13 February 2025

Environmental Protection Department
The EIA Ordinance Register Office
27/F Southorn Centre,
130 Hennessy Road,
Wanchai, Hong Kong

By email

Attn: Ms Tiffany Cheung / Environmental Protection Officer (Territory South)23

Dear Madam,

Odour Monitoring Report (April 2024) for Harbour Area Treatment Scheme Stage 2A (Operational Phase)

In compliance with sections 2.38 and 2.41 of the EM&A Manual, we are submitting the Odour Monitoring Report (April 2024) for the Harbour Area Treatment Scheme Stage 2A (Operational Phase) for your review.

If you have any questions or require further information, please feel free to contact me or Mr. Dickson WONG at Tel. 2195 3462, email: leontppun@dsd.gov.hk or dicksonstwong@dsd.gov.hk.

Yours faithfully,
CMA Industrial Development Foundation Limited

PUN Tsz Ping, Leon
Environmental Consultant

Encl.
cc Chemist/ST2/2, DSD Mr. K. F. LEE By Email

Odour Monitoring Report for Harbour Area Treatment Scheme Stage 2A (Operational Phase) April 2024

Report No.: OT_2024002

Prepared by: _____
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1. Introduction

1.1. Background

1.1.1. Drainage Services Department appointed ALS Technichem (HK) Pty Limited ("ALS") and CMA Industrial Development Foundation ("CMA") to undertake the Odour Monitoring for the Operational Phase of the Harbour Area Treatment Scheme Stage 2A (hereafter referred to as "the Project").

1.1.2. The Project is reference to Environmental Permit No. EP-322/2008/G issued on 9th May 2014 by the Environmental Protection Department (hereafter called EPD) to the Drainage Services Department (hereafter called the DSD) as the Permit Holder and the Environmental Monitoring and Audit ("EM&A") Manual for the Harbour Area Treatment Scheme ("HATS") Stage 2A.

1.1.3. The odour measurement and odour patrol shall be conducted in the first five years upon commissioning of the expanded SCISTW. For the 1st year, odour monitoring shall be conducted every three months. For the 2nd to 5th year, if the monitoring results from the 1st year comply with the requirements stated in Section 2.38 and Section 2.41 of EM&A Manual, the frequency of the monitoring could be reduced to once every 6 months subject to EPD's approval.

1.2. Objectives of the Monitoring

1.2.1. The objective of odour patrol and odour measurement is to compare the result obtained from the operational phase with the baseline data at the designated points in order to determine the impact from the operation.

1.3. Objectives of the Report

1.3.1. The purpose of the odour monitoring report for the operational phase is to provide analysis and graphical presentation to determine if there are any changes of odour impacts with respect to the implementation of HATS Stage 2A.

2. Odour Patrol

2.1. Monitoring Requirement

2.1.1. An odour patrollist with at least 3 independent trained personnel / competent persons, will be provided to conduct the odour patrol work at 23 designated odour monitoring locations and at the site boundary of 8 Preliminary Treatment Works (PTW) and the Stonecutters Island Sewage Treatment Works (SCISTW). The patrollist will be "calibrated" with reference to European Standard Method: BS EN13725 to ensure the patrollist odour sensitivity within 20-80 ppb/V. The Odour Certificates are shown in **Appendix B**.

2.1.2. The monitoring shall not be conducted on rainy days. Meteorological conditions including ambient temperature, relative humidity, wind speed and wind direction will be recorded with photo showing the sampling locations during each monitoring.

2.1.3. The independent trained personnel / competent persons shall:

- have their individual odour threshold of n-butanol in nitrogen gas in the range of 20 to 80 ppb/v required by the European Standard Method (EN 13725).
- be at least 16 years of age and willing and able to follow instructions.
- be free from any respiratory illnesses.
- be engaged for a sufficient period to build up and monitor/detect at several monitoring locations;
- not be allowed to smoke, eat, drink (except water) or use chewing gum or sweets 30 min before and during odour intensity analysis;
- take great care not to cause any interference with their own perception or that of others by lack of personal hygiene or the use of perfumes, deodourants, body lotions or cosmetics;
- not communicate with each other about the results of their choices.

2.2. Monitoring Frequency

2.2.1. Odour Patrol shall be conducted every three months for the first year of operation for 8 PTWs and expended SCISTW. The first odour monitoring shall be conducted within one month, after the operation of the upgraded PTWs and expended SCISTW. Subsequent odour monitoring shall be conducted at the 4^{th}, 7^{th} and 10^{th} month.

2.3. Monitoring Location

2.3.1. According to section 2.23 of the EM&A Manual, odour patrol monitoring will be conducted at (1) the odour monitoring locations listed in **Table 2.1** and at (2) the site boundary of 8 PTWs and SCISTW listed in **Table 2.2**.

2.3.2. The layout of odour patrol monitoring locations is shown in **Appendix A**.

Table 2.1 Odour Patrol Monitoring Locations

ASR ID in EIA Report*	Monitoring Station ID	Location
NP3	OM_NP1	King's Road Playground & Skating Area
NP4	OM_NP2	Customs HQ Tower
NP5	OM_NP3	K. Wah Centre
WC3	OM_WC1	Society for the Prevention of Cruelty to Animals
WC4	OM_WC2	Rest Garden near Wan Chai Interchange
C1	OM_C1	Sheung Wan Fire Station
C2	OM_C2	Water Front Divisional Police Station
C3	OM_C3	Sheung Wan Gala Point
FM2	OM_FM1	Western Wholesale Food Market
SB1	OM_SB1	University of Hong Kong Stanley Ho Sports Centre Pitch
SB2	OM_SB2	Home for the Elderly
SB3	OM_SB3	Maclehose Medical Rehabilitation Centre
SB4	OM_SB4	The Duchess of Kent Children's Hospital
CB1	OM_CB1	Cyber Centre
CB2	OM_CB2	Le Meridien Cyberport
WF2	OM_WF1	Wah Ming House, Wah Fu Estate
AB4	OM_AB1	Dairy Farm Ice and Cold Storage
ALC3	OM_ALC1	Shell Ap Lei Chau Depot
SCI1	OM_SCI1	Government Dockyard Offices
SCI3	OM_SCI2	COSCO Hit Terminal
SCI4	OM_SCI3	KMB Depot Office
SCI5	OM_SCI4	Planned FSD Diving Rescue and Diving Training Centre
SCI6	OM_SCI5	Club House

Remark:

* EIA Report reference from Agreement No. CE 43/2005 (EP) Harbour Area Treatment Scheme (HATS) Stage 2A EIA Study – Investigation, Final EIA Report, 3 Air Quality, Table 3.4.

Table 2.2 Odour Patrol Monitoring of site boundary Locations

Monitoring Location
North Point PTW Boundary
Wan Chai East PTW Boundary
Central PTW Boundary
Sandy Bay PTW Boundary
Cyberport PTW Boundary
Wah Fu PTW Boundary
Aberdeen PTW Boundary
Ap Lei Chau PTW Boundary
SCISTW Boundary Location A
SCISTW Boundary Location A1
SCISTW Boundary Location B
SCISTW Boundary Location C
SCISTW Boundary Location D

2.4. Monitoring Parameters

2.4.1. During the patrolling, the meteorological and surrounding information are recorded:

- the prevailing weather condition;
- the wind direction;
- the wind speed;
- location where odour is spotted;
- source of odour;
- perceived intensity of the odour;
- duration of odour; and
- characteristics of the odour detected
- some relevant meteorological data such as daily average temperature, and daily average humidity, on the day of odour patrol should be obtained from the nearest Hong Kong Observatory station for reference.

2.4.2. The perceived intensity is to be divided into 5 levels which are ranked in a descending order as shown in **Table 2.3**.

Table 2.3 Description of Odour Intensity Levels

Odour Level	Odour Intensity	Classification Criteria
0	Not detected	No odour perceives or an odour so weak that it cannot be easily characterised or described
1	Slight	Slight identifiable odour, and slight chance to have odour nuisance
2	Moderate	Moderate identifiable odour, and moderate chance to have odour nuisance
3	Strong	Strong identifiable, likely to have odour nuisance
4	Extreme	Extreme severe odour, and unacceptable odour level

3. Odour Patrol Monitoring Result

3.1. Odour Intensity

3.1.1. The odour patrol monitoring result on 12th April 2024 is summarized in **Table 3.1**. The field records and photo records at the ASRs during the patrols are attached in **Appendix C**.

Table 3.1 Summary of the Odour Patrol Results

Monitoring Location	Odour Intensity (0 to 4)			
	Odour Patrol Member			
	O-1	O-2	O-3	O-Mean
OM_NP1	0	0	0	**0**
OM_NP2	0	0	0	**0**
OM_NP3	0	0	0	**0**
North Point PTW Boundary	1#@	1#@	1#@	**1#@**
OM_WC1	0	0	0	**0**
OM_WC2	0	0	0	**0**
Wan Chai East PTW Boundary	1#	1#	1#	**1#**
OM_C1	0	0	0	**0**
OM_C2	0	0	0	**0**
OM_C3	0	0	0	**0**
Central PTW Boundary	1#	1#	1#	**1#**
OM_FM1	0	0	0	**0**
OM_SB1	0	0	0	**0**
OM_SB2	0	0	0	**0**
OM_SB3	0	0	0	**0**
OM_SB4	0	0	0	**0**
Sandy Bay PTW Boundary	1#	1#	2#	**1#**

Monitoring Location	Odour Intensity (0 to 4)			
	Odour Patrol Member			
	O-1	O-2	O-3	O-Mean
OM_CB1	0	0	0	**0**
OM_CB2	0	0	0	**0**
Cyberport PTW Boundary	2#	1#	1#	**1#**
OM_WF1	0	0	0	**0**
Wah Fu PTW Boundary	1#	1#	1#	**1#**
OM_AB1	0	0	0	**0**
Aberdeen PTW Boundary	1#	1#	1#	**1#**
OM_ALC1	0	0	0	**0**
Ap Lei Chau PTW Boundary	1#	1#	1#	**1#**
OM_SCI1	0	0	0	**0**
OM_SCI2	0	0	0	**0**
OM_SCI3	0	0	0	**0**
OM_SCI4	0	0	0	**0**
OM_SCI5	0	0	0	**0**
SCISTW Boundary Location A	1@	1@	1@	**1@**
SCISTW Boundary Location A1	0	0	0	**0**
SCISTW Boundary Location B	1@	1@	1@	**1@**
SCISTW Boundary Location C	2@	1@	2@	**2@**
SCISTW Boundary Location D	0	0	0	**0**

Remark:

1. # The odour was detected with sewage or urine characteristics.
2. @The odour was detected with garbage characteristics.

3.2. Meteorological Conditions

3.2.1. The meteorological conditions (including temperature, wind speed, wind direction, relative humidity) from the nearest Hong Kong Observatory's Weather Stations for each of the odour patrols were provided for reference in **Appendix D**.

3.3. Odour Patrol Result Discussion

3.3.1. Generally, the odour intensities detected around the SCISTW and PTWs ranged from level 0 to level 2. A level 2 intensity was recorded at one monitoring locations, Location C of the SCISTW site boundary. With reference to the Action/Limit Level shown in **Table 3.2**, the location met the action level. However, a distinct garbage odour was detected at Location C of the SCISTW site boundary, and the nearby West Kowloon Refuse Transfer Station was identified as the potential source of odour. Therefore, it was concluded that the exceedance is unrelated to the project.

Table 3.2 Action / Limit Levels of the Odour Patrol

Parameter	Action	Limit
Odour Nuisance	Odour Intensity of 2 is measured from odour patrol	Odour Intensity of 3 or above is measured from odour patrol

3.3.2. By comparing our impact monitoring data with the baseline monitoring data, generally, there were no significant difference between two sets of data. A summary table was shown in **Table 3.3**.

Table 3.3 Comparison between Baseline Data and Impact Data of Odour Patrol

Monitoring Location	Operational Phase Baseline*	Operational Phase Impact^
	Odour Intensity (0 to 4)	
OM_NP1	0	0
OM_NP2	0	0
OM_NP3	0	0
North Point PTW Boundary	0	1#@
OM_WC1	0	0
OM_WC2	0	0
Wan Chai East PTW Boundary	0	1#
OM_C1	0	0
OM_C2	0	0
OM_C3	0	0
Central PTW Boundary	0	1#
OM_FM1	0	0
OM_SB1	0	0
OM_SB2	0	0
OM_SB3	0	0
OM_SB4	0	0
Sandy Bay PTW Boundary	0	2#
OM_CB1	0	0
OM_CB2	0	0
Cyberport PTW Boundary	0	2#

Monitoring Location	Operational Phase Baseline*	Operational Phase Impact^
	Odour Intensity (0 to 4)	
OM_WF1	0	0
Wah Fu PTW Boundary	0	1#
OM_AB1	0	0
Aberdeen PTW Boundary	0	1#
OM_ALC1	0	0
Ap Lei Chau PTW Boundary	0	1#
OM_SCI1	0	0
OM_SCI2	0	0
OM_SCI3	1	0
OM_SCI4	0	0
OM_SCI5	0	0
SCISTW Boundary Location A	1	1@
SCISTW Boundary Location A1	1	0
SCISTW Boundary Location B	2	1@
SCISTW Boundary Location C	3	2@
SCISTW Boundary Location D	1	0

Remarks:

1. *The Largest Data throughout the baseline period are extracted.
2. ^ The Largest Data among the three Odour Patrol Member are extracted.
3. # The odour was detected with sewage or urine characteristics.
4. @ The odour was detected with garbage characteristics.

4. Summary of Odour Patrol Result

4.1. Conclusion

4.1.1. In general, the odour patrol results were similar to the baseline data. No exceedance of the action level was recorded at the 23 designated odour monitoring locations and the site boundary of 8 PTWs and SCISTW, except for SCISTW Boundary Location C. The exceedance was found to be associated with the garbage characteristics in the vicinity of nearby West Kowloon Refuse Transfer Station.

4.2. Recommendations

4.2.1. Based on the odour patrol results, it is recommended to take more attention on 8 PTWs and SCISTW. These sites have indicated the detection of Level 1 odour intensity with sewage characteristics in their respective regions, which suggesting the potential occurrence of odour nuisance events. The attention aimed to ensure the odour nuisance would not be deteriorated.

4.3. Exceedance

4.3.1. There was one action level exceedance recorded at SCISTW Boundary Location C.

4.3.2. The Investigation Reports from January, April, July, and October 2022 confirmed that the odour exceedances at Locations C of the SCISTW site boundary were caused by the West Kowloon Refuse Transfer Station. Therefore, no action is required for these locations as the exceedances were caused by the West Kowloon Refuse Transfer Station, which is not related to the project.

4.3.3. **Table 4.1** showed the Event/Action Plan for Operation Air Quality Monitoring.

Table 4.1 Event/Action Plan for Operation Air Quality Monitoring

Event	Action	
	Person-in-charge of Odour Monitoring	**DSD**
Action Level		
Exceedance of action level	1. Identify source/reason of exceedance; 2. Repeat odour patrol to confirm finding; 3. Repeat odour measurement at exhaust stacks of deodourization system of SCISTW (if exceedance at SCISTW) to confirm finding.	1. Carry out investigation to identify the source/reason of exceedance. 2. Investigation shall be completed within 2 weeks; 3. Implement more mitigation measures if necessary.
Limit Level		
Exceedance of Limit level	1. Identify source / reason of exceedance; 2. Repeat odour patrol to confirm finding; 3. Repeat odour measurement at exhaust stacks of deodourization system of SCISTW (if exceedance at SCISTW) to confirm finding; 4. Increase monitoring frequency to monthly; 5. If exceedance stops, cease additional monitoring.	1. Carry out investigation to identify the source/reason of exceedance. Investigation shall be completed within 2 weeks; 2. Rectify any unacceptable practice; 3. Formulate remedial actions; 4. Ensure amended working methods and remedial actions properly implemented; 5. If exceedance continues, consider what mitigation measures shall be implemented.

5. Odour Measurement

5.1. Monitoring Requirement

5.1.1. Air samples will be collected by passive sampling technique at the odour monitoring station. A Nalophan^{TM} sampling bag will be placed inside an airtight sampler and then drawn to vacuum for sampling. Approximately 60 litres of the gas sample is collected into the sampling bag for testing. A diagram of the passive sampling equipment that will be used for the sampling is shown below:

Figure 1: Passive Sampler

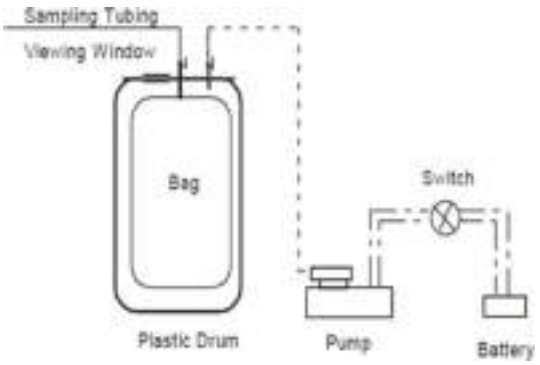


Figure 2: A Schematic Diagram of Sampling Device

5.1.2. Air samples in Nalophane bags shall be kept in cool condition not under direct sunlight exposure during the collection. If any condensate is observed on the inner surface of the sampled bag, the sample shall be discarded.

5.1.3. All samples collected during the sampling day shall be returned to laboratory at the same day. All olfactometry testing shall be conducted and finished within 24 hours after sampling.

5.1.4. The selected laboratory is the local laboratory for the measurement of odour concentration following the European Standard Method BS EN13725:2003 (by dynamic olfactometry). The Reporting Limit for the Olfactometry Analysis is 11 OUE/m^3.

- Odour concentration of the sample is determined by Forced-choice Dynamic Olfactometer in accordance to European Standard Method: BS EN13725:2003.
- Testing should be performed by five qualified panellists who have been trained and complied with the requirement of the European Standard Method: BS EN13725:2003 in the range of 20 to 80 ppb/v and a standard deviation of $R < 2.3$.
- Testing shall be started immediately after sample receipt and all testing to be completed with 24 hours after sampling.

5.1.5. The odour concentration is measured by determining the dilution factor required to reach the detection threshold. The odour concentration at the detection threshold is by definition 1 OUE/m^3. The odour concentration is then expressed in terms of multiples of the detection threshold.

Figure 3: Olfactory Laboratory with Scentroid^{TM} SS600 Olfactometer

5.1.6. During each odour sampling day, one blank sample should be collected for quality control. The sample will be taken by purging pure nitrogen gas into the odour bag directly on site as a blank sample.

5.1.7. All equipment for odour measurement and analysis are maintained and calibrated in according to the requirement of the European Standard Method EN13725.

5.2. Monitoring Frequency

5.2.1. Odour measurement shall be conducted every three months for the first year of operation for the expanded SCISTW. The first odour measurement shall be conducted within one month after operation of the expanded SCISTW. Subsequent odour measurement shall be conducted at the 4th, 7th and 10th month.

5.3. Monitoring Location

5.3.1. According to section 2.36 of the EM&A Manual, odour measurement will be conducted at 15 exhaust stacks of the deodourization system at SCISTW. The odour measurement locations are listed in **Table 5.1**. As suggested by the contractor, the location ID is renamed to better identify the deodourization unit which is different from that on the detailed reporting requirement of odour monitoring report.

5.3.2. The layout of odour monitoring locations for odour measurement is shown in **Appendix E**.

Table 5.1 Odour Monitoring Locations for Odour Measurement

Location Point
DOU 1B-1
DOU 1B-2
DOU 1-PS (3)
DOU 1-R (2)
DOU 2-PS (4)
DOU 2PS-ACF (7)
DOU 4-PS (5)
DOU 5-PS (6)
DOU 6
DOU 6A
DOU 6B
DOU 8-1
DOU 8-2
DOU 9-1
DOU 9-2

Notes:

(1) DOU means Deodourization Unit.

(2) Replace DOU 4-2 stated in Detailed Reporting Requirement of Odour Monitoring Report
(Renaming to distinguish the source of odour is different from that of DOU4)

(3) Replace DOU 1 stated in Detailed Reporting Requirement of Odour Monitoring Report
(A polishing stage (PS) is added after the treatment of DOU 1 to enhance odour treatment performance)

(4) Replace DOU 2 stated in Detailed Reporting Requirement of Odour Monitoring Report
(A polishing stage (PS) is added after the treatment of DOU 2 to enhance odour treatment performance)

(5) Replace DOU 4 stated in Detailed Reporting Requirement
(A polishing stage (PS) is added after the treatment of DOU 4 to enhance odour treatment performance)

(6) Replace DOU 5 stated in Detailed Reporting Requirement
(A polishing stage (PS) is added after the treatment of DOU 5 to enhance odour treatment performance)

(7) Replace DOU 3 stated in Detailed Reporting Requirement
(A polishing stage (PS) DOU 2PS-ACF is added after the treatment of DOU 3 to enhance odour treatment performance.)

5.4. **Monitoring Parameter**

5.4.1. During sampling, following items will be recorded:

- ambient temperature;
- relative humidity;
- wind speed;
- wind direction; and
- photo showing the sampling locations relative to existing land features.

6. Odour Measurement Result

6.1. Odour Concentration and Odour Emission Rate

6.1.1. The odour measurement was conducted on 12th April 2024. The detail of location photo is shown in **Appendix E**.

6.1.2. The odour emission rate is listed in **Table 6.1.** The total odour emission rate is calculated to be 871 ou/s. The detail monitoring results for each monitoring location is shown in **Appendix F**.

Table 6.1 Summary of Odour Emission Rate

Location ID	Odour Emission Rate (ou/s)
DOU 1B-1	16
DOU 1B-2	16
DOU 1-PS	118
DOU 1-R	8
DOU 2-PS	104
DOU 2PS-ACF	157
DOU 4-PS	75
DOU 5-PS	41
DOU 6	116
DOU 6A	77
DOU 6B	67
DOU 8-1	14
DOU 8-2	14
DOU 9-1	20
DOU 9-2	28

6.2. Odour Measurement Result Discussion

6.2.1. The total odour emission rate presented in EIA Report Table 3.14 are given in **Appendix G**, the design total mitigated odour emission rate is 11,506.21 ou/s for Option 2 – Decentralized Design.

6.2.2. Comparison between impact monitoring data and data obtained from EIA is shown in **Table 6.2**.

Table 6.2 Comparison between Impact Monitoring Data and Data Obtained from EIA

Total Odour Emission Rate (ou/s)	
Operation Phase Impact	**EIA**
871	11,506.21

6.2.3. According to Table 2.3 of EM&A Manual, the Action / Limit Level is shown in **Table 6.3.** There was no complaint received in April 2024.

Table 6.3 Action / Limit Levels of the Odour Measurement

Parameter	**Action**	**Limit**
Odour Nuisance	- When two documented complaints are received; or - Measured total odour mission rate from exhaust tacks of deodourization system at SCSITW ≧ 0.9 x total mitigated odour emission rate presented in EIA Report	- Five or more consecutive genuine documented complaints within a week; or - Measured total odour emission rate from exhaust stacks of deodourization system at SCISTW ≧ Total mitigated

7. Summary of Odour Measurement

7.1. Conclusion

7.1.1. The impact total odour emission rate is smaller than the 90% of total mitigated odour emission rate presented in the EIA report (10,355.59 ou/s). The odour measurement is acceptable and no exceedance of total odour emission rate is recorded.

7.2. Recommendation

7.2.1. The operator is reminded to maintain the plants and deodourization units are in good condition and to keep a close monitoring on the in-house H_2S sensors to ensure that no odour nuisance is induced by SCISTW.

7.3. Correlation between Odour and H_2S Concentration

7.3.1. To further understand the gas composition, the overall correlation between H_2S concentrations and odour units of available DOUs was plotted in **Graph 1**. In-house H_2S concentration from sensors and odour concentration from odour measurement for April 2024 was listed in **Table 7.1**.

Table 7.1 In-house H_2S Concentration from Sensors and Odour Concentration from Odour Measurement for April 2024

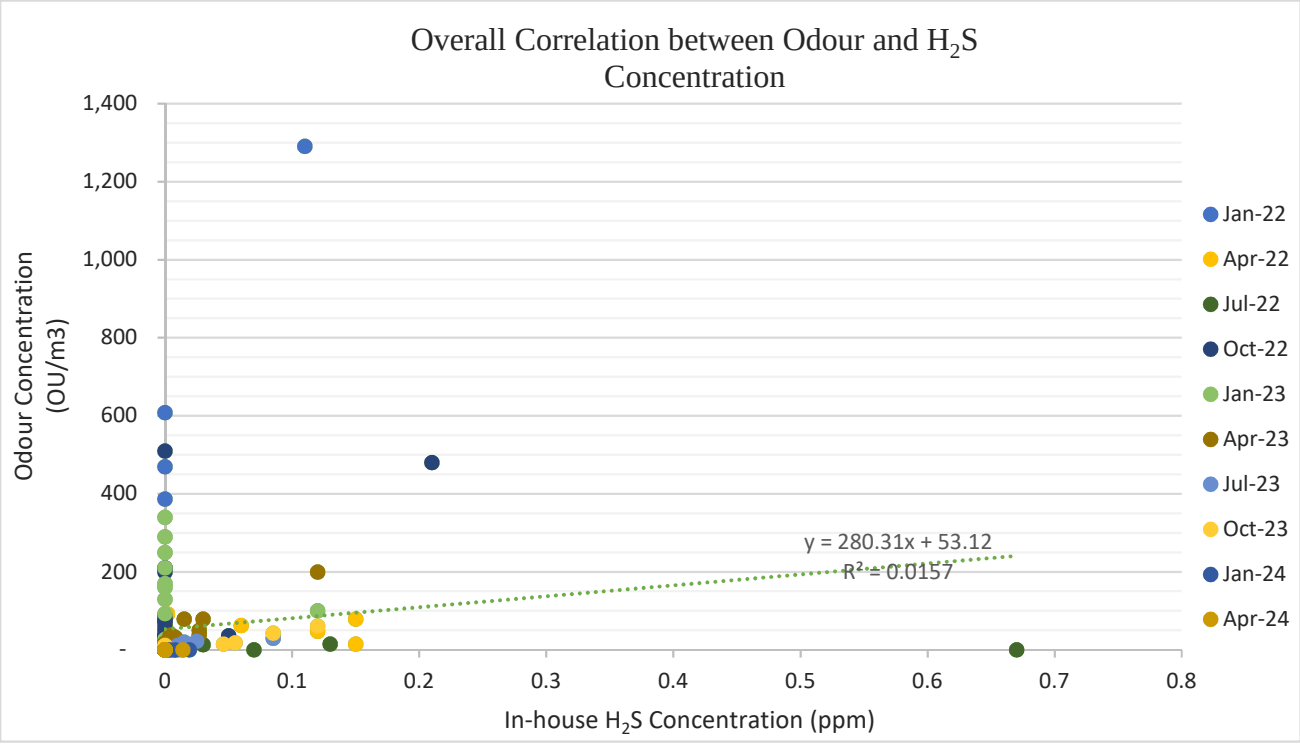
Location ID	Portable H_2S Equipment Concentration (ppm) *	Odour Concentration (OU/m^3)
DOU 1B-1	<0.001	< 11
DOU 1B-2	<0.001	< 11
DOU 1-PS	<0.001	< 11
DOU 1-R	<0.001	< 11
DOU 2-PS	<0.001	< 11
DOU 2PS-ACF	<0.001	< 11
DOU 4-PS	<0.001	< 11
DOU 5-PS	<0.001	< 11
DOU 6	<0.001	< 11
DOU 6A	<0.001	< 11
DOU 6B	<0.001	< 11

Location ID	Portable H_2S Equipment Concentration (ppm) *	Odour Concentration (OU/m^3)
DOU 8-1	<0.001	< 11
DOU 8-2	<0.001	< 11
DOU 9-1	<0.001	< 11
DOU 9-2	0.014	< 11

Remark:

1. *The reported unit for H_2S concentration were converted from ppb to ppm by calculation.

Graph 1 Overall Correlation between Odour and H_2S Concentration

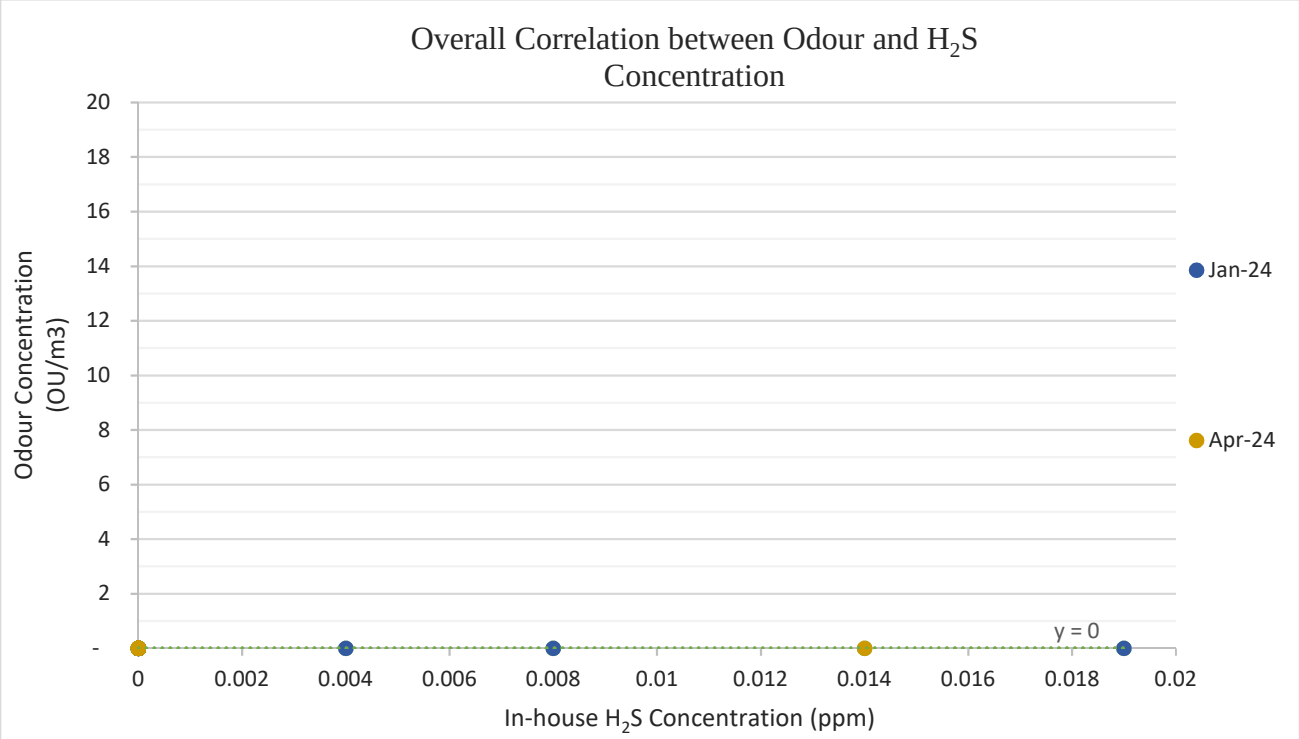


Remark:

1. Data smaller than detection limit would be plotted as zero for graph presentation

7.3.2. According to **Graph 1**, no correlation can be established generally. With the above-mentioned observation, the monitoring results in Jan 2024 and Apr 2024 was similar. It is believed that the fine-tuned operating mode including change of quantities of chemical used at the wet chemical scrubbers and replacement of activated carbon at the activated carbon filters after odour measurement exceedance in Jan 2022 can effectively minimize the odour nuisance. To confirm the correlation between H_2S concentrations and odour units, a graph without exceedance data (data from January 2022) should be established. **Graph 2** shows the correlation between Odour and H_2S Concentration for Jan 2024 and Apr 2024.

Graph 2 Correlation between Odour and H_2S Concentration for Jan 2024 and Apr 2024



Remark:

1. Data smaller than detection limit would be plotted as zero for graph presentation

7.3.3. When comparing the data in **Graph 1** with the data for Jan 2024 and Apr 2024 in **Graph 2**, a significant contrast becomes apparent. In **Graph 1**, the majority of the data exhibits high levels of odour concentration with lower H_2S concentration. However, in **Graph 2**, constant variables of odour concentration are observed across different H2S concentrations, with the odour concentration being consistently below the detection limit. Therefore, there is no clear and obvious evidence to suggest H_2S is the major component contributing to the emitted odour from SCISTW. The contrasting patterns between the two graphs suggest the involvement of other factors may influence the odour concentration.

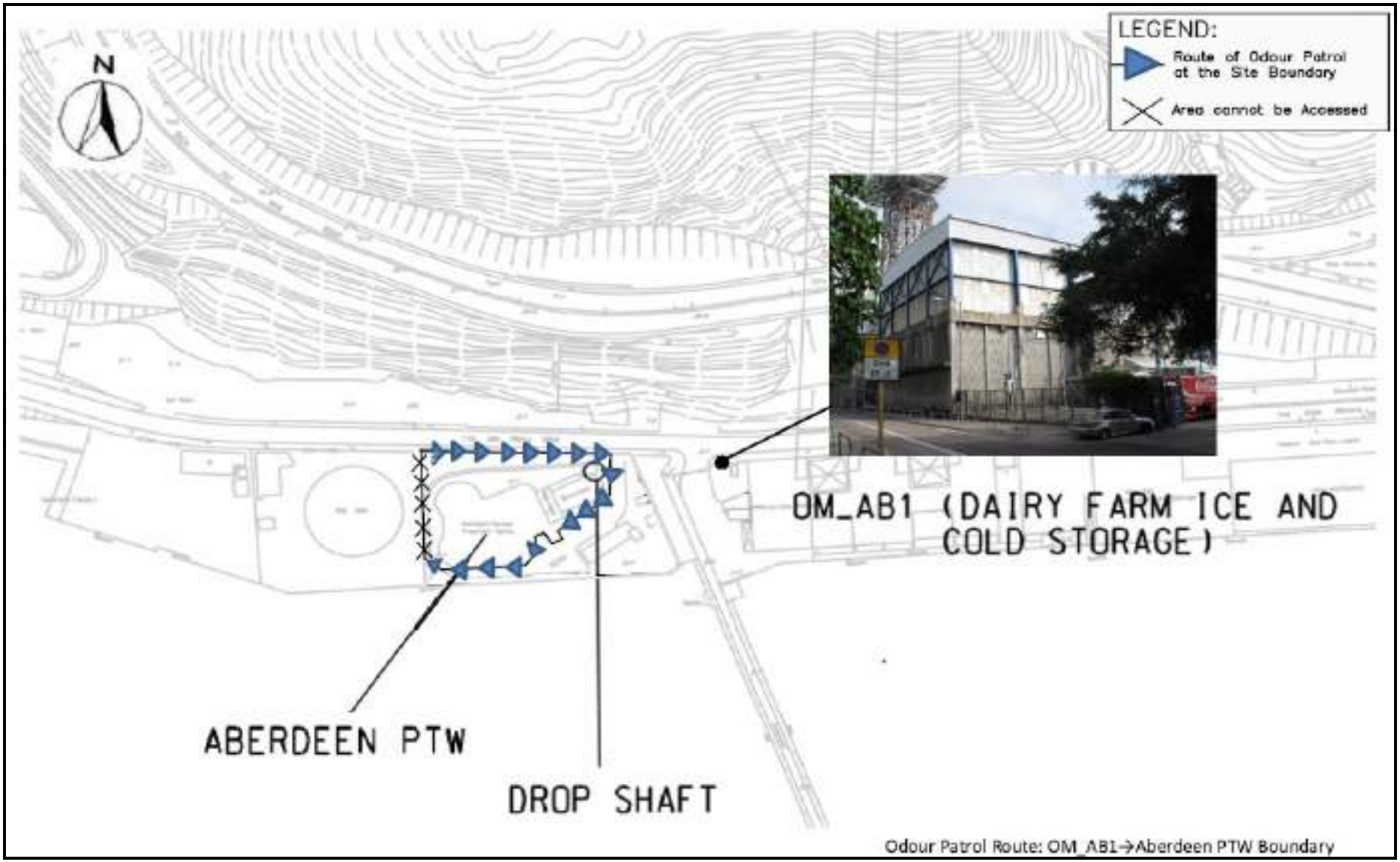
7.3.4. Furthermore, the relatively low concentrations of both H_2S and odour observed in April 2024, along with the significant differences in the scales used in the graphs, suggest that the deodorization units are in good condition, effectively mitigating the emission rate of odour in SCISTW.

7.3.5. To conclude, the data from April 2024 indicates that the deodorization units have effectively mitigated the emission rate of odour, resulting in low levels of odour concentration. This highlights the importance of continuous monitoring and maintenance of equipment by operators to ensure the deodorization units maintain good performance. Additionally, it is important to note that the correlation between H_2S and odour concentration may not be significant after the mitigation provided by the deodorization units. The performance of the deodorization units plays a crucial role in reducing odour concentrations, potentially weakening the correlation between H_2S and odour. Therefore, measuring H_2S concentration using sensors could be a more appropriate method for quickly screening the performance of the deodorization units in SCISTW.

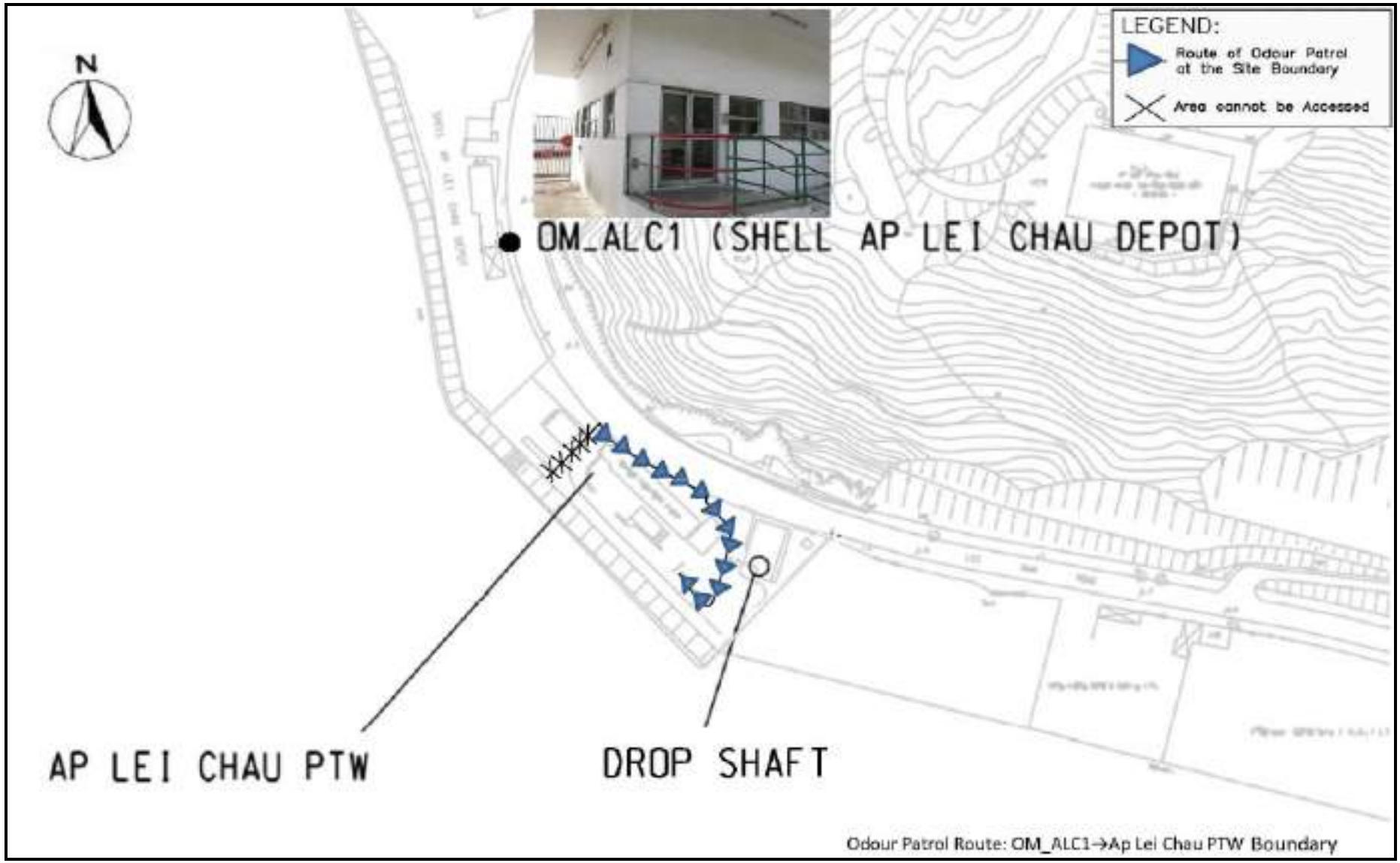
-End of Report-

Appendix A

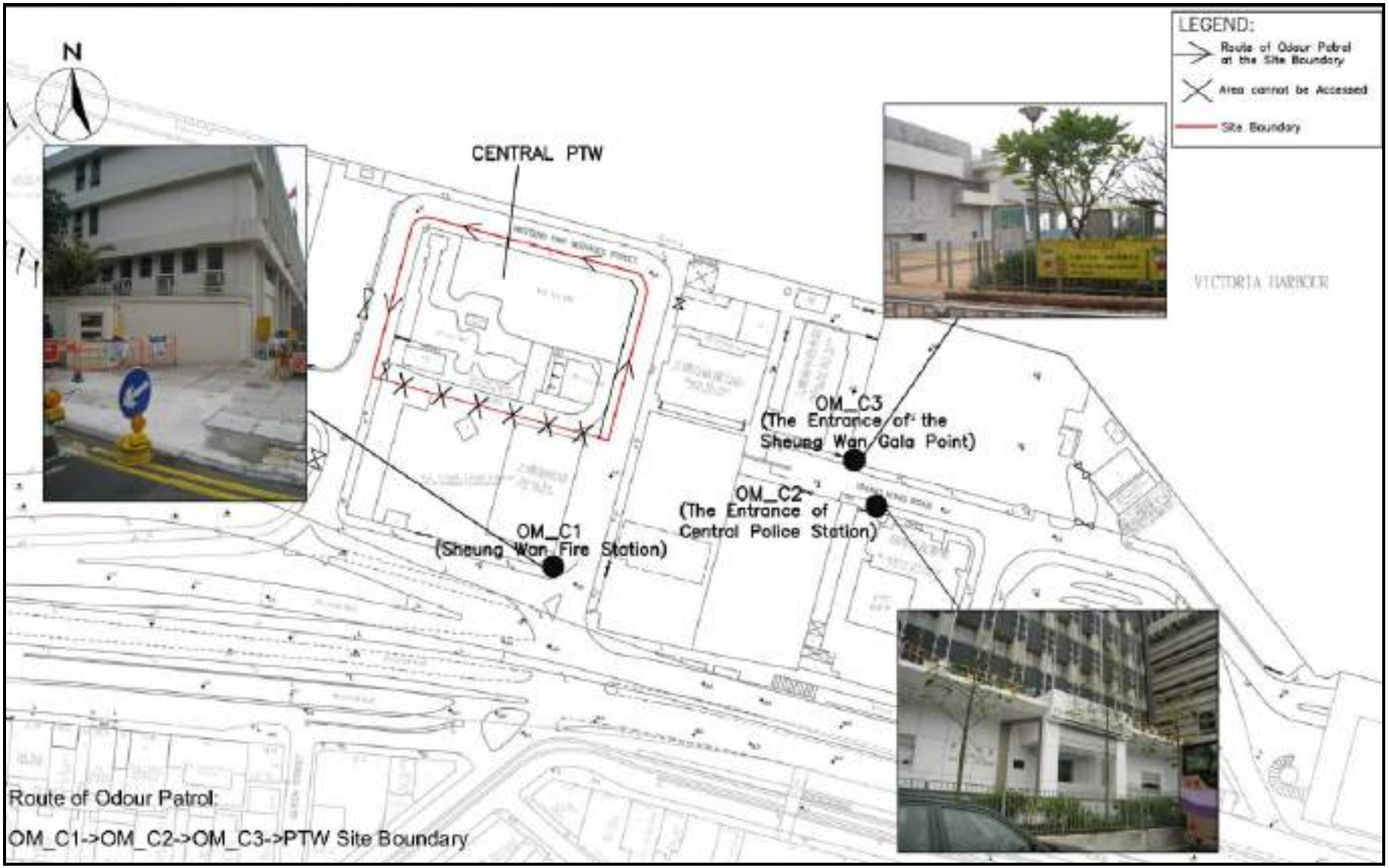
Layout of Odour Patrol Monitoring Locations



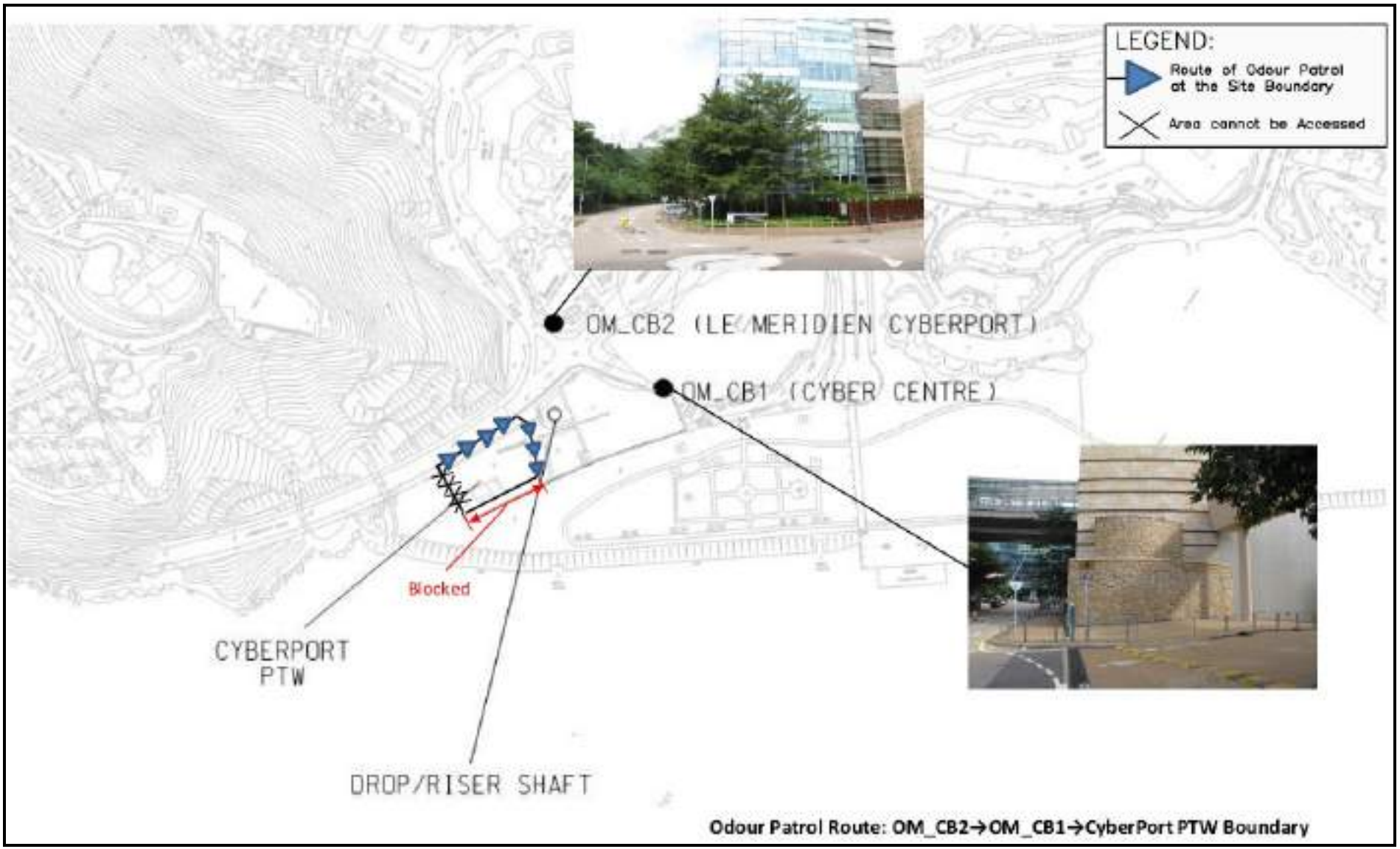
Aberdeen PTW



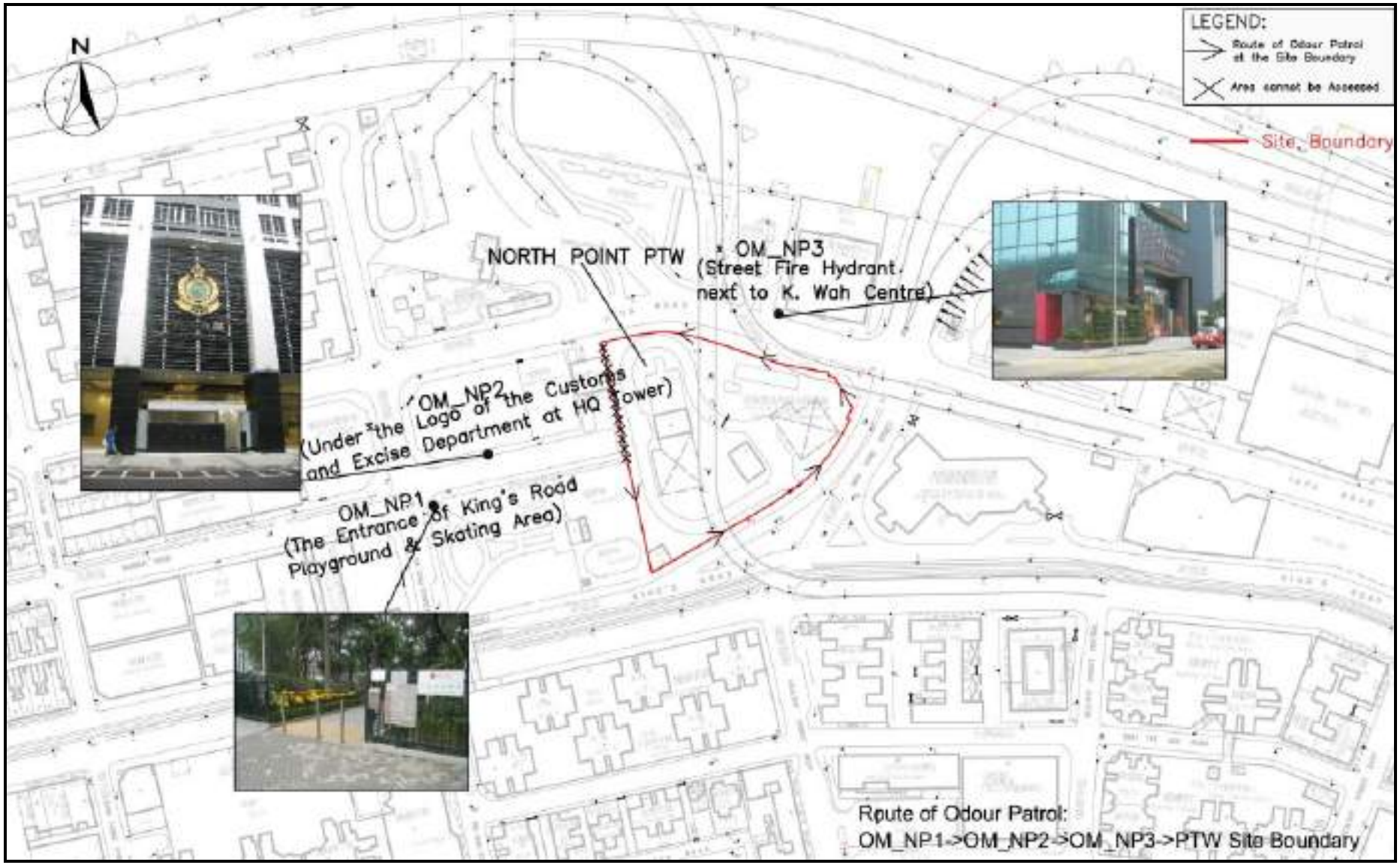
Ap Lei Chau PTW


N
LEGEND:
Route of Odour Patrol at the Site Boundary
Area cannot be Accessed
Site Boundary
CENTRAL PTW
VICTORIA HARBOUR
OM_C3
(The Entrance of the Sheung Wan Gala Point)
OM_C2
(The Entrance of Central Police Station)
OM_C1
(Sheung Wan Fire Station)
Route of Odour Patrol:
OM_C1->OM_C2->OM_C3->PTW Site Boundary

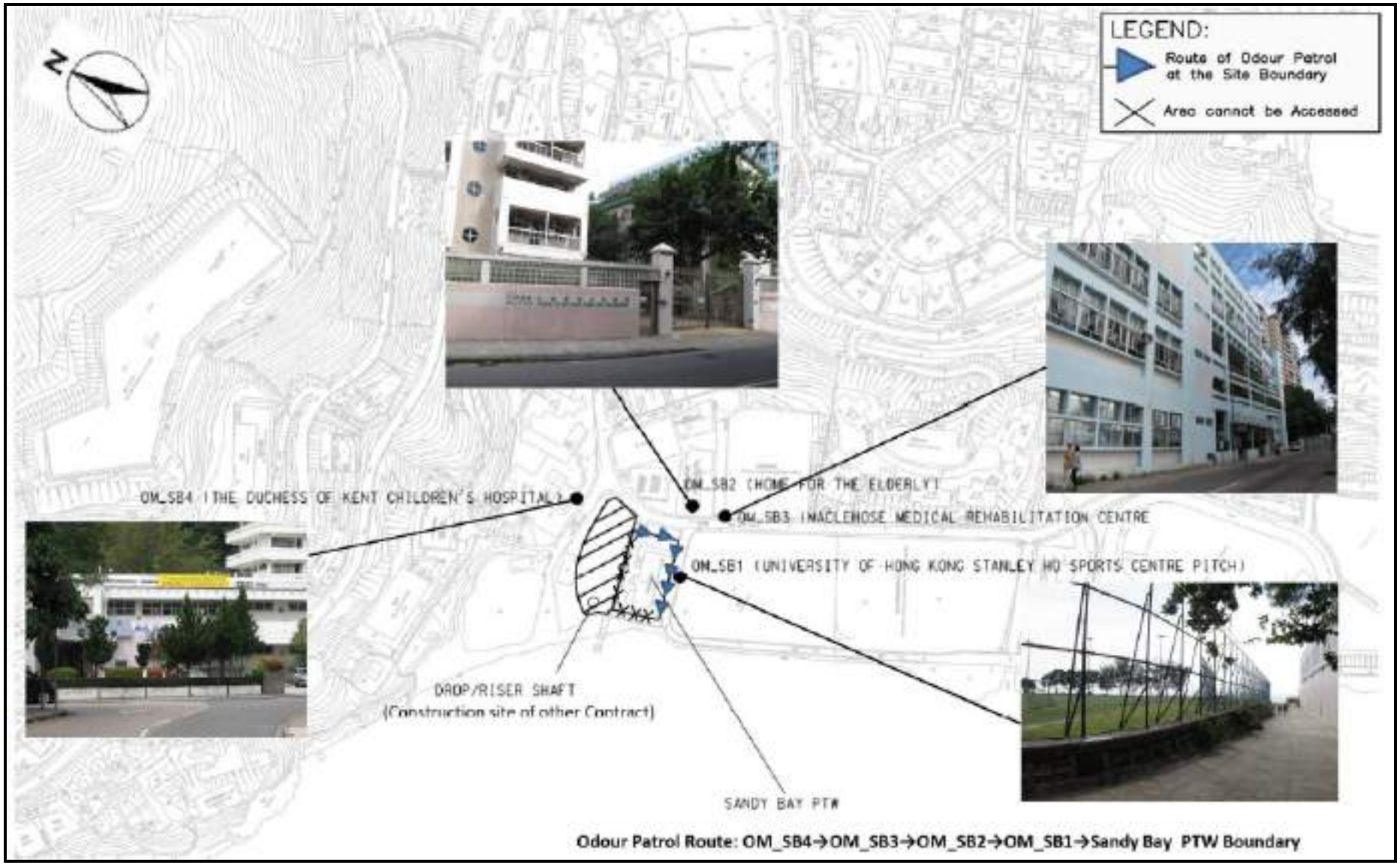
Central PTW



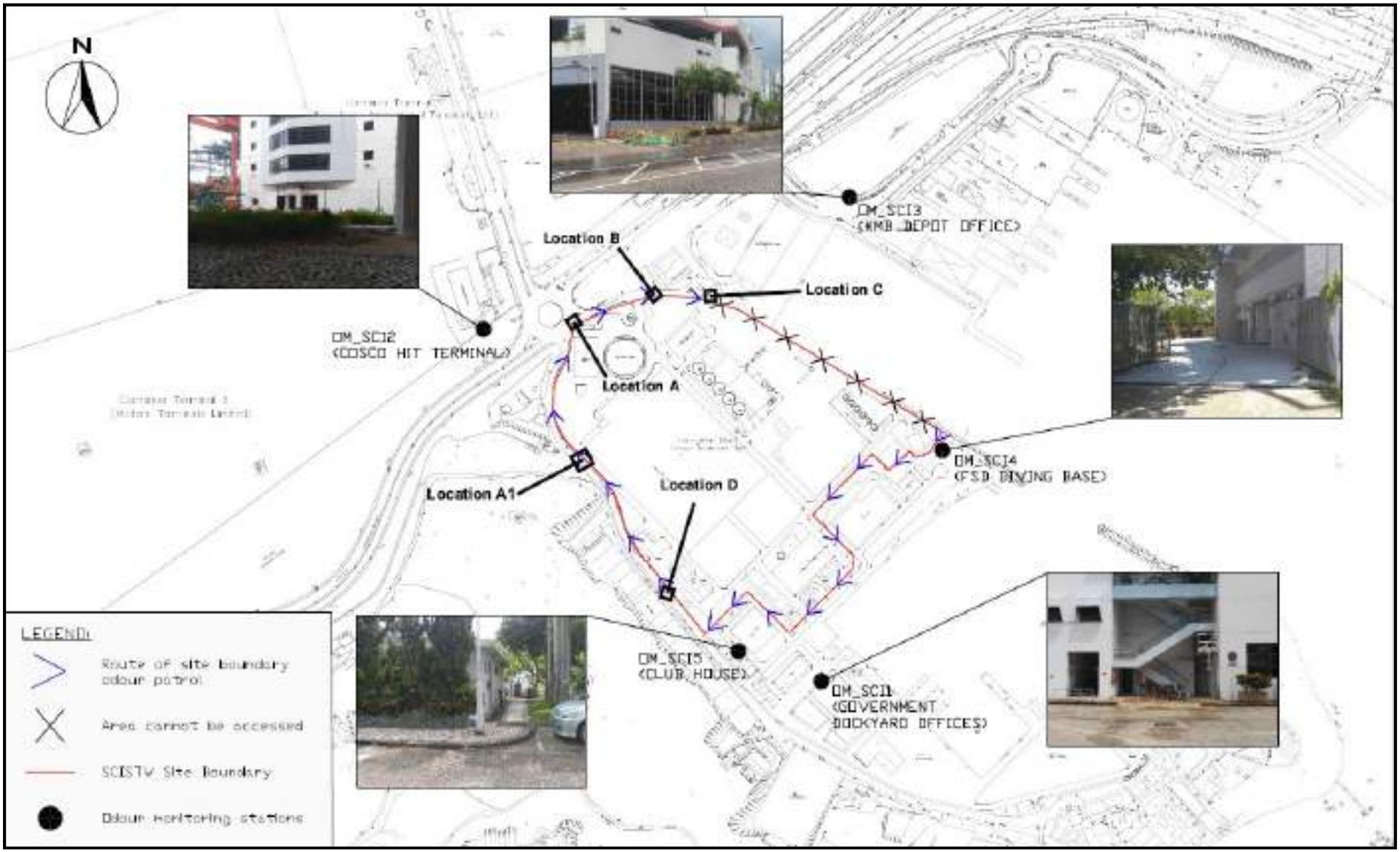
Cybersport PTW



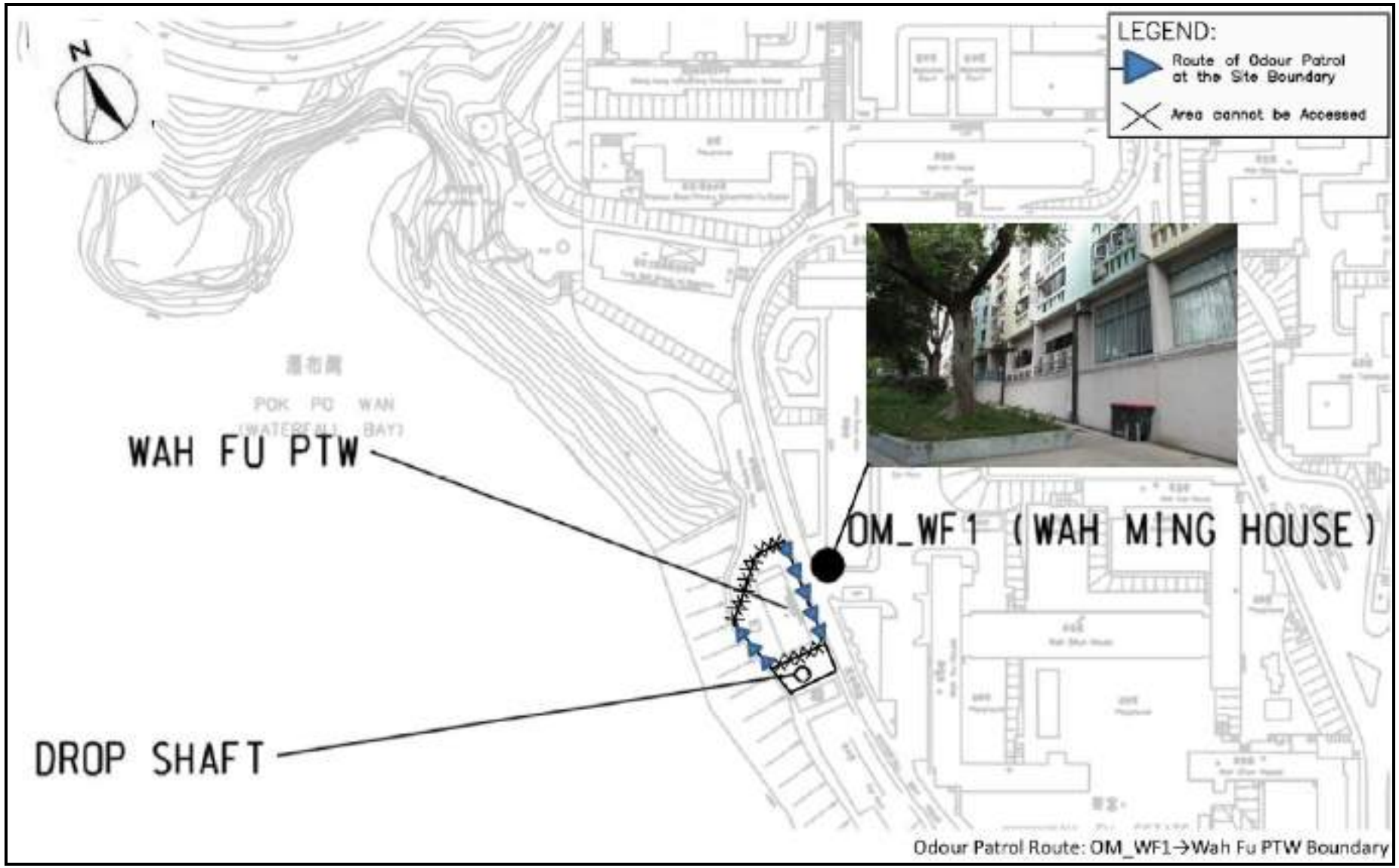
North Point PTW



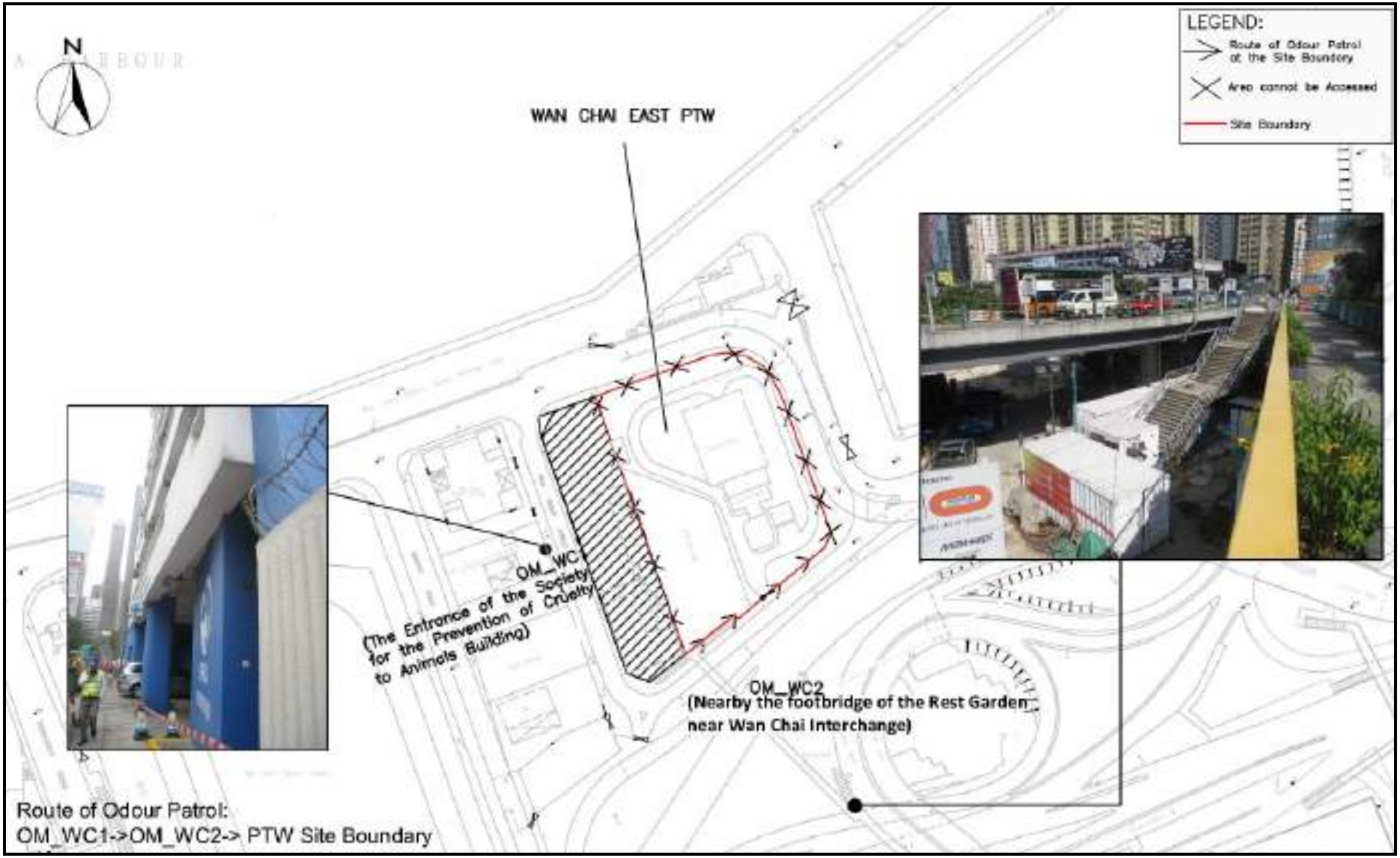
Sandy Bay PTW


N
OM_SCI3
(KMB DEPOT OFFICE)
Location B
Location C
OM_SCI2
(COSCO HIT TERMINAL)
Location A
OM_SCI4
(FSD DIVING BASE)
Location A1
Location D
OM_SCI5
(CLUB HOUSE)
OM_SCI1
(GOVERNMENT
DOCKYARD OFFICES)
LEGEND:
Route of site boundary odour patrol
Area cannot be accessed
SCISTW Site Boundary
Odour monitoring stations

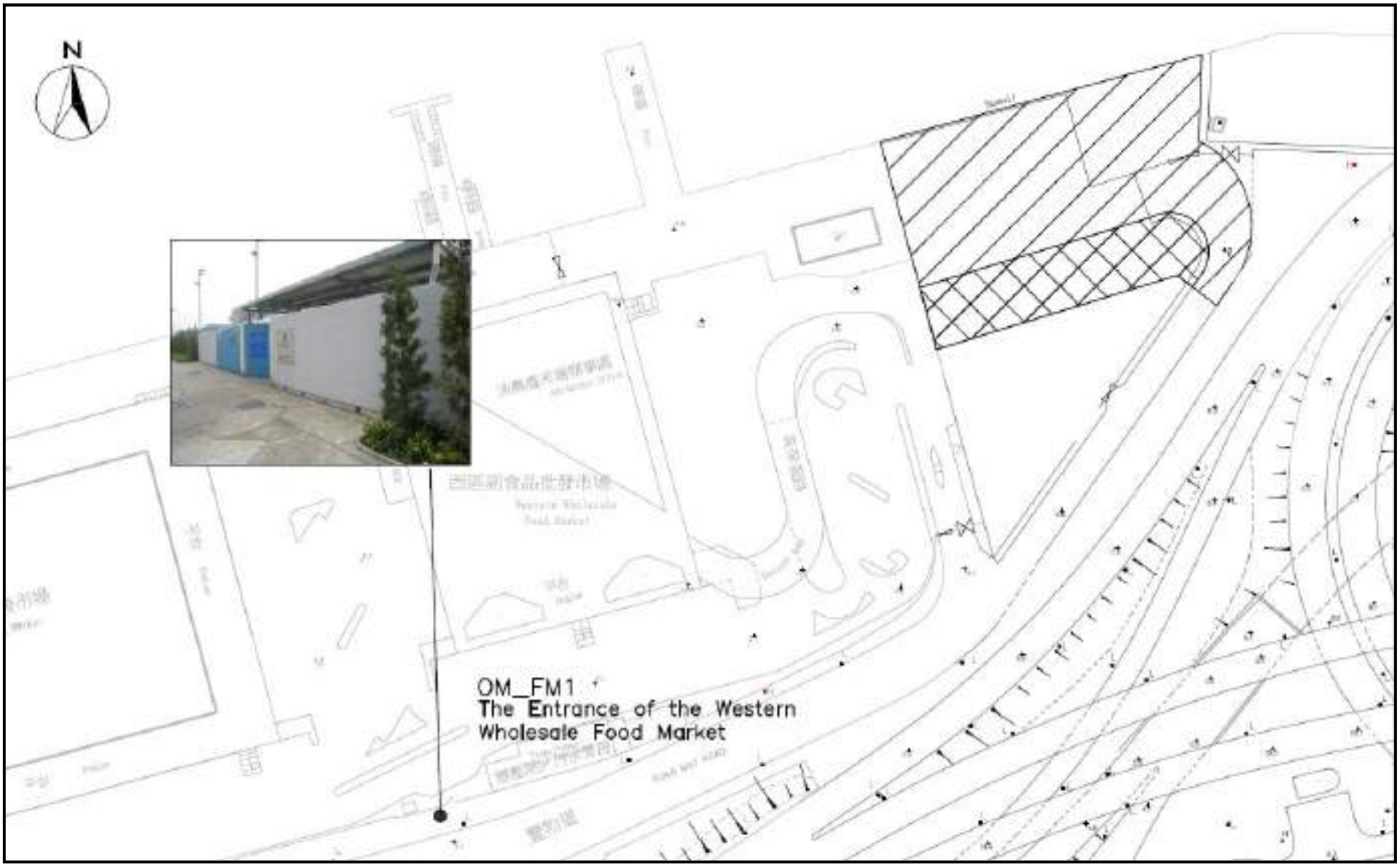
SCISTW


LEGEND:
Route of Odour Patrol at the Site Boundary
Area cannot be Accessed
N
WAH FU PTW
OM_WF1 (WAH MING HOUSE)
DROP SHAFT
Odour Patrol Route: OM_WF1→Wah Fu PTW Boundary

Wah Fu PTW



Wan Chai East PTW



Western Wholesale Food Market

Appendix B

Odour Certificates

ALS Life Sciences | Environmental Certificate No.: C0318-01

Certificate for a Qualified Odour Panellist

This is to certify that

Chan Wai Hung, Mannix

has participated in twelve (12) sets of individual N-Butanol screening test
during 10-Jan-2023 to 9-Jan-2024

with Individual Threshold : 46 ppb
Standard Deviation : 1.56 ppb

and

fulfil the Requirement of the European Standard Method of Air Quality -
Determination of Odour Concentration by Dynamic Olfactometry (BS EN 13725:2022) -

The Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 – 80 ppb/v with at least 12 sets of individual threshold estimates and standard deviation less than 2.3

9-January-2024	8-January-2025	
Issue Date	**Valid Until**	**Fung Lim Chee, Richard**

ALS Life Sciences | Environmental Certificate No.: C0800-01

Certificate for a Qualified Odour Panellist

This is to certify that

Chen Ci He, Wayne

has participated at least twelve (12) sets of individual N-Butanol screening test
during 14-Nov-2023 to 26-Feb-2024

with Individual Threshold : 42 ppb
Standard Deviation : 1.53 ppb

and

fulfil the Requirement of the European Standard Method of Air Quality -
Determination of Odour Concentration by Dynamic Olfactometry (BS EN 13725:2022) –

The Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 – 80 ppb/v with at least 12 sets of individual threshold estimates and standard deviation less than 2.3

26-February-2024	25-February-2025	
Issue Date	**Valid Until**	**Fung Lim Chee, Richard**

ALS Life Sciences | Environmental Certificate No.: C0404-01

Certificate for a Qualified Odour Panellist

This is to certify that

Poon Kwong Lun, Allen

has participated in twelve (12) sets of individual N-Butanol screening test
during 10-Feb-2023 to 01-Feb-2024

with Individual Threshold : 43 ppb
Standard Deviation : 1.47 ppb

and

fulfil the Requirement of the European Standard Method of Air Quality -
Determination of Odour Concentration by Dynamic Olfactometry (BS EN 13725:2022) –

The Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 – 80 ppb/v with at least 12 sets of individual threshold estimates and standard deviation less than 2.3

01 February 2024	31 January 2025	
Issue Date	**Valid Until**	**Fung Lim Chee, Richard**

ALS Technichem (HK) Pty Ltd 11/F Chung Shun Knitting Centre, 1-3 Wing Yip Street, Kwai Chung, NT, Hong Kong Tel: 852-2610 1044

RIGHT SOLUTIONS | RIGHT PARTNER

CMA TESTING

Certificate for a Qualified Odour Panel Member

Serial No.	:	**P-047**
Odour Panel Member	:	**Andrew Yuen Chun Wa**
Date of Screening Test	:	**16 Feb 2024** **19 Feb 2024** **21 Feb 2024**
Valid Until	:	**20 Aug 2024**

This is to certify that Mr. Andrew Yuen participated in a set of n-butanol screening tests in our laboratory between 16 Feb 2024 and 21 Feb 2024.

The odour threshold test results of n-butnaol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of R < 2.3, which comply with the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN 13725).

The participant is Approved and Authorized as Qualified Odour Panel Member for odour patrol and olfactometry analysis.

Signed for and on behalf of
CMA Industrial Development Foundation Limited

Winnie

Tam Wing Kwun, Winnie
Assistant Manager – Environmental Division

Date: 21 Feb 2024

CMA TESTING

Certificate for a Qualified Odour Panel Member

Serial No.	:	**P-061**
Odour Panel Member	:	**Chan Kai Fat**
Date of Screening Test	:	**16 Feb 2024** **19 Feb 2024** **21 Feb 2024**
Valid Until	:	**20 Aug 2024**

This is to certify that Mr. Chan Kai Fat participated in a set of n-butanol screening tests in our laboratory between 16 Feb 2024 and 21 Feb 2024.

The odour threshold test results of n-butnaol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of R < 2.3, which comply with the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN 13725).

The participant is Approved and Authorized as Qualified Odour Panel Member for odour patrol and olfactometry analysis.

Signed for and on behalf of
CMA Industrial Development Foundation Limited

Tam Wing Kwun, Winnie
Assistant Manager – Environmental Division

Date: 21 Feb 2024

CMA TESTING

Certificate for a Qualified Odour Panel Member

Serial No.	:	**P-057**
Odour Panel Member	:	**Arnold Keung Chi Young**
Date of Screening Test	:	**16 Feb 2024** **19 Feb 2024** **21 Feb 2024**
Valid Until	:	**20 Aug 2024**

This is to certify that Mr. Arnold Keung Chi Young participated in a set of n-butanol screening tests in our laboratory between 16 Feb 2024 and 21 Feb 2024.

The odour threshold test results of n-butnaol in nitrogen gas was found to be in the range of 20 – 80 ppb/v and a standard deviation of R < 2.3, which comply with the requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN 13725).

The participant is Approved and Authorized as Qualified Odour Panel Member for odour patrol and olfactometry analysis.

Signed for and on behalf of
CMA Industrial Development Foundation Limited

Tam Wing Kwun, Winnie
Assistant Manager – Environmental Division

Date: 21 Feb 2024

Appendix C

Field Record and Photo Record

Monitoring Result of Odour Patrol

Location ID	Panellist	Weather	Time	Temperature (℃)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
OM_NP1	1	Sunny	15:02	29.5	70	0.6	S	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_NP2	1	Sunny	15:07	29.7	70	1.3	SE	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_NP3	1	Sunny	15:05	29.6	70	2.6	S	0	NA	NA	NA	NA
	2							0				
	3							0				
North Point PTW Boundary	1	Sunny	13:05	30.7	75.3	0.5	SW	1	Continuous	Side wind	Garbage / Sewage / Grassy	Refuse Collection Point / PTW / Trees
	2							1				
	3							1				
OM_WC1	1	Sunny	15:23	31.5	68	0.6	SE	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_WC2	1	Sunny	15:21	31.2	70	0.2	S	0	NA	NA	NA	NA
	2							0				
	3							0				

Monitoring Result of Odour Patrol

Location ID	Panellist	Weather	Time	Temperature (℃)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
Wan Chai East PTW Boundary	1	Sunny	12:27	29.1	75.1	0.4	NE	1	Continuous	Downwind	Sewage	PTW
	2							1				
	3							1				
OM_C1	1	Sunny	15:49	31.6	69	0.6	S	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_C2	1	Sunny	15:45	29.9	69	0.5	W	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_C3	1	Sunny	15:46	30.4	69	0.7	W	0	NA	NA	NA	NA
	2							0				
	3							0				
Central PTW Boundary	1	Sunny	10:23	27.1	77	0.7	N	1	Continuous	Side wind	Sewage / Rubber	PTW / Sports Ground
	2							1				
	3							1				
OM_FM1	1	Sunny	15:58	31.3	69	0.9	SE	0	NA	NA	NA	NA
	2							0				
	3							0				

Monitoring Result of Odour Patrol

Location ID	Panellist	Weather	Time	Temperature (℃)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
OM_SB1	1	Sunny	14:30	30.5	68	1.6	S	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_SB2	1	Sunny	14:30	30.4	68	2.3	S	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_SB3	1	Sunny	14:29	30.2	68	1.9	SW	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_SB4	1	Sunny	14:26	31	68	1.1	SW	0	NA	NA	NA	NA
	2							0				
	3							0				
Sandy Bay PTW Boundary	1	Sunny	11:02	26.9	87.2	0.8	W	1	Continuous	Side wind	Sewage / Grassy	PTW / Trees
	2							1				
	3							2				
OM_CB1	1	Sunny	14:18	29.8	69	0.5	0:00	0	NA	NA	NA	NA
	2							0				
	3							0				

Monitoring Result of Odour Patrol

Location ID	Panellist	Weather	Time	Temperature (℃)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
OM_CB2	1	Sunny	14:18	30.6	69	0.4	SW	0	NA	NA	NA	NA
	2							0				
	3							0				
Cyberport PTW Boundary	1	Sunny	11:15	27.9	82.9	0.8	N	2	Continuous	Side wind	Sewage	PTW
	2							1				
	3							1				
OM_WF1	1	Sunny	14:04	27	70	0.5	W	0	NA	NA	NA	NA
	2							0				
	3							0				
Wah Fu PTW Boundary	1	Sunny	11:32	27.8	80	0.5	N	1	Continuous	Side wind	Sewage	PTW
	2							1				
	3							1				
OM_AB1	1	Sunny	13:53	26.9	70	0.7	S	0	NA	NA	NA	NA
	2							0				
	3							0				
Aberdeen PTW Boundary	1	Sunny	11:45	29.1	77.4	1.0	E	1	Continuous	Side wind	Sewage	PTW
	2							1				
	3							1				

Monitoring Result of Odour Patrol

Location ID	Panellist	Weather	Time	Temperature (℃)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
OM_ALC1	1	Sunny	13:44	27.4	70	1.1	SE	0	NA	NA	NA	NA
	2							0				
	3							0				
Ap Lei Chau PTW Boundary	1	Sunny	12:01	28.5	83	1.2	S	1	Continuous	Side wind	Sewage	PTW
	2							1				
	3							1				
OM_SCI1	1	Sunny	15:47	32.6	52	0.7	SW	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_SCI2	1	Sunny	15:12	32.2	53	1.8	SW	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_SCI3	1	Sunny	15:20	32.1	54	0.5	SE	0	NA	NA	NA	NA
	2							0				
	3							0				
OM_SCI4	1	Sunny	15:52	32.9	53	2.4	SW	0	NA	NA	NA	NA
	2							0				
	3							0				

Monitoring Result of Odour Patrol

Location ID	Panellist	Weather	Time	Temperature (℃)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
OM_SCI5	1	Sunny	15:57	30.6	59	2.6	SE	0	NA	NA	NA	NA
	2							0				
	3							0				
SCISTW-Location A	1	Sunny	9:53	28.9	79.6	0.6	NW	1	Continuous	Side wind	Rubbish	Refuse Collection Vehicles for the West Kowloon Refuse Transfer Station
	2							1				
	3							1				
SCISTW-Location A1	1	Sunny	9:57	26.9	84.9	1.1	SE	0	NA	NA	NA	NA
	2							0				
	3							0				
SCISTW-Location B	1	Sunny	9:51	27.6	82.2	0.4	NW	1	Continuous	Downwind	Rubbish	Refuse Collection Vehicles for the West Kowloon Refuse Transfer Station
	2							1				
	3							1				

Monitoring Result of Odour Patrol

Location ID	Panellist	Weather	Time	Temperature (℃)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
SCISTW-Location C	1	Sunny	9:46	26.7	76.7	0.0	-	2	Continuous	NA	Rubbish	Refuse Collection Vehicles & Refuse Transfer Station
	2							1				
	3							2				
SCISTW-Location D	1	Sunny	10:00	27	82.9	1.9	S	0	NA	NA	NA	NA
	2							0				
	3							0				

Photo Record of Odour Patrol

	
OM_NP1	OM_NP2
	
OM_NP3	North Point PTW Boundary
	
OM_WC1	OM_WC2

Photo Record of Odour Patrol

<table>
<tr><td> 
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<tr><td>Wan Chai East PTW Boundary</td><td>OM_C1</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>OM_C2</td><td>OM_C3</td></tr>
<tr><td> 
</td><td> 
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<tr><td>Central PTW Boundary</td><td>OM_FM1</td></tr>
</table>

Photo Record of Odour Patrol

<table>
<tr><td> 
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</td></tr>
<tr><td>OM_SB1</td><td>OM_SB2</td></tr>
<tr><td> 
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<tr><td>OM_SB3</td><td>OM_SB4</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Sandy Bay PTW Boundary</td><td>OM_CB1</td></tr>
</table>

Photo Record of Odour Patrol

	
OM_CB2	Cyberport PTW Boundary
	
OM_WF1	Wah Fu PTW Boundary
	
OM_AB1	Aberdeen PTW Boundary

Photo Record of Odour Patrol

	
OM_ALC1	Ap Lei Chau PTW Boundary
	
OM_SCI1	OM_SCI2
	
OM_SCI3	OM_SCI4

Photo Record of Odour Patrol

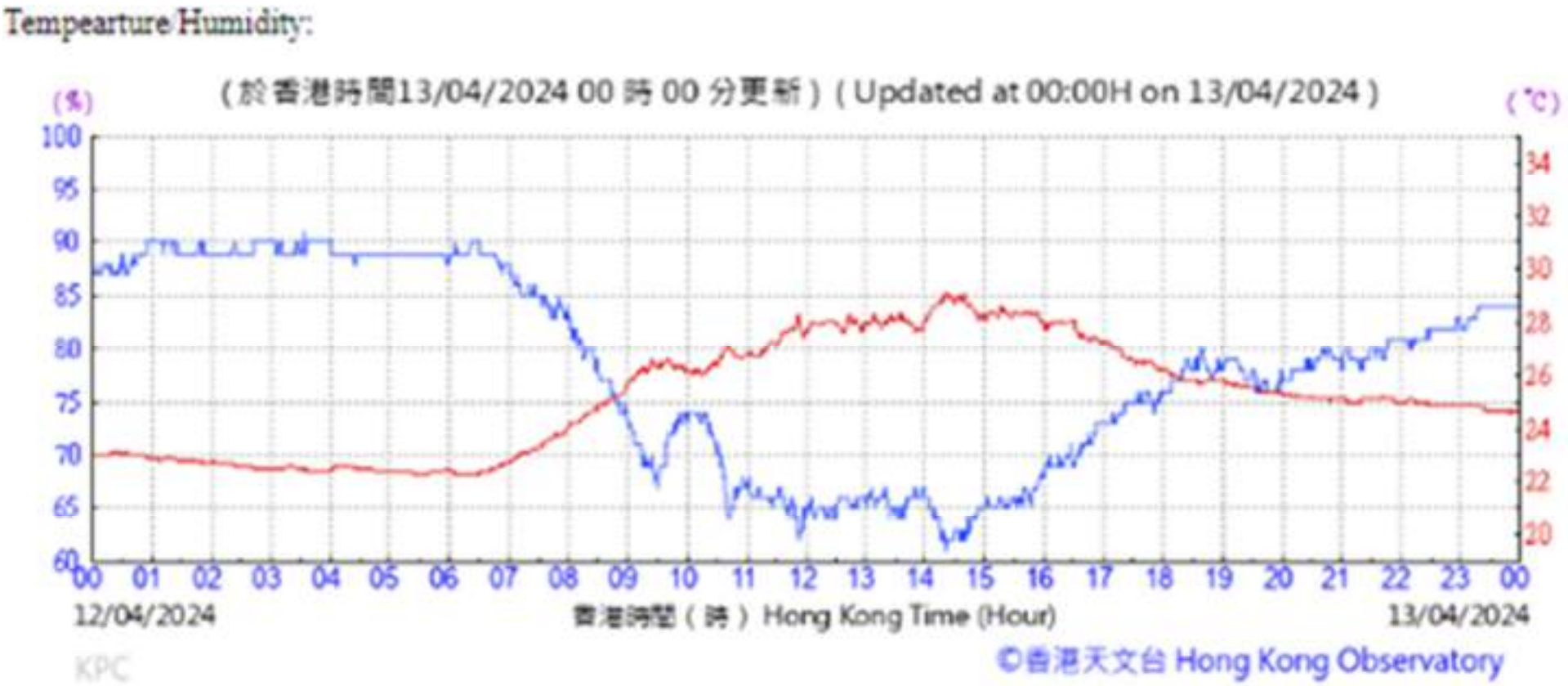
	
OM_SCI5	Location A
	
Location A1	Location B
	
Location C	Location D

Appendix D

Meteorological Information from the Hong Kong Observatory Station

Meteorological Information from the Hong Kong Observatory Station

- Temperature and Humidity



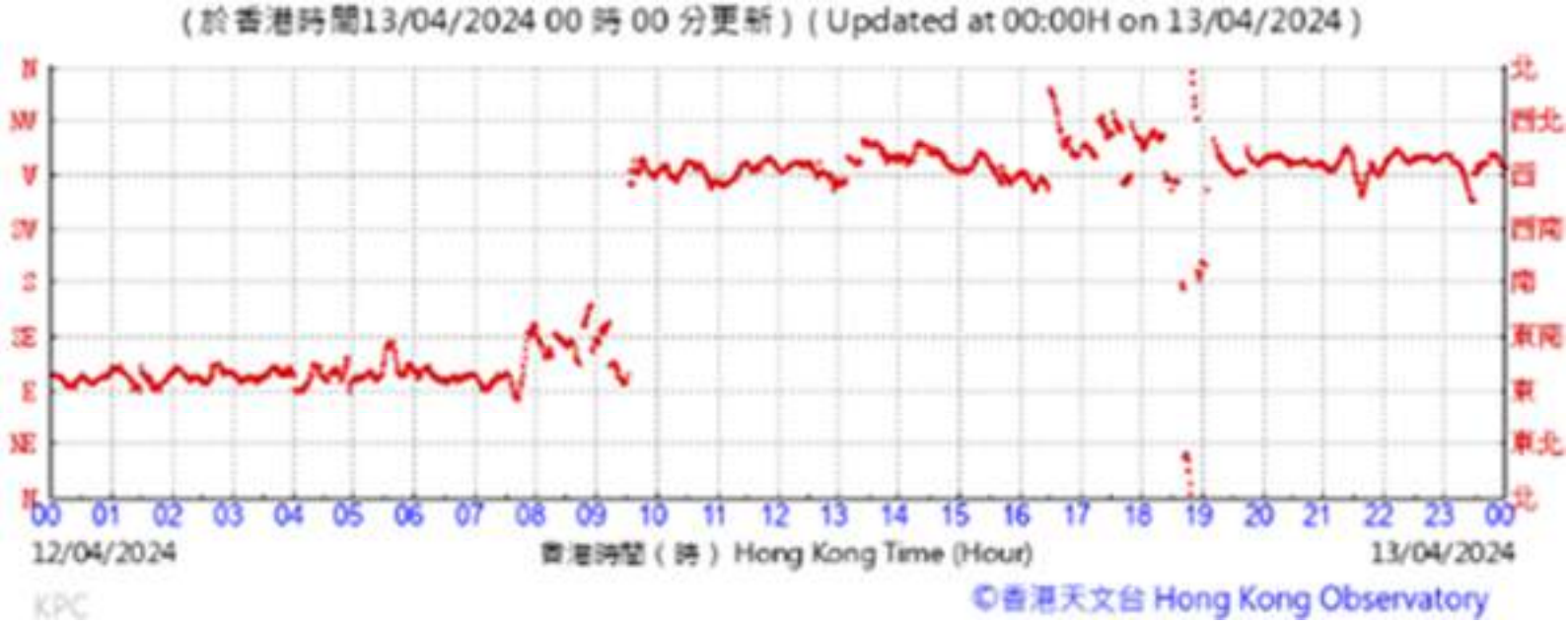
Reference from:

https://www.hko.gov.hk/en/wxinfo/ts/display_graph.htm?hko&

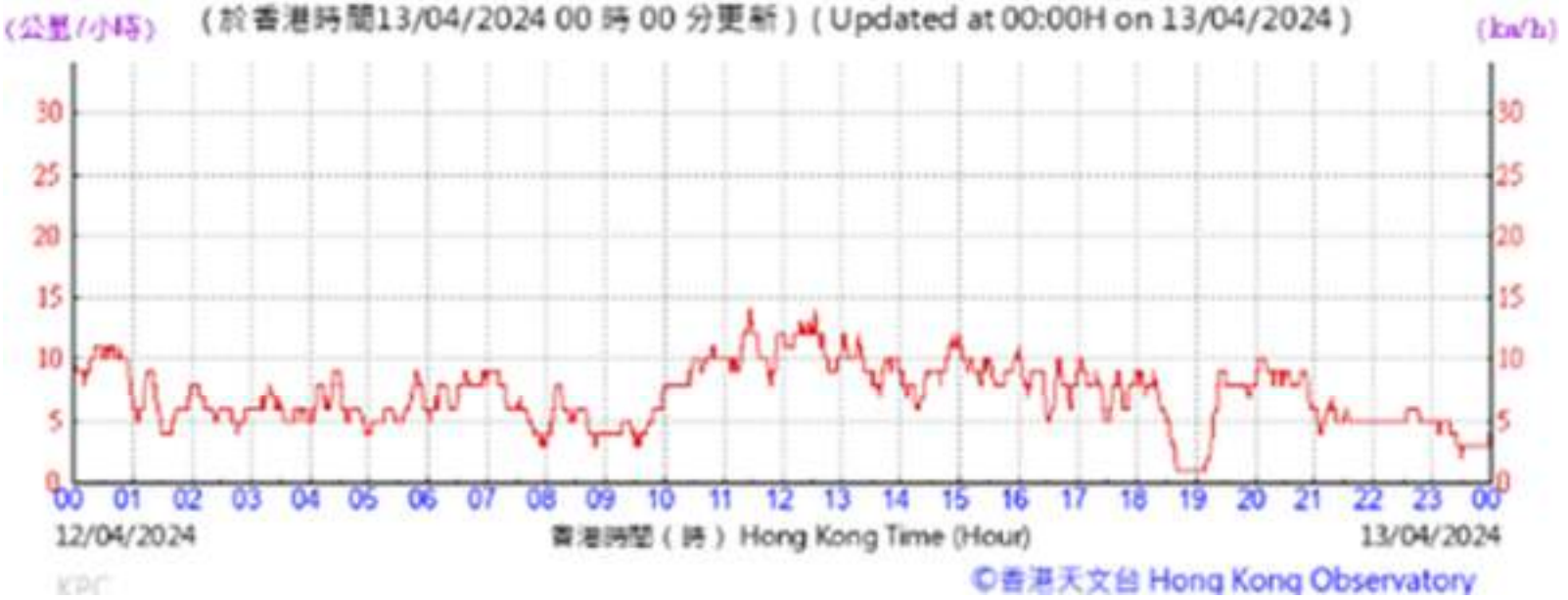
&

https://i-lens.hk/hkweather/daily_extract.php?date=2024-04-12

- Wind Direction



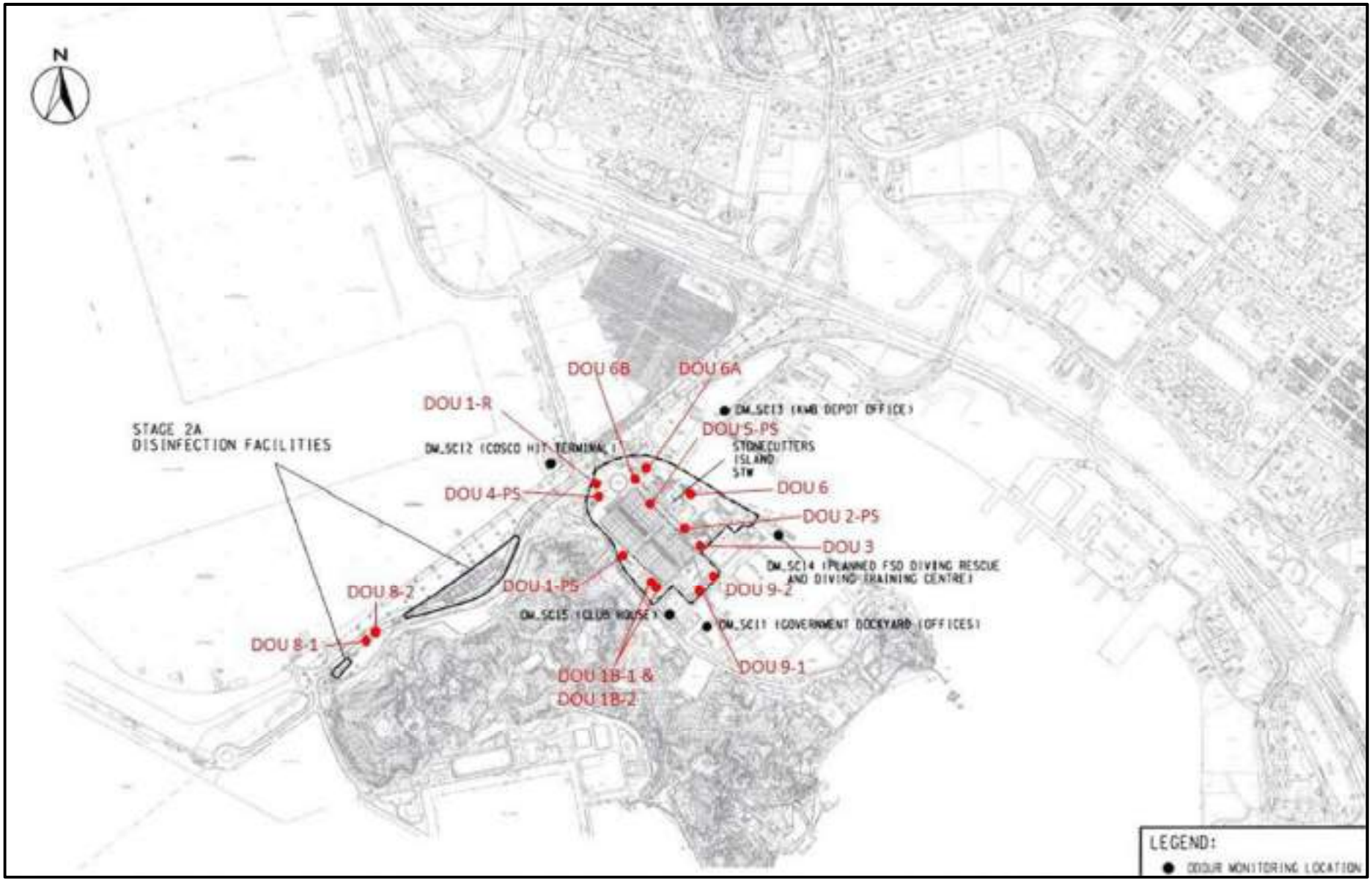
- Wind Speed



Appendix E

Layout of Odour Monitoring Locations for Odour Measurement

Monitoring Location of Deodourization Unit in SCISTW



Remark:

1. DOU 3 stated on map was replaced by DOU 2PS-ACF.

Sampling Location Photos

			
DOU 1B-1	DOU 1B-2	DOU 1-PS	DOU 1-R
			
DOU 2-PS	DOU 2PS-ACF	DOU 4-PS	DOU 5-PS

Sampling Location Photos

			
DOU 6	DOU 6A	DOU 6B	DOU 8-1
			
DOU 8-2	DOU 9-1	DOU 9-2	

Appendix F

Odour Measurement Result

Sampling Record - SCI STW

Sampling Location	Date	Time	Odour Concentration (OU_E/m^3)	H_2S Concentration (ppb)	Temperature (°C)	Humidity (%)	Wind Speed (m/s)	Wind Direction	Duct Volumetric Flow Rate (m^3/hr)	Odour Emission Rate (OU/s)
DOU 1B-1	12-Apr-2024	12:00	<11	<1	30.2	59	0.5	E	5,271	16
DOU 1B-2		12:15	<11	<1	30.2	59	0.5	E	5,308	16
DOU 1-PS		12:35	<11	<1	30.7	59	0.7	N	38,660	118
DOU 1-R		14:25	<11	<1	30.6	42	1.0	SW	2,567	8
DOU 2-PS		10:40	<11	<1	31.1	55	1.1	W	34,115	104
DOU 2PS-ACF		10:50	<11	<1	30.7	57	1.0	W	51,319	157
DOU 4-PS		14:00	<11	<1	31.1	50	0.5	SW	24,523	75
DOU 5-PS		9:36	<11	<1	29.9	59	0.5	E	13,481	41
DOU 6		10:10	<11	<1	31.4	55	0.3	W	37,923	116
DOU 6A		9:17	<11	<1	30.9	58	<0.1	-	25,356	77
DOU 6B		9:26	<11	<1	31.5	58	<0.1	-	21,874	67
DOU 8-1		14:45	<11	<1	31.5	46	1.5	W	4,468	14
DOU 8-2		15:03	<11	<1	31.6	44	0.7	W	4,674	14
DOU 9-1		11:15	<11	<1	31.4	55	1.3	SW	6,451	20
DOU 9-2		11:30	<11	14	31.4	56	1.3	SW	9,101	28
Total Odour emission rate (OU/s)										**871**

Appendix G

Total Odour Emission Rate Extracted from EIA Report

Facility	Unmitigated odour Emission Rate, ou/s	Deodourizer Requirement					Mitigated Odour Emission Rate, ou/s
		Deodourizer Discharge ID	Discharge Height, m	Total Discharge Cross-sectional Area, m^2	Discharge velocity, m/s	Total no. of discharge point	
Option 2 - Decentralized Design							
CEPT Facilities (Odd No. Units) & Flow Distribution Channel)	146162.21	S-O2-DO1	12	1.86	20	1	4384.87
CEPT Facilities (Even No. Units) & NWKPS + NWKPS O/F chamber	136086.21	S-O2-DO2	12	1.86	20	1	4082.59
Sludge TreatmentFacilities (include Sludge Storage Tanks, Sludge Dewatering Building 1 & 2, Existing and New Sludge Cake Silos)	19057.82	S-O2-DO3	6	2.40	12.58	3	571.73
Stage 1 MPS & Riser Shaft	6518.89	S-O2-DO4	18	1.13	12.28	4	195.57
Stage 2A MPS & Riser Shaft	6518.89	S-O2-DO5	18	1.13	12.28	4	195.57
NWKPTW	19963.88	S-O2-DO6	13	2.26	12.28	8	598.92
Flow DistributionChambers	2688.01	S-O2-DO7	4.5	0.32	10.48	2	80.64
New Flow Distribution Chamber							
Chlorination Contact Tank	37776.64	S-C-DO1	11	1.13	7.2	4	1133.30
Drop Shaft and Chamber 15A	2630.22	S-C-DO2	4	0.57	8.84	2	263.02

Note: (1) CEPT facilities include Influent upflow structure, distribution channel, flocculation tanks, sedimentation tanks and effluent weirs, drop shafts, scum pit and rapid mixing tank of sedimentation tanks

(2) MPS is Main Pumping Station

(3) NWKPTW, NWKPS and NWKO/F chambers are North West Kowloon PTW, NWKPTW Pumping Station and NWKPTW Overflow Chamber, respectively

(4) The emission rate included a 1.31 ambient temperature correction factor.

Total Mitigated Odour Emission Rate, ou/s: 11,506.21

Reference:

https://www.epd.gov.hk/eia/register/report/eiareport/eia_1482008/EIA/pdf/Text/S3%20Air.pdf