no vegetation will be reduced from the proposed development. The proposed paper pulping plant will be encouraged to provide ‘green’ areas within their lots.

3.8.5 No adverse landscape and visual issues arisen from the plant is anticipated.

4 CONCLUSIONS

- 4.1 This Environmental Review Report has been prepared to review the potential environmental impacts arising from pulp production and facilitate the planning development of the proposed paper pulping plant. The Report also provides a more update information of the facility in the EcoPark.
- 4.2 After reviewing the environmental impacts, there is no change of environmental impacts with respect to air quality, noise issues, water quality, waste management, land contamination, landfill gas hazard, landscape and visual issues and hazard to life. It has been concluded that there will be no material change to the EcoPark project resulting from the proposed paper pulping plant.
- 4.3 The mitigation measures are expected to meet the requirements of the EIAO-TM.
- 4.4 For reference, Appendix A provides further details of the proposed changes, as required in Part D of EIAO "Form 5 Application for Variation of an Environmental Permit".

Appendix A –

Further details of the Part D of Form 5 for

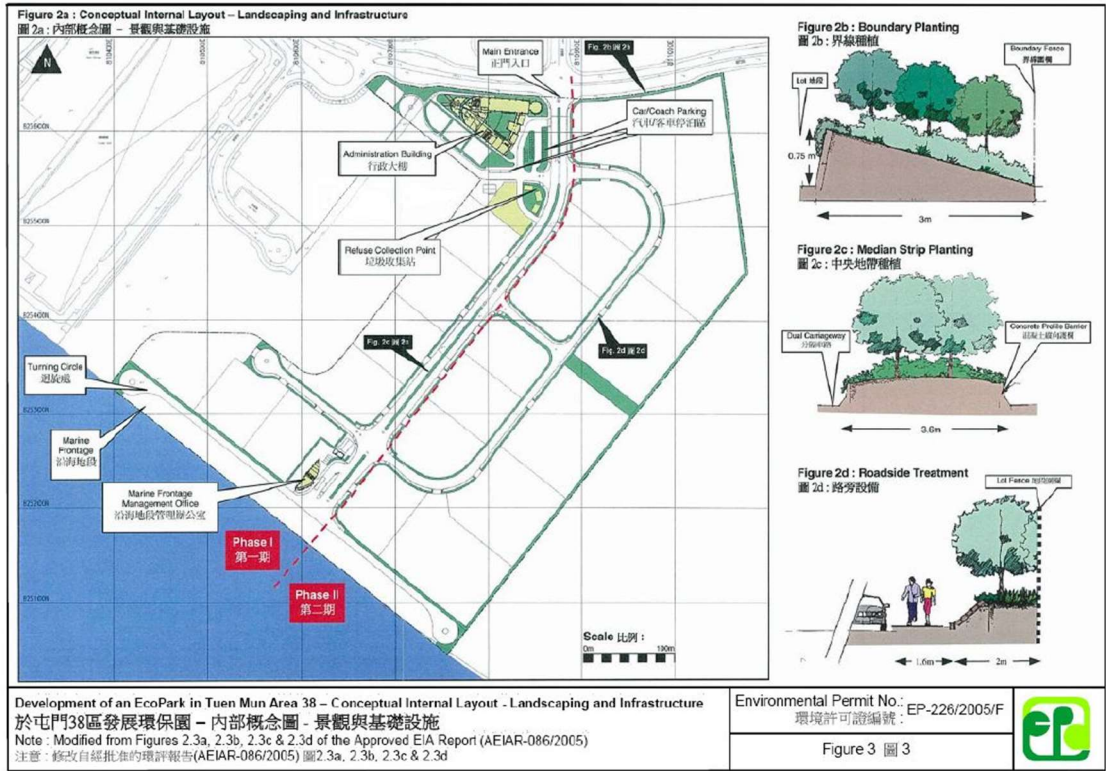
“Application for Variation of an Environmental Permit”

D1. Condition(s) in the Current Environmental Permit:	D2. Proposed Variation(s):	D3. Reason for Variation(s):	D4. Describe the environmental changes arising from the proposed variation(s):	D5. Describe how the environment and the community might be affected by the proposed variation(s):	D6. Describe how and to what extent the environmental performance requirements set out in the EIA report previously approved or project profile previously submitted for this project may be affected:	D7. Describe any additional measures proposed to eliminate, reduce or control any adverse environmental impact arising from the proposed variation(s) and to meet the requirements in the Technical Memorandum on Environmental Impact Assessment Process:
Annex B – Building Height Restrictions within the Project Site	Replace the building height restrictions with that approved in the PAFF EIA.	To align the building height restrictions stated in PAFF EIA.	Environmental impacts were compared to the EIA Report No. AEIAR-086/2005 and no significant environmental changes are identified. Please refer to the ERR.	Environmental impacts were compared to the EIA Report No. AEIAR-086/2005 and no significant environmental changes are identified. Please refer to the ERR.	No significant environmental changes are identified. Please refer to the ERR.	The mitigation measures recommended in the EIA Report No. AEIAR-086/2005 are considered to be sufficient and no additional measures are recommended.
Annex E – Total Annual	Increase from 507,590 tpa	To facilitate the planning of	Environmental impacts	Environmental impacts	No significant	No adverse environmental

Planning for a Development of a Paper Pulping plant at EcoPark

Throughput Limits of Paper	to 1,000,000 tpa with conditions. A footnote summarises the paper pulping plant operation will be added.	development of a paper pulping plant.	were compared to the EIA Report No. AEIAR-086/2005 and no significant environmental changes are identified. Please refer to the ERR.	were compared to the EIA Report No. AEIAR-086/2005 and no significant environmental changes are identified. Please refer to the ERR.	environmental changes are identified. Please refer to the ERR.	impacts are anticipated and no additional measures are recommended.
Figure 3 – Conceptual Internal Layout – Landscaping and Infrastructure	Deletion of the “Wastewater Treatment Facility”	The construction plan of wastewater treatment facility was not proceeded as planned.	Environmental impacts were compared to the EIA Report No. AEIAR-086/2005 and no significant environmental changes are identified. Please refer to the ERR.	Environmental impacts were compared to the EIA Report No. AEIAR-086/2005 and no significant environmental changes are identified. Please refer to the ERR.	Environmental impacts were compared to the EIA Report No. AEIAR-086/2005 and no significant environmental changes are identified. Please refer to the ERR.	No adverse environmental impacts are anticipated and no additional measures are recommended.

Appendix B –
Updated Figure 3 in the EP



Appendix C –
Siu Lang Shui Landfill Gas Monitoring Results

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui

Equipment Used: Landtec GEM-2000

Date of Monitoring: 2-Jan-19

Weather Condition: Cloudy

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	10:53	<0.1	9.4	11.3	14.5	0	
DH203A	10:58	<0.1	6.9	9.5	15.4	0	
DH204	11:06	<0.1	3.1	18.2	15.5	0	
DP220	10:49	<0.1	<0.1	20.8	14.2	0	
DP221	10:55	<0.1	11.4	8.9	13.6	0	
DP223	11:01	<0.1	13.8	8.2	13.9	0	
DP224	11:04	<0.1	14.5	3.3	14.7	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui

Equipment Used: Landtec GEM-2000

Date of Monitoring: 4-Feb-19

Weather Condition: Cloudy

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	11:05	<0.1	8.0	13.0	22.9	0	
DH203A	11:10	<0.1	1.0	18.0	26.2	0	
DH204	11:17	<0.1	0.7	18.7	27.2	0	
DP220	11:02	<0.1	<0.1	20.2	24.6	0	
DP221	11:08	<0.1	1.9	18.2	26.9	0	
DP223	11:13	<0.1	8.5	12.3	27.4	0	
DP224	11:15	<0.1	12.9	3.9	27.5	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui

Equipment Used: Landtec GEM-2000

Date of Monitoring: 1-Mar-19

Weather Condition: Sunny

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	15:01	<0.1	7.9	13.0	24.5	0	
DH203A	15:07	<0.1	<0.1	20.3	27.2	0	
DH204	15:16	<0.1	<0.1	20.1	25.1	0	
DP220	14:58	<0.1	<0.1	20.9	25.7	0	
DP221	15:04	<0.1	1.9	18.5	26.2	0	
DP223	15:10	<0.1	14.5	3.1	28.5	0	
DP224	15:13	<0.1	14.3	2.5	25.6	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui

Equipment Used: Landtec GEM-2000

Date of Monitoring: 1-Apr-19

Weather Condition: Cloudy

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	14:33	<0.1	7.1	13.8	22.6	0	
DH203A	14:39	<0.1	<0.1	20.7	23.5	0	
DH204	14:49	<0.1	0.1	20.2	22.6	0	
DP220	14:29	<0.1	<0.1	20.8	23.0	0	
DP221	14:36	<0.1	2.0	18.7	23.2	0	
DP223	14:42	<0.1	13.6	2.4	23.3	0	
DP224	14:45	<0.1	13.9	3.0	22.7	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui
 Date of Monitoring: 2-May-19
 Weather Condition: Cloudy
 Equipment Used: Landtec GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	10:31	<0.1	7.0	13.5	23.0	0	
DH203A	10:37	<0.1	6.6	8.6	24.9	0	
DH204	10:46	<0.1	0.2	20.3	24.1	0	
DP220	10:28	<0.1	<0.1	21.0	23.0	0	
DP221	10:35	<0.1	2.5	18.0	24.3	0	
DP223	10:41	<0.1	11.2	6.8	24.8	0	
DP224	10:43	<0.1	13.1	3.7	23.9	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui
 Date of Monitoring: 6-Jun-19
 Weather Condition: Sunny
 Equipment Used: Landtec GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	10:38	<0.1	7.3	12.0	28.8	0	
DH203A	10:47	<0.1	5.0	0.3	31.7	0	
DH204	10:57	<0.1	1.9	15.4	33.1	0	
DP220	10:42	<0.1	<0.1	20.0	36.8	0	
DP221	10:44	<0.1	3.1	16.3	33.8	0	
DP223	10:50	<0.1	11.4	1.2	36.6	0	
DP224	10:54	<0.1	9.4	7.9	31.2	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui

Equipment Used: Landtec GEM-2000

Date of Monitoring: 03-Jul-19, 26-Jul-19

Weather Condition: Cloudy, Sunny

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	10:48	<0.1	8.2	11.6	26.7	0	
DH203A	11:07	<0.1	<0.1	20.6	29.5	0	*
DH204	11:16	<0.1	3.4	15.1	34.2	0	*
DP220	10:45	<0.1	<0.1	20.4	26.5	0	
DP221	10:52	<0.1	5.4	13.1	26.9	0	
DP223	11:09	<0.1	17.8	0.2	37.5	0	*
DP224	11:13	<0.1	9.4	7.1	32.9	0	*

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui

Equipment Used: Landtec GEM-2000

Date of Monitoring: 23-Aug-19

Weather Condition: Cloudy

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	11:10	<0.1	6.2	13.7	28.2	0	
DH203A	11:20	<0.1	0.1	19.8	29.8	0	
DH204	11:32	<0.1	6.0	8.3	30.9	0	
DP220	11:05	<0.1	<0.1	19.3	27.7	0	
DP221	11:14	<0.1	3.2	16.4	29.2	0	
DP223	11:26	0.1	16.6	0.1	30.6	0	
DP224	11:28	<0.1	11.0	3.7	30.6	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui
Date of Monitoring: 5-Sep-19
Weather Condition: Sunny

Equipment Used: Landtec GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	10:28	<0.1	9.1	9.0	27.7	0	
DH203A	10:37	<0.1	<0.1	18.6	29.5	0	
DH204	10:47	<0.1	3.8	11.2	29.5	0	
DP220	10:25	<0.1	<0.1	20.4	29.1	0	
DP221	10:32	<0.1	6.3	10.8	28.7	0	
DP223	10:41	<0.1	0.6	18.6	32.8	0	
DP224	10:43	<0.1	9.2	1.2	30.9	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui
Date of Monitoring: 2-Oct-19
Weather Condition: Sunny

Equipment Used: Landfill gas monitor GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	10:18	<0.1	1.5	19.1	28.0	0	
DH203A	10:25	<0.1	0.1	20.0	30.3	0	
DH204	10:32	<0.1	1.0	18.6	32.8	0	
DP220	10:16	<0.1	<0.1	20.9	30.4	0	
DP221	10:22	<0.1	1.0	19.4	31.2	0	
DP223	10:28	<0.1	15.7	3.6	33.0	0	
DP224	10:30	<0.1	11.8	4.8	34.7	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui

Equipment Used:

Landfill gas monitor

Date of Monitoring: 4-Nov-19

GEM-2000

Weather Condition: Sunny

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	10:43	<0.1	3.4	16.9	26.7	0	
DH203A	10:54	<0.1	<0.1	20.0	28.8	0	
DH204	11:03	<0.1	1.6	17.6	30.4	0	
DP220	10:39	<0.1	<0.1	20.6	26.6	0	
DP221	10:50	<0.1	2.3	17.9	29.3	0	
DP223	10:56	<0.1	14.5	7.8	35.4	0	
DP224	11:00	<0.1	15.7	0.4	34.3	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui

Equipment Used:

Landfill gas monitor

Date of Monitoring: 11-Dec-19

GEM-2000

Weather Condition: Sunny

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	10:18	<0.1	7.4	13.7	20.5	0	
DH203A	10:27	<0.1	1.0	18.6	23.5	0	
DH204	10:37	<0.1	7.9	11.6	23.2	0	
DP220	10:14	<0.1	<0.1	20.7	19.3	0	
DP221	10:21	<0.1	10.6	10.7	24.1	0	
DP223	10:31	<0.1	10.2	12.5	25.1	0	
DP224	10:34	<0.1	16.0	0.7	26.2	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui
Date of Monitoring: 09-Jan-2020
Weather Condition: Cloudy

Equipment Used: Landfill gas monitor
GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	10:35	<0.1	7.3	13.8	21.4	0	
DH203A	10:44	<0.1	0.1	20.3	23.6	0	
DH204	10:52	<0.1	0.1	20.4	21.4	0	
DP220	10:32	<0.1	<0.1	20.6	22.9	0	
DP221	10:39	<0.1	4.0	16.8	23.8	0	
DP223	10:47	<0.1	11.3	9.9	25.7	0	
DP224	10:50	<0.1	14.9	1.4	22.3	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui
Date of Monitoring: 04-Feb-2020
Weather Condition: Cloudy

Equipment Used: Landfill gas monitor
GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	10:24	<0.1	8.1	12.6	16.2	0	
DH203A	10:29	<0.1	6.4	11.2	16.7	0	
DH204	10:38	<0.1	7.8	10.9	17.6	0	
DP220	10:21	<0.1	0.1	19.7	14.7	0	
DP221	10:27	<0.1	10.0	11.5	16.3	0	
DP223	10:32	<0.1	9.6	10.8	16.6	0	
DP224	10:36	<0.1	15.7	1.1	16.9	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui
Date of Monitoring: 03-Mar-2019
Weather Condition: Fine

Equipment Used: Landfill gas monitor
GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	10:06	<0.1	4.6	16.2	21.1	0	
DH203A	10:10	<0.1	<0.1	20.1	22.1	0	
DH204	10:16	<0.1	1.6	18.8	21.9	0	
DP220	10:02	<0.1	<0.1	20.2	20.6	0	
DP221	10:07	<0.1	0.9	19.4	21.6	0	
DP223	10:12	<0.1	10.6	10.4	23.0	0	
DP224	10:19	<0.1	11.8	5.5	23.6	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui
Date of Monitoring: 17-Apr-2020
Weather Condition: Sunny

Equipment Used: Landfill gas monitor
GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	13:39	<0.1	4.4	16.2	27.2	0	
DH203A	13:44	<0.1	1.5	18.0	32.1	0	
DH204	13:54	<0.1	4.4	14.7	28.6	0	
DP220	13:36	<0.1	<0.1	20.2	28.1	0	
DP221	13:41	<0.1	1.1	19.1	31.4	0	
DP223	13:47	<0.1	12.1	5.3	31.7	0	
DP224	13:52	<0.1	12.4	4.2	29.0	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui
Date of Monitoring: 06-May-2020
Weather Condition: Cloudy

Equipment Used: Landfill gas monitor
GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	10:12	<0.1	1.9	18.7	28.9	0	
DH203A	10:19	<0.1	<0.1	20.2	30.5	0	
DH204	10:29	<0.1	0.3	19.7	32.1	0	
DP220	10:03	<0.1	<0.1	20.7	29.3	0	
DP221	10:16	<0.1	1.6	18.7	31.1	0	
DP223	10:22	<0.1	9.6	11.5	31.1	0	
DP224	10:25	<0.1	10.5	6.9	29.9	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui
Date of Monitoring: 03-Jun-2020
Weather Condition: Cloudy

Equipment Used: Landfill gas monitor
GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	9:52	<0.1	2.4	17.9	28.5	0	
DH203A	9:58	<0.1	<0.1	19.7	32.1	0	
DH204	10:07	<0.1	0.2	18.9	32.0	0	
DP220	9:48	<0.1	0.2	20.8	29.3	0	
DP221	9:56	<0.1	0.3	19.7	31.8	0	
DP223	10:02	<0.1	6.4	4.5	34.5	0	
DP224	10:05	<0.1	12.6	2.4	31.2	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Sin Lang Shui
Date of Monitoring: 02-Jul-2020
Weather Condition: Cloudy

Equipment Used: Landfill gas monitor
GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	10:43	<0.1	0.1	19.8	29.7	0	
DH203A	10:48	<0.1	<0.1	19.7	30.9	0	
DH204	10:55	<0.1	<0.1	19.3	30.0	0	
DP220	10:40	<0.1	<0.1	20.6	28.8	0	
DP221	10:46	<0.1	1.5	18.0	30.8	0	
DP223	10:51	<0.1	10	7.5	31.0	0	
DP224	10:53	<0.1	10.4	6.8	29.7	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Sin Lang Shui
Date of Monitoring: 10-Aug-2020
Weather Condition: Sunny

Equipment Used: Landfill gas monitor
GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	14:04	<0.1	<0.1	20.3	32.2	0	
DH203A	14:09	<0.1	<0.1	20.0	34.0	0	
DH204	14:17	<0.1	0.1	19.5	35.8	0	
DP220	14:01	<0.1	<0.1	20.2	32.5	0	
DP221	14:06	<0.1	1.6	18.1	35.5	0	
DP223	14:13	<0.1	12.3	1.7	35.6	0	
DP224	14:15	<0.1	9.6	9.9	35.7	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui
Date of Monitoring: 04-Sep-2020
Weather Condition: Cloudy

Equipment Used: Landfill gas monitor
GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	9:47	<0.1	0.2	20.6	32.3	0	
DH203A	9:54	<0.1	0.7	18.9	34.2	0	
DH204	10:05	<0.1	<0.1	20.7	38.1	0	
DP220	9:43	<0.1	<0.1	21.1	33.8	0	
DP221	9:49	<0.1	2.0	18.3	34.3	0	
DP223	10:00	0.1	11.2	7.4	36.3	0	
DP224	10:03	<0.1	11.0	5.9	36.8	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui
Date of Monitoring: 09-Oct-2020
Weather Condition: Cloudy

Equipment Used: Landfill gas monitor
GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	9:24	<0.1	1.1	20.2	26.5	0	
DH203A	9:30	<0.1	1.5	19.0	26.7	0	
DH204	9:40	<0.1	3.1	17.8	28.1	0	
DP220	9:21	<0.1	<1	21.6	24.5	0	
DP221	9:27	<0.1	4.6	16.4	26.9	0	
DP223	9:33	<0.1	10.9	9.9	28.4	0	
DP224	9:38	<0.1	13.1	5.5	28.9	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui
Date of Monitoring: 04-Nov-2020
Weather Condition: Cloudy

Equipment Used: Landfill gas monitor
GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	9:50	<0.1	4.8	16.5	24.7	0	
DH203A	9:58	<0.1	<0.1	21.0	26.7	0	
DH204	10:10	<0.1	1.2	19.4	28.5	0	
DP220	9:47	<0.1	<0.1	21.2	24.9	0	
DP221	9:54	<0.1	3.4	17.5	27.8	0	
DP223	10:03	<0.1	11.9	10.0	29.6	0	
DP224	10:06	<0.1	14.3	2.1	27.2	0	

LANDFILL GAS MONITORING - FIELD MEASUREMENT

Name of Site : Siu Lang Shui
Date of Monitoring: 2-Dec-20
Weather Condition: Sunny

Equipment Used: Landfill gas monitor
GEM-2000

Well No.	Time	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temperature (°C)	Relative Pressure (mbar)	Remark
DH201	10:45	<0.1	5.3	16.2	21.0	0	
DH203A	10:50	<0.1	0.8	19.6	25.9	0	
DH204	10:57	<0.1	1.8	18.9	27.2	0	
DP220	10:42	<0.1	<0.1	21.2	21.0	0	
DP221	10:48	<0.1	6.2	15.7	25.9	0	
DP223	10:52	<0.1	6.4	15.7	29.2	0	
DP224	10:55	<0.1	16.0	1.0	26.2	0	